

**A Descriptive Research of drivers and stumbling blocks in the  
Sustainable supply chain: (Specially focused on the Indian  
Automotive Industries)**

Research dissertation presented in partial fulfilment of the requirements  
for the degree of **MSc Procurement and Supply Chain Management**

Griffith College Dublin

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28/08/2020

## Candidate Declaration

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I certify that the dissertation entitled: **A Descriptive Research of drivers and stumbling blocks in the Sustainable supply chain: (Specially focused on the Indian Automotive Industries)** that I have submitted to Griffith College Dublin for the degree of **MSc Procurement and Supply Chain Management** is the result of the my own investigations and that where reference is made to the work of others, due acknowledgment is given.

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## Abstract

This study outlined the main drivers and barriers of sustainability in the supply chain in the context of the automobile industry. For the profound understanding of how these practices are implemented, scholar proposed two research objectives to understand the measures that companies have taken on implementing sustainability and how farther are their implementation of different sustainable practices. This study involved five automobile companies with operations in different cities of India.

After systematic investigation of current literature in sustainable supply chain management, scholar noticed that there is a gap in research since there are significantly fewer studies on the drivers and barriers for the implementation of the sustainable supply chain. To achieve the objectives, the scholar selected qualitative research approach. By using a qualitative research technique, the scholar focused on getting complete information related to the sense of different firms' employees, such as purchasing manager or head engineer. With the help of semi-structured interviews, scholar obtained a thorough understanding of the drivers and barriers that firms face when an attempt to implement sustainable practices.

The results of the study disclosed that there are various motivators and barriers to sustainable supply chain implementation. Stakeholders such as customers and government were referred to by participants as driving forces for the association of sustainable practices in the automobile firms. Government policies and regulations are a powerful driver for enhancing sustainable practices for firms. However, the lack of policies may diminish the pace of sustainability. To be competitive in the global market, sustainable relations with all kinds of internal and external stakeholders is essential when implementing sustainability in the automotive supply chain.

**Keywords:** Sustainability, Drivers and barriers of sustainability, Automotive Industry, Implementation of sustainability.

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## 1. Introduction

Sustainable advancement is occasionally appreciated as an eventual value system to provide orientation for judgment making and activity in various situations. It can be observed as a framework for firms and their management to modify their duties for environmental, economic and social comportment into business processes within the authenticity of our society (Michael Mesterharm, 2006). As one specific example, the automotive firm includes a product structure that directly and indirectly pertains to economic asset production as well as effects on nature and human environment along with entire phases of the vehicle's life cycle (Warren et al., 2001). The automotive firm plays a crucial role in the environment and social progress of our globe in the subject of sustainability. They have to react to upsurge government regulations and environmental and social prospects by executing managerial strategies (Mei Peng Low<sup>1</sup>, 2016). Companies are encountered with an increasing fashion towards globalisation. Internationalisation empowers firms to work with various suppliers to get different parts and preliminary products. Every 1-Tier supplier frequently relies on a multilevel supplier chain for its manufacturing; this type of framework makes it more complicated to handle the entire supplier network (Winkler, 2011). The automaker has to assure that production of automobiles without any environmental damage and violate social requirements. This truth depicts a critical risk to a firm's reputation, and it is not appealing on sale in the market because it has to accept the duty for its suppliers ahead of media and NGO (Susana Azevedo, 2016). This research begins with the Introduction by stating the problem background. It also includes the research gap, research questions, purpose of study, and overview of the rest of the research's structure.

### 1.1 Choice of subject

I am a postgraduate student studying MSc. in Procurement and supply chain management from Griffith College, Dublin. I select this topic for my dissertation about Supply chain management and sustainability in the supply chain as I studied various modules related to services and supply chain management and sustainable procurement.



Additionally, I read information and news regarding this area, and as far as I think that implementing sustainability in supply chain management is a new fashion and demand for the market, which is value to be studied. As I completed my bachelor's degree in Mechanical and Automation Engineering, I completed my internship in an automobile company, and I am very much interested in automobile manufacturing, that is why I select the automotive industry for my research. To enhance my understanding, why automobile companies adopt sustainable practices and goals in their supply chain, I limited my topic to drivers and barriers in implementing sustainable practices in the automotive supply chain. I selected various automotive companies that are achieving sustainability in their supply chain for my study. Thus, I have interacted with companies from India, where I able to approach the management team for interviews. I presumed. It would be compelling and challenging to conduct my research with automotive industries that accepted sustainable managerial exercises in the supply chain. According to my research topic, I have selected various concepts such as Supply chain management, Sustainable supply chain, Green procurement, Corporate Social Responsibility, etc.

## 1.2 Problem

The automotive sector is the most significant and dominant industries in the world. It plays a vital role in the day to day human activities, by providing millions of jobs and impacting the environment, economy, and social activities worldwide. As the most significant manufacturing industry in the world, It deals with many challenges; depleting natural resources, air quality, causes climate change (Xia et al., 2015). WCED report (Brundtland report) introduced the venerable concept of sustainability, which stated that sustainability was essential and viewed as a merger of social, environmental, and economic factors(MRCGP, 1988).

Recently, environmental awareness is getting first popularity in the government and corporate worldwide. Green supply chain management has gained a trend in the past few years. It has noticed that the automobile production industry shift towards the more sustainable practices by applying different concepts like reverse logistics, using recyclable

parts in the products, by reducing the wastes, by producing more fuel economical cars. Brown (2008) outlined the use of outsourcing in the automotive industry for the environmental practices to be more competitive globally, reducing the cost, improvement of quality, increased profits and exploring the new markets (Brown, 2008).

As automotive supply chain develops globally, along with the different facing tasks of managing the logistics and international suppliers, but with the environmental awareness and long-term sustainability of associated business processes. Managers forced to resolve the issues related to the environment and social, not only for their firm but with other supply chain partners (Vachon and Klassen, 2006).

Greening has become gain popularity with time in every business to be competitive and effective in markets rather than just a concept or belief, which results in savings resources. Some studies state that the organisation shifted towards the Green supply chain management precisely because it is right to do for the environment. Still, other studies suggest that organisation initiate sustainability in their supply chain to make more profit and reduce costs (Sanghavi, 2015).

Supply chain management has changed significantly with time, the way of organisations to see themselves. Previously firms considered themselves as having customers and suppliers and did not recognise the potential of their supplier and customer to develop a partnership in the overall framework of supply chain management. In the 1960s and 1970s, firms start to work in the overall structure whose joint focus was on customer satisfaction. In 1992 in India, organisations began to adopt the best global managerial practices such as integration of purchasing, operations, distribution for better customer satisfaction and reduced service costs. However, other outside functions such as product development, quality, manufacturing, after-sales and supplier management were not integrated by organisations. This hindered them from responding quickly for the customer changing needs and competing with global players in Indian markets.

The automotive plan of India (2016-2026) is a collective effort of the government of India and automotive industry to develop the new path of evolution of automotive eco-

system by innovative regulations and policies which govern research, design, technology, testing, export/import, sale, repair and recycling of the vehicles, components and services. These objectives are the catalyst for achieving sustainable practices in these industries. Conversely, a decline is noticed in the sale of the vehicles last year due to the economic slowdown coupled with the inconsistent monsoon (GOI and Indian Automotive industry, 2016). The automotive industry is a significant supporter of the Indian economy, and it is responsible for more than 12 % of the overall economy. Automotive industries deal with social and environmental pressures from stakeholders due to globalisation (Zhu *et al.*, 2007). In the present situation, Indian automotive companies are at a spike pressure to shift towards green supply chain management due to prolonged globalisation pressure, government regulations and social awareness and standards. Therefore, Indian industries acknowledge social and environmental issues more seriously than ever (Kannan *et al.*, 2016).

### 1.3 Research gap

After a precise review of the current literature in Indian automotive sustainable supply chain management, it has noticed that there are some loopholes in research. Since there are limited studies on the drivers and barriers in implanting the sustainability in Indian automotive supply chain and also how managers do sustainable practices in the companies, therefore, the drivers, barriers and implementation of sustainability in the automotive industry are still under investigation. It will make successful accomplishment to sustainable supply chain management in the automotive sector by filling the research gaps in sustainability.

The performance of various Indian manufacturer has tracked using different performance indicators and sub-indicators related to green practices, green sourcing and procurement, green design (Sarbjit Singh, 2010). Sustainable practices in the supply chain have been in the spotlight by many automotive companies because of expanded awareness about the environment economy issues, and requirements which are related to the other stakeholders in the society (Brilhante *et al.*, 2017).

Although there are fewer researchers that researched involving drivers and barriers to sustainability in supply chain management, most of them mainly focus at studying sustainable practices in the automotive industry and how to measure the sustainability in automotive supply chains. Despite the increasing popularity of integrating sustainability into the Supply chain, the literature on this topic is still narrow, and most research is base on case studies for large automobile companies to explore their method to deal with sustainability issues in their supply chain work with the challenges related to the relevant sectors.

The truth that the present literature cannot adequately give an entire understanding of drivers of sustainability in the automotive sector, what are the barriers for implementing sustainability and how is the implementation going, In sort the research gaps are:

- Limited research about the drivers and barriers of implementing sustainability to the Indian automotive sector.
- Limited studies have addressed the issues in Sustainable supply chain in the Indian automotive sector.

#### 1.4 Research objective

This research paper outlines how to resolve the challenges and reduce the impact of the automobile industry on the Indian environment (According to the world quality air report 2018 India comes under the top four most polluted countries (Enrico, 2019)), globally and on the economy. Sustainability is a concept of economic development without the depletion of natural resources. Many automobile industries have already moved from traditional supply chains to the sustainable supply chain in past years to compete with the global players. However, still, they lack a lot. This study pursuit of administering a broad view of objectives elaborated below:

- To investigate drivers and barriers in sustainable automotive supply chain
- To compare the drivers and barriers with each other

These are the objectives of this research which will be followed in the future for a better understanding of the drivers of the GSM (Green Supply chain) in automobile manufacturing, and identifying the reasons why this industry still struggling in achieving its sustainable goals, what the manager can do in the future for the better implementation of the sustainability what strategies should use in different steps of the supply chain, what type of R&D still needed to achieve the triple bottom line.

### 1.5 Purpose

The automobile sector is more dominant, large, and diverse than the rest of the industries. Over 15000 components require to manufacturing a vehicle, which means thousands of suppliers, a large number of processes, complex logistics, creating wastes intones. Therefore, the products of this industry impact our daily life by providing mobility to a million people but also create challenges. The depletion of the air quality in the local region, along with global issues such as climate change and treatment of the scraped vehicles are some challenges. Additionally, economic challenges in the automotive industry are notably over-capacity, saturated and fragmenting markets, capital intensity, and having problems in achieving adequate profits (Orsato and Wells, 2007). These challenges need to be reduced and removed for the betterment of a healthy society, economy, and business.

The primary purpose of this exploratory dissertation is to improve the implementation of sustainable practices in the Indian automotive industries by investigating the stumbling blocks and drivers of sustainability. As sustainability is a concept which cannot implement in just a month, but it takes years to achieve sustainability practices, and continuous improvement is needed. On doing a regular investigation of operations in the supply chain to identify factors which hinder and accelerate the sustainable goals. By improving the understanding of the motivation and requirement of supply chain managers, there can make quick and informed decisions in the response of challenges and issues they face to attain sustainability. This research undergoes with the perspective of professionals who are working in the automotive supply chain. The study follows the inductive approach and

used semi-structured interviews with the professionals in the supply chain in the geographical boundaries of India. This research spotlights the impact of neglected barriers and drivers of sustainability and innovative ways of attaining sustainability.

## 1.6 Structure of the study

This dissertation study is a combination of 5 chapters which construct the structure of research in an orderly trend. The origin of this dissertation initiates with an Introduction chapter, which states information in a compiled manner for the topic to be investigated. A brief report of the study is underline here, which comprises purpose and inspire for which the research has been done. Also, It consists of the different aspects of business where sustainability helps to flourish the supply chain.

The second division is a literature review which starts with the description of various terminologies and concepts which are comprehensive in the supply chain industry and directly or indirectly effects of sustainable practices. The arguments support each theory, and other researchers file the related study. The secondary data is collected via an online database of research articles and sustainability reports of Indian automotive industries, google scholar, research gate, science direct. This section also explains the necessary drivers and barriers of sustainability in Indian automotive supply chain, and It consists of a proposed conceptual framework is the result of the relevant and critical literature examination.

The third chapter is the research methodology consists of the successive section of the research. It shows light on the approach of research philosophy, the research strategy, which is the overall structure to do the ongoing investigation. This chapter also defines the way of primary data collection and sample size of data collection. It also states the details of the tools and techniques of analysis of collected data to achieve the objectives of the study. Additionally, it depicts the selection of the participant and the interview technique to conduct the research.

Presentation and findings formulae section is next chapter which illustrates an overall result of research concerning the drivers and stumbling blocks of the sustainable supply chain in the Indian Automotive sector. The gathers primary data correlates with secondary data to find out the findings of the research is also included in this chapter.

The final chapter is conclusions forms which direct the conclusion of findings concerning investigation and research that undertake.

## 2. Literature Review

This chapter depicts an understanding of intellectual concepts, published journals, research papers & collegiate writings which have advanced the scholar to learn an understanding of the topic at hand. The information search from an ample pool of scholarly & global business database online and offline. The study gives a significant allocation of literature and the various mode of data on which research depends.

### 2.1 Indian Automotive Sustainable Supply chain perspective

The complication of the automotive supply chain can estimate with the idea of the fact that a typical vehicle consists of more than 15000 components with many sub-assemblies. The automotive supply chain consists of a myriad of Tier1, 2 and Tier 3 suppliers with various assembly operations and dealerships. Customers expect for advance configurations and innovative features which need a high level of response from automobile supply chains. Due to increasing international trade, the whole supply chain activity has become very complicated with manufacturing in one county, supplier in another country. The order completion time required by a customer is commonly at four to six weeks in the automobile industry, and there is an explicit correlation between the implementation of SCM practices and quality and conformation of design (Balasubramanian and Shukla, 2018).

In the international market, Toyota's manufacturing reverse lean objectives has long since been a benchmark progression in the automotive industry, which improve the supply chain. It can say that supply chain must be altered according to the need of product manufactured(Harvey *et al.*, 2013). It is so vital that the Indian automotive sector coordinates their supply chain practices with business strategies to be more competitive in a new market. The enormous scale growth of economic cycles, recession and recovery, build astounding pressure on the effectiveness of entrenched supply chain in the automotive industry due to its widespread association with other sectors.



In the last two decades, automotive firms have started to decline their vertical integration, curtail their suppliers. They shift towards openly announced strategic partnerships to achieve strategic aims, for example, target on core competencies, steady improvement and advancement in critical performance areas. They have increased the dependency on their suppliers which forces them to develop more effective supplier management to accomplish long-lasting aggressive advantages(Trent and Monczka, 1999).

The carmaker has faced fast technology changes that require higher supplier competence, as well as active manufacturer-supplier association. Due to the dominant of supplier reduction policy, the dependency of the automotive industry on outsourcing of supplier also increases(Hussain, 1999), roles, for example, design, inspection and final assembly. Previously these roles belonged to the carmakers, which now shifted to their suppliers (Lamming et al., 2005).

Therefore, the interrelationship of buyer and supplier upsurge as the value created by suppliers increases day by day with the outsourcing. However, suppliers enhance their abilities and escalate business volume, which results in carmakers purchases accounted from suppliers more than 60 percent(Mclvor, 2010).

## 2.2 Factors which help in Implementation of the SSCM

As the condition of the environment in India, an awareness of sustainability should be indulged in every manufacturing industry so that every sector should try to achieve sustainable goals in their business. A broad view of sustainability incorporates the approach of economic, social, and environmental performance. The automotive sector, one of the largest manufacturing sectors in India, significant growth of the automobile sector can be seen in the past five years, and they regularly try to achieve sustainability goals.

Sustainable automotive SSM involves the method for findings and providing innovative products and services that will reduce the resources intake; dispose of toxic substances; introduces the zero waste strategy to decrease greenhouse gases across the overall life

cycle of the goods and services. Garg (2014) explained various drivers of the Sustainable SSM in the manufacturing Industries. According to Garg, there are nine different types of drivers that can enhance sustainability, which includes the government policies and regulations which ensure that all the Automotive SSM should consist of the green goals in their procedures(Luthra et al., 2016). Manufacturing firms should include of CSR (Corporate, Social and Responsible) strategies in their business and processes so that they can attract the International market and stakeholders and they can set a right image in the front of the world. Automotive industries should also maintain a sustainable culture in their company So that employees can attach sustainability emotionally and they can understand the importance of balancing the economy, social equity, and environmental accountability(Choi et al., 2004).

The main drivers of sustainability in a supply chain are Green sourcing and procurement, Green manufacturing, Green Warehousing, Green Distribution, Green Packing, Green logistics.

These six can be the significant drivers of sustainability and help the firm to make their SCM more sustainable and giving the competitive edge on a global level. They can also attract other manufacturers to motivate their SCM partners to do the same (Dube et al., 2011).

Additionally, SCM is not only supporting the social, economic and environmental benefits, and sustainability can convey additional advantages to all stakeholders. As a longstanding profit, it will facilitate to gain value for spending by including the overall life-cycle cost of goods, serviceability and increased resource efficiency. Green supply chain assists in strengthening environmental performance reduction of wastes and gases emissions and helps in enhancing productivity by improving quality and leaning. Sustainability is an essential strategy which allows firms to perform better than their competitors and developing the overall performance (Al-Odeh and Smallwood, 2012).

During an investigation, scholars found the occurrence of thirteen pressures and impetus for the automotive industry and other industries in China. The outcoming states

that the automotive industry has most drivers and barriers in comparison to other manufacturers. Rules compliance indicate that the primary stress on Chinese carmakers is the entry of China in the world trade organisation. Result tells that the carmaker in china in scoring more good competitive advantages and environmentally friendly responsibility, which is a driver to a sustainable supply chain management(Zhu and Sarkis, 2006).

By implementing sustainability in their supply chain firms can create value for all their stakeholders. Stefan Seuring argued that large customer firms faced much pressure to achieve sustainability in their SCM; this pressure can be from the government, customers, and stakeholders' sides. Sometimes companies have to implement sustainability, and they force their outsourcer and suppliers to do the same because they want to set the standard to continue the customer's and stakeholder's loyalty (Beske and Seuring, 2014).

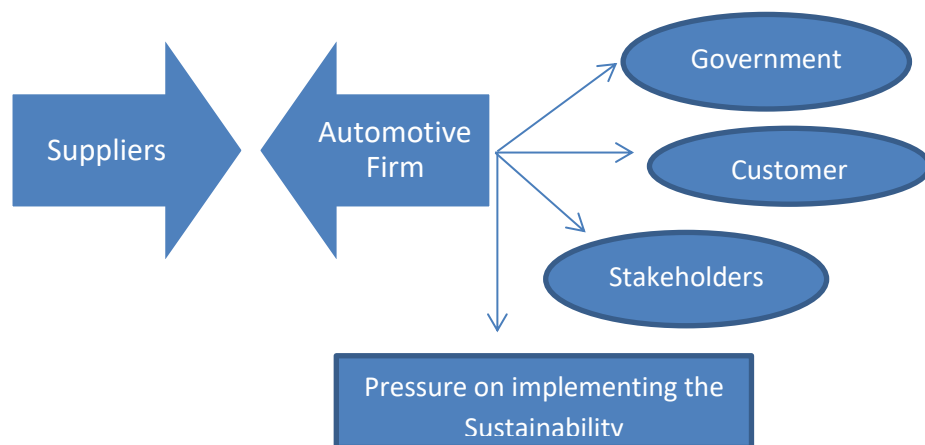


Figure 1: Pressure on Implementation of Sustainability

### 2.3 Sustainability and Business value

According to Blythe Chorn, supply chain sustainability is the managerial practices of environment, social and economic effects and assistance of good governance practices, all over the life-cycles of goods and services. The green supply chain aim is to construct, safe and advance stable environmental, social and economic profit for all stakeholders engaged in escorting products and services to market(Blythe Chorn, 2010).

Some scholars suggest that conceptually supply chain overspread directly or indirectly,

the overall physical process from getting the raw materials to the product reaches to the customers. Besides, this information flows through the entire process also include in the supply chain. All the manufacturer, suppliers, transporters, warehouses, retailers and customers include in supply chain management (M. Tay et al., 2015)

There is a direct relationship between adopting sustainable practices, and the brand image of a company in the global market, the reputation of a company will increase. If, they will shift towards the green SCM. In most of the Indian states, the economy foundation empowers by the small and medium SME's So, and their supply chains need to modify from traditional to sustainable by the initiation of the green procurement (Testa et al., 2018). In various manufacturing firm's management concern about the engagement in the sustainable initiatives reduce the profit of the firm at the liability of actual environmental attainment (Singh and Thakar, 2018).

Supplier management system entangles with planning, improving, controlling, monitoring firm relationships with existing and potential suppliers. Additionally, It also coordinating the excellent flow of exceptional quality, value for money materials from a comfortable group of inventive suppliers to manufacturing firms (Aguazzoul and Ladet, 2005)

For the past 30 years, an environmental movement inspired all successful and big firms, which is known as Sustainable development. Sustainable development defined as the future generation's need counterbalance with the unmet need of the present world. It includes three classifications: economic, environmental, and social goals which are interlinked. Sustainability also impacts how to do business, how to buy, even in selecting the leaders. Environment sustainability, is the leading solution to reduce the SCM challenges, is defined as fulfilling the demand of the present without hindering the future generation's ability to meet their demand (M. Y. Tay et al., 2015).

SMEs involvement in forming the economic infrastructure of India is vital. Therefore, Indian SMEs have to advance their supply chains from an eco-friendly sustainability point of view by changing their previous Supply chain management into green by starting some

green initiatives. for example, purchasing strategies, logistics functions, waste management etc. (Mudgal et al., 2010).

## 2.4 Drivers of supply chain sustainability

In the process of endorsement of green initiatives in the traditional supply chain, some problems can foresee due to conventional evolution. These problems are known as barriers, and firms must know the ways to deal with them(Govindan *et al.*, 2014).

The essential purpose of sustainable supply chain management is to upsurge the amount of efficient output, which includes finished goods, used raw materials, utilities used, money invested and leaning waste during the manufacturing process. The primary activities of the sustainable supply chain are green procurement, production, storage, distribution, packaging and logistics (Bhateja et al., 2012).

In an investigation, scholar investigates that many firms believe that, the reputation of firms and their brand image enhanced with the adoption of green initiatives. They take more than 5000 managers from the organisation in seven different countries. Although the result comes positive in the perspective of the improving reputation and brand image of a company, this did not imply that increasing efficiency also promotes Sustainability (Cosimato, 2015).

In 2009 Eltayeb and Zailani described the critical motivator of SSCM and found a relation between green trend and supply chain, which gives four conclusions such as; environmental, cost reduction, economic and intangible outcomes (Green et al., 2012).

## 2.5 The critical supporter of sustainable supply chain management

Drivers which are differentiated as motivators are prominent to the improvement of sustainable practices in the supply chain, and they can come from internal and external constrain. Government regulation, media, customers and company's CEO are the ones who can create such pressure on the organisations and indirectly imposing them to compute sustainable supply chain practices into their systems. A constructing sustainable

environment is not a prominent individual factor for a firm to follow the contemporary movement of the sustainable supply chain(Law and Gunasekaran, 2012).

Drivers can farther divide into many categories, the green supply chain includes diverse concepts, for example, social or social sustainable supply chain, where firms seek to reduce negative social impacts in their supply chains. Organisations contradict in what demand them to employ in Green practices; some organisations engage in sustainable practices in the influence of their top management whereas others engage in due to external pressures such as stakeholders, customer requirement and global demands (Walker and Jones, 2012).

According to Freeman's stakeholder study, organisations acquire amenities to their shareholders and other stakeholders (McWilliams *et al.*, 2006). The academic papers of business sustainability have a purpose of defining the attributes of the interrelationship between profit performance and economic or environmental performance. Meanwhile, the use of both factual and expressive types of research aims to inspect the connection hypothesised and to examine further how companies approach the business sustainability in practice, respectively (Salzmann *et al.*, 2005).

## 2.6 Promoters of Sustainable supply chain management

Some of the promoters of SSCM are the government policies and regulations which the government imposed on firms to improve the environment. Top Managers who want to include the sustainability in their business, corporate image and brand value, market tendencies, the participation of the employees, building sustainable culture in the organisation.

Olugu discovered divided the whole manufacturing process of the automobile industry into three interrelated tasks; Upstream, Internal stream, downstream. For the application of SSCM, the inclusion of environmental criteria in upstream which includes a selection of the supplier and specifications of components, the internal stream consists of the assembling of vehicles and different testing with minimum use of natural resources.

Downstream of the organisation should be responsible for the disposal of the waste, sale of extra stock, after completing the life of the vehicle recycle the components of a car and reuse them in future manufacturing (Olugu et al., 2011).

## 2.7 Drivers to SSCM

Muhammad Amad Saeed outlined two types of factor which can drive sustainability in a Supply chain. They can be internal (Market pressure, societal pressure, Regulations pressure) and external drivers (Corporate Strategy, Organization's culture, organisation's resources, organisation's characteristics) which influence the organisation. These motivators or influencers can motivate and pressurise an organisation to implement sustainability in the supply chain. Different drivers affect the supply chain's goals differently (Saeed and Kersten, 2019). He farther states that dealing with risk in an organisation is very crucial in organisations that contain value associates with customers and for an organisation that earn their value from brand perception and reputation forecast (May Alzawawi, 2014).

Researches state that some drivers result in the acceptance of green supply chain movement. Some encouragements regard as internal, which include the firm related factors, and this enhances the firm's capacity to develop the risk management capabilities to reduce any uncertain threats. Internal drivers also contain the association with suppliers to find eco-friendly materials and equipment to deduce the ecological publicity (Zainudin *et al.*, 2014). A notion by a scholar reveals that the aspiration to reduce costs is an internal motivator for eco-friendly SCM (Aslam *et al.*, 2018). Every organisation has the inspiration of compressing their spending to produce profits. Without sustainability into supply chain processes is sure for a firm to diminish their budgets.

In some organisations communicate with the supplier and find more environmentally friendly materials and equipment to reduce the environmental impact, easily recyclable, and disposal wastes. In some organisations, the managers indulge the sustainability in their supply chain, and good leaders can motivate their employees to make a sustainable culture in the company. Motivated employees give the best result in the implementation

of the GSCM. Adopting sustainable manufacturing techniques also helps in improving the efficiency and quality of products but this required training of staff.

Motivated staff members perform a crucial role in compelling advancement and implementation of best practices. Sustainability also gets improved by accepting an eco-friendly management system. Motivation in GSCM may result in organisation competitiveness and help to manage provincial and environmental risk. Considering more typically at sourcing and supply function, firms can improve abilities is essential and determining a sustainable strategy is of benefit.

There is an interrelation between the quality and environmental practices that mean if a firm wants to improve the quality of its product, then they must follow the sustainable goals such as; elimination of the wastes and continuous improvement. In other words, a firm that tries to improve its sustainability automatically also works for the quality of the product (Pil and Rothenberg, 2003). Besides, the scholar depicts that investor usually plays as an encouragement tool to improve strategies that are already adopted by a firm. Due to the continuous pressure from investors, It has been noticed in the improvement of environmental regulations (Trowbridge, 2006).

Sustainability is a progressively important issue for the government due to global problems like global warming, change of the climate. As the mother of the all drivers legislations leave no other option for a company to comply with it or exit the market. Legislations can also use general environmental rules made by the government. For Example, Government can also make some regulations so that company will take responsibility for disposal their waste and start to use those items which can be recycled and reuse in the future manufacturing after completion the life of products (Mann et al., 2010).

Besides the internal demand that leads to the association of green practices into supply chain processes, some external factors played a vital role in this investigation of sustainable practices. These drivers are from outside form the organisation but have a significant impact on the company's internal functions. It incorporates demands that each



firm should fulfil due to maintaining their reputation, brand image and social welfare. These drivers indebted firms to build social and environmental alertness into their supply chain management and other business functions. Therefore, organisations have to prepare new managerial tactics for their progress. Foreign drivers are primarily are stockholder pressure, government regulations, customer, competitors, society and their partners.

External Drivers of the SSCM are those drivers which push the organisation towards sustainability. The big firms can drive sustainability to their small suppliers. In SSCM collaboration with the suppliers and other partners, for example, if a big firm wants to achieve sustainability, they can push their goals on their logistics partners, outsourcers, R&D department. External factors are those factors which forcefully enable the sustainable goals in their new management goals. For the past decades, because of the cost-oriented outsourcing trend, External stakeholders expect social and ecological production from the major buying firms( Mofokeng and Chinomona, 2019).

External factors which can force a firm to do sustainable practices arrive from a variety of stakeholders. Large firms can influence their suppliers to meet GSCM activities and put pressure in the supply chain. The government can impact their regulations and policies. The non-government organisation can play a crucial role in constructing awareness and squeezing organisations to follow green supply chain practices (Foerstl *et al.*, 2015). It has cited in papers that sometimes due to cost-effective outsourcing, been getting famous in the last ten years. External stakeholders, for example, customers, competition, hope the prominent purchasing organisations to ensure social, economically and environmentally friendly production at their supplier's sites. Therefore, any irresponsible supplier activities can spoil the brand image and reputation of purchasing firms sometimes, which can result in expensive legal obligations (Carter and Jennings, 2004).

The growing dependency on a global supply chain enlarges the requirement for supply risk management and in precise for aggressive management of supplier sustainability risks. Risk administration plays a vital role in dealing sustainable supply chain at the

supplier. Firms can look after themselves form abeyant supply chain disruption or cut off related to suppliers. Human rights, labour law, environmental and governmental rules are ensuring suppliers active compliance activities and robust management systems housing entire field of the global compact regulations (Wagner and Bode, 2006).

## 2.8 Barriers to SSCM

Mee Yean Tay (2015) in his review he discussed on the size of the organisation in adopting the SSCM, the firms which are more significant in size are more likely to choose the green practices as compared to the smaller one. The size of the firm is one of the substantial firm characteristics to which influence the adoption of sustainability (M. Tay et al., 2015).

As small and medium-sized manufacturers encounter many barriers if they try to achieve sustainability as there is a sufficient cost invested in sustainable practices. Comparatively, larger firms are more influence to adopt SSCM. Similarly, suppliers with more giant footprints are more indulge in the SSCM as compare to the smaller ones. Barriers exist both inside and outside of the organisation. Some of the internal walls are the cost, lack of understanding of how to do green procurement, lack of management commitment, sometimes resistance of change by the employees, lack of legitimacy. Some external barriers are weak supplier commitment, unwillingness to exchange the different information sectors have various problems(Walker et al., 2008).

Combining the sustainability path with the traditional supply chain management is a sophisticated process(Linton et al., 2007). Small and medium organisations pursue to enhance more eco-friendly sustainability, and They deal with a mixture of stumbling blocks which are less critical or tenuous when comparing to the large corporate firms (Hadley and Herren, 2010). Scholars state that various barriers in the process of managing the supplier relationship in the approach of environmental discussion and analyse that the work of the society is not sufficient in the evolution of sustainability (Preuss, 2009).

Researchers classify the barriers for SSCM into five main areas: investment increases, rationalisation of sustainable improvement, improving perception and ethos, pressure in dealing and administration of unpredictability and establishments, and the complication of challenges (Abbasi and Nilsson, 2012a). Some scholars introduce conflicts that the automobile firms can deal in the improvement of sustainable practices in their supply chains and emphasis on communal and moralistic duty. Although investment and earnings are still the primary drivers in the advancement of the supply chain, and most of the research depicts that it must compensate for being sustainable (Abbasi and Nilsson, 2012b).

The conjunction in the supply chain across association in deference to sustainable ambition can conclude in various cost-saving activities: collective waste contraction, profitable and eco-friendly solutions to manufacturer and operation problems. The interrelationship of sustainable practices inside the supply chain is an essential method for broadcasting customer demands (that include environmental issues) to suppliers (Bartholomew et al., 2007).

Planet-friendly regulation is an adequate gadget to empower companies across their supply chain to neutralise the impacts of their adverse processes (Carter and Jennings, 2002). On the other hand, consent with green regulation compels the supply chain managers to execute probably expensive adaptation techniques that can impact their artfulness and benefits as much as they reconstruct manufacturing methods and systems. Therefore, a firm's reaction to fines and penalties for dissension can base on how firm see that pressure either in pressure. If they take them as contingencies, it can support firms to focus on long-lasting sustainability. The drivers in the supply chain can conduct and distribute the advantage among contracts, society and partner agreements, which can consequence in the improving effectiveness of all partners. In a giant firm, the supply chain partners work together cooperatively with long-term aims and which inturns a win-win strategy (Mutumi and Simatele, 2017).

According to research by Shaikha Al Zaab (Zaabi et al., 2013), some of the barriers of SSCM in the Indian automotive firm are:

- The too-high cost of disposal of waste.
- Cost of environmental packing.
- Lack of clarity regarding the sustainability.
- Cost of the sustainability and economic conditions.
- Complex in design to reduce the consumption of resources and energy.

The cost of the adoption of the triple bottom line, capacity constraints, lack of funds for sustainability practices, and green power shortage is the significant barriers for a firm to adopt the green goals. All of those barriers are the main reasons for the firms lacking the SSCM. Due to lack of infrastructural capabilities, some of the organisations do not show their interest in implementing the SSCM. Sometimes reverse supply chain is robust and costs taking without the contribution from the end customers. Support is needed from every member of a supply chain if an organisation wants to implement the SSCM. The organisation also includes the CSR in their values, missions, strategies, and in their approach, to motivate the other employees and supply chain partners to gain the attention of every person who is related to their supply chain, for the actual implementation of the SSCM (Shibin *et al.*, 2020).

The most significant barrier to the eco-friendly sustainable improvement of firms is the evidence that destructive and contaminated products are comparatively cheap in value because eco-friendly costs do not add to the price (Revell and Blackburn, 2007). It is debatable that duplication on sustainable actions increases the likeliness of beneficial exploitation. Community conflicts and civilising differences are also prominent barriers in the endorsing of sustainable practices is non-profitable in firms, and it needs more investment (Reinhardt, 1999). Revell mentions some obstacles in implementing the sustainability in the supply chain in his research those are improper understanding, inadequate resources and tools, due to anticipated time, price and raw material required, and unbelief of the business profits (Revell and Blackburn, 2007).

According to Harwood, one of the biggest challenges while making a decision on the amount of money that should invest in the CSR activities relating to the supply is acquiring the data and finding an approach in CSR (corporate social responsibility) of a firm. Twenty percent of the firms viewed the sustainability issues as their supply chain risk, and 25 percent of the firms required suppliers to adhere to social and ecological standards to mitigate supply chain risks (Harwood and Humby, 2008).

## 2.9 Conceptual Framework

The conceptual framework communicates the investigators see in the progress of the flowchart way. It drives about as a type of perception for the different scholars to take up an idea of examining subject. Individual research has described their exclusive interpretation and knowledge of the conceptual framework. An assimilated view on the problem is described in a theoretical system (Liehr and Smith, 1999). The two scholars describe the importance of the conceptual framework (Adom et al., 2018).

According to my research, there is not much remaining literature on the topic. To construct the development of the conceptual research framework is presented. Implementing sustainable practices in any organisation is no easy. A descriptive analysis of SSCM in the automobile industry is as follows: (Masoumi et al., 2019).

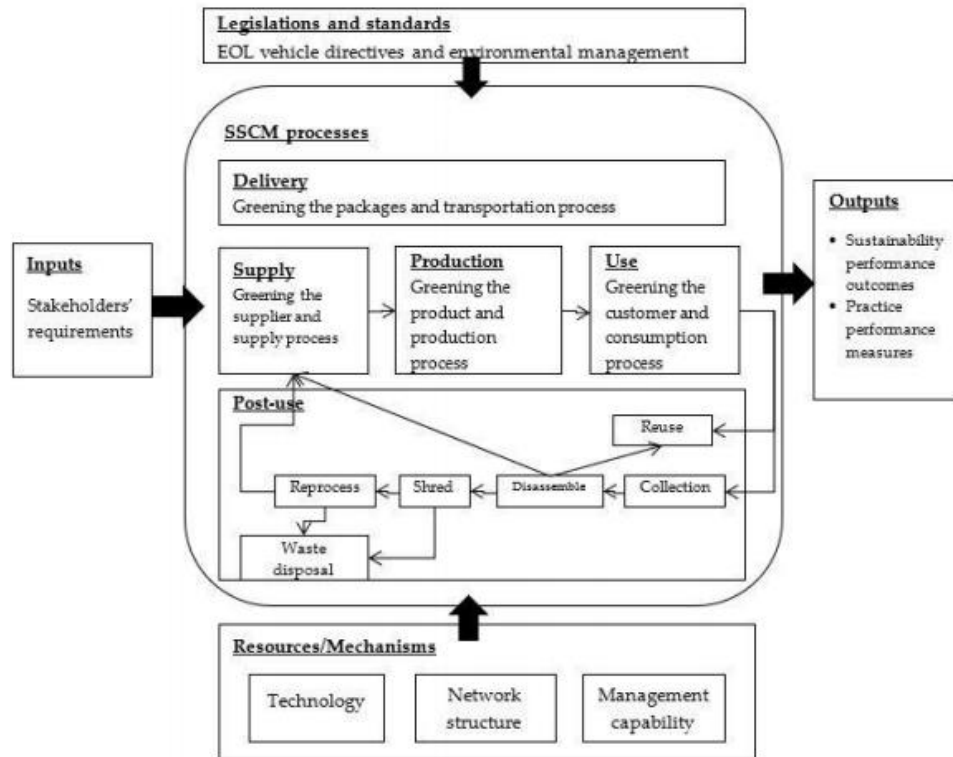


Figure 2: SSCM in the Automobile Industry (Masoumi et al., 2019)

The above figure shows that how sustainability works in different levels of the automotive supply chain and almost all automotive manufacturing firms try to achieve sustainable practices in their various stages of the supply chain. SSCM integrates environmental attention into the supply chain management, along with product design, making processes, outsourcing activities, and delivery of the automobile to customers as well as recycle of the product after the life-cycle end. It also indicates that the control of sustainability starts with product design and ends with the disposal of the product (Miller, 2008). SSCM practices define by various names, including green operations, environmental initiatives, SSCM competencies, strategies, tools (Teixeira, 2016).

The research includes the analysis of the automotive industry in India, and the sample selection is according to three leading automobile manufacturers in India. Recognition of drivers and barriers of the SSCM is a necessary measure that needs to be accomplished by automobile organisations to identify their potential opportunities and risks in achieving the SSCM. This gives a chance to the organisation in forecasting the

problems and avoid the failure of SSCM. Moreover, analysing the drivers and barriers to sustainability is the first step in measuring the performance of SSCM (Narimissa et al., 2020). Silvestre discussed that internal and external drivers and barriers empower the supply chain to find new opportunities in the business market place to improve its SSCM achievement and create new solutions for sustainable supply chain models (Silvestre, 2016).

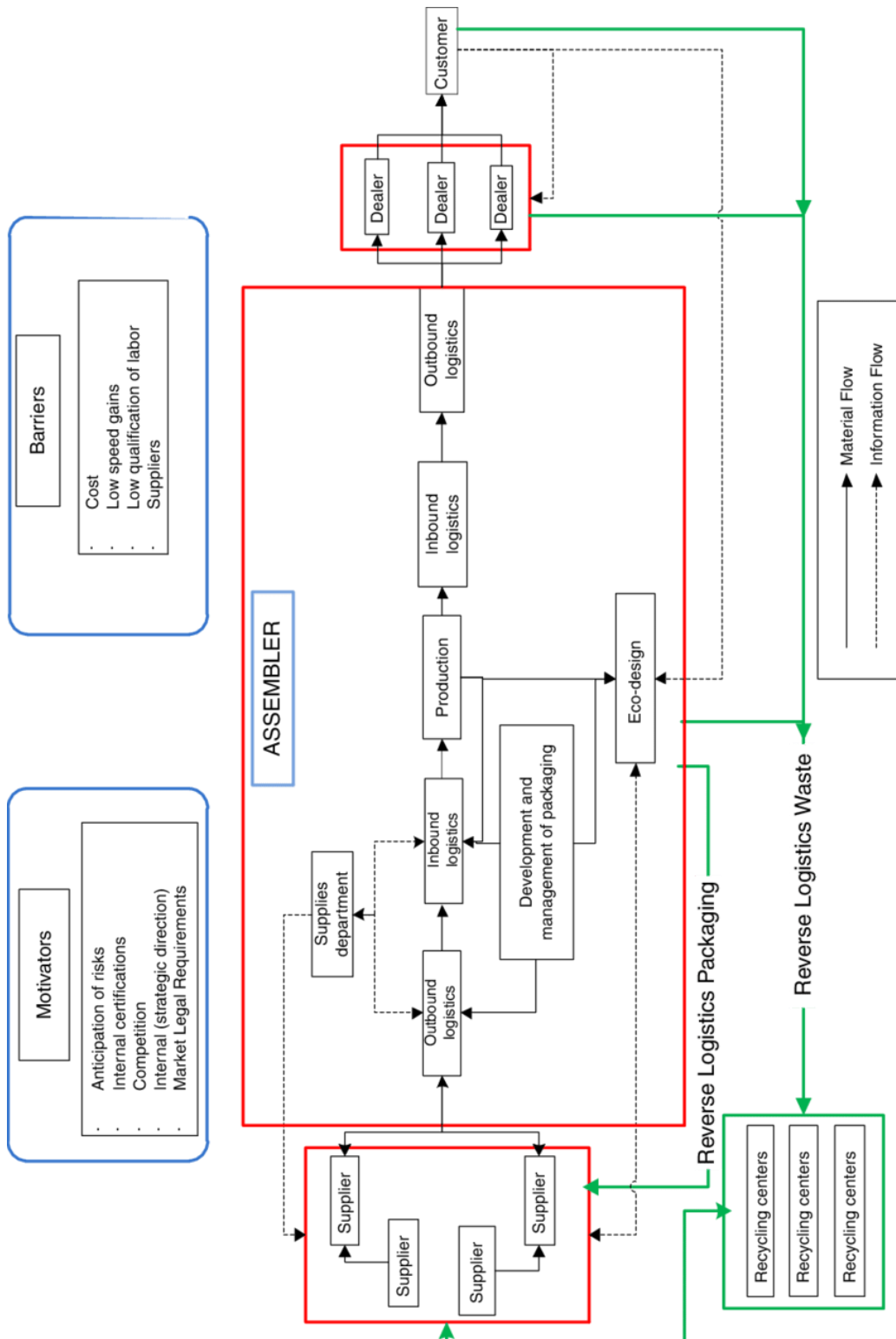


Figure 3: Motivators and Barriers from SSCM in the Automobile Industry (Drohmeretski et al., 2014a)



The framework presents the contact between the upstream and downstream in the supply chain as literature review encapsulates sustainable supply chain and business value, enablers of SSCM, drivers of SSSCM, barriers of SSCM. It is the framework of the research this how motivators and barriers are to be pointed out from SSCM in the automobile industry (Drohomeretski *et al.*, 2014). The main focal area of the research is the production facility of the automotive manufacturer. It is tough to research the entire supply chain operations. However, in literature depicts a general overview of sustainability in the automotive supply chain. Researcher's primary focus is the actual working in the production facility, how automotive firms is using the resources and what they are doing to achieve more sustainable practices and what restricts them. After identifying the barriers and drivers, the company can measure its sustainable performance and find new ways to improve its sustainability. In this way, some of drivers and barriers have pointed out by reading the different literature and classified into external and internal. The research will pursue the following framework.

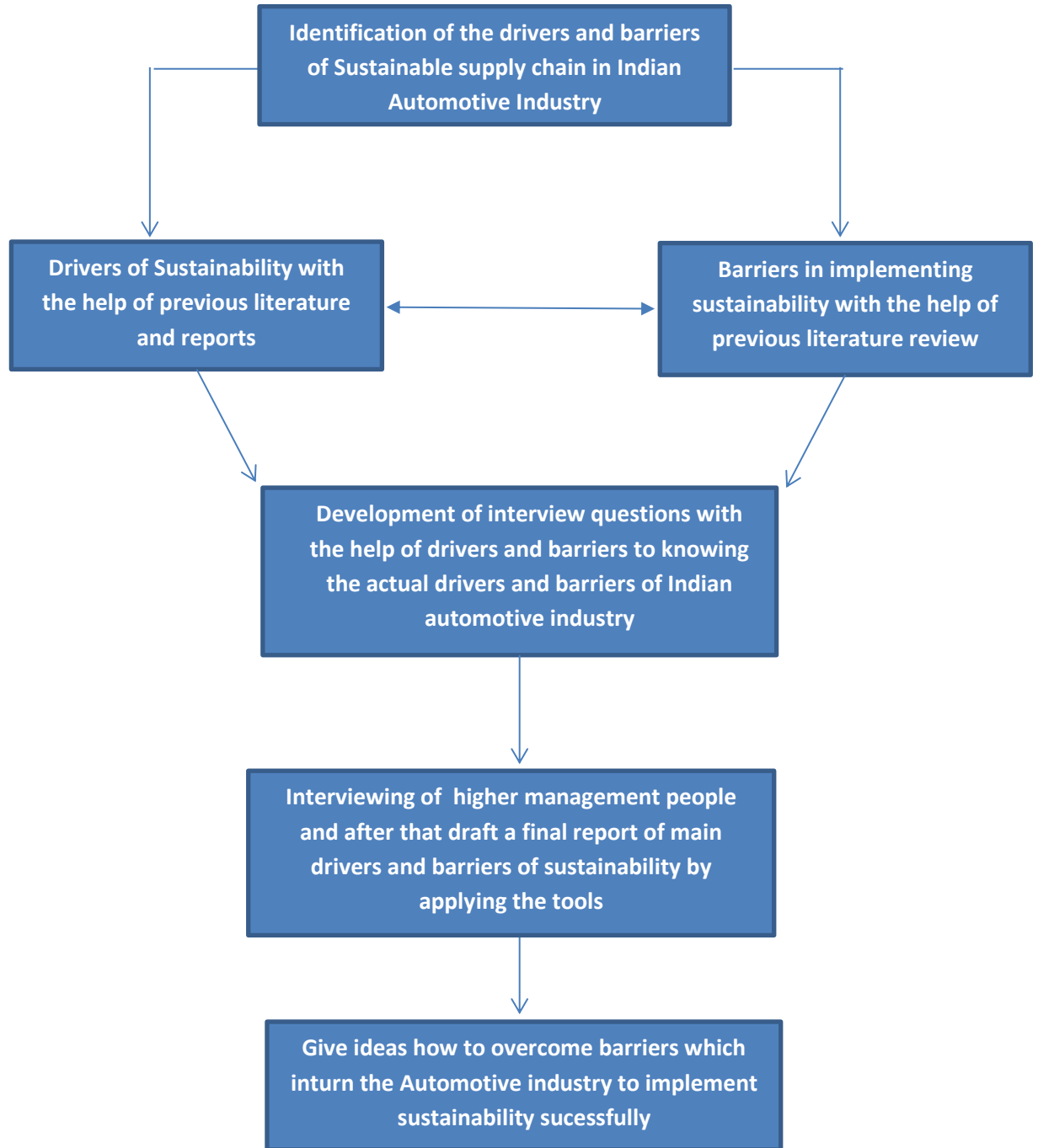


Figure 4: Research Framework

## Conclusion

To summarise, the research of academic concepts of sustainability in the automotive supply chain along with the drivers and barriers of sustainability describe in the literature review. A conceptual framework of analysis is defined and explained the overall flow of the research to give a more precise overview of research. Without any doubt, technological development is increasing rapidly, but the concepts like sustainability in the automotive supply chain and its drives and barriers are still in early-stage.

## 3. Methodology and Research Design

### 3.1 Overview

In this part of the study, I have solicited to give the information on the methods engaged in collecting the data for research purposes. The pieces of information which also contain especially the technique used for data analysis and the type of study it establishes too.

### 3.2 Research Philosophy and Approach

A paradigm is an acceptance system and an academic framework with some hypotheses like ontology, epistemology, methodology, and methods. There are three different types of approaches for educational research: 1.) Positivism, 2.) Interpretivism, 3.) Critical theory (Abdul Rehman and Alharthi, 2016). In this research, scholar concentrates on the guidelines of research ideology for finding the research outcomes. I have decided the Interpretivism philosophy for this research over other philosophies. (Lindsay Mack, 2010) depicts, a scholar should clear about the selection one does to be taken critically. Interpretivism complements humans to be defined from a physical process as they constitute definition and scholar study these definitions.

The researcher approves the interpretive philosophy to master and answers of research problems in the research process. It is a different standard than a positivist research philosophy and is expected to take less time. The researcher's primary aim of this study is to find the drivers and barriers to sustainability in the Indian automotive supply chain. Sustainability is complicated; drivers and restrictions of the sustainable supply chain have a unique shape in industry and depend on the critical aspects of the involvement of employees in sustainable practices and strategies. As drivers and Barriers to sustainability are deeply subjective words in nature, and these are the matters of individual industry and their view of the supply chain. As a result, the sustainable practices related to the particular sector are different according to the implementation strategy. Due to its subjective nature, this dissertation is interpretivism philosophy. This way of research is

adequate to acknowledge the understanding according to the background of research problems. Finally, the scholar has chosen this philosophy to find useful research results. This approach is best suited for this research as it helped research to understand the critical concepts of research problems being subjective. Considering the problem from all aspects and accounting the views of the social world is an objection for interpretivists.

The research paradigm first described in Kuhn's philosophical research work. As Kuhn describes the research paradigm is "a combined bundle of significant concepts, valuables and conflicts related with analogous fabricated accession and tools" (Adom et al., 2018). The research philosophy furnish hypothesis that contributed the researcher to decide how to gather data and to select the tool for data analysis to conclude in an organised way. This design the core for study to assimilate the nature of research dilemma by constituting a model of understanding. The study of research philosophies which are in practice is positivism, interpretivism, pragmatism and realism. Every theory has its unique working and research guide in constructing and analyse significant ideas to anticipate the nature of the research.

Each philosophy is associated with a particular theoretical value that provides guidance for researchers to undertake research tools, methods, and approaches (Ayuen, 2015).

A deductive approach towards this research is not appropriate because a hypothesis has not introduced. Interpretive philosophy needs that social phenomena be understood "through the eyes of the participants rather than researcher" (Lawrence Manion, 2007). The Interpretive philosophy aims to learn social aspects in their context. Dissertations with the Interpretive methodology collect mostly qualitative data from the participants over a while. The approach to analysing the data is inductive, ie. The researcher tries to explain the patterns in data which are collapsed under the broad themes to develop a phenomenon and achieve theory. This dissertation will introduce the drivers and barriers of the sustainable supply chain by analysing the data from the participants that's why the approach the method will develop in the end, so this research has an inductive approach.

This research includes the collection of data from supply chain professionals in the form of the questionnaire in the different hierarchical level (operational and managerial level) in several different automotive industries in different levels of the supply chain. By seeing various viewpoints of the same situation, it will allow me to validate what are the barriers and drivers to sustainability in the automotive industry. The approach of this dissertation is qualitative research because the researcher is trying to understand drivers and restrictions of the sustainable supply chain in the automotive sector from five different automotive company's professionals. The way of data collection is a holistic view of sustainability and mitigate the bias, which can be possible due to individual experience, positions, and preferences.

From my literature review, there is a lack of data and research on sustainability in the Indian automotive industry. One cause of this might be a fear of knowledge dispersion, which will result in less sustainability in firms, and firms must keep this data secret to maintain their competitiveness in the market. However, my research must achieve a deeper understanding of sustainability challenges which automotive industries are facing in India. Due to a lack of data and analysis on sustainable barriers and drivers in the Indian automotive industry, this research is appropriate to use an exploratory approach to understand these issues deeply.

### 3.3 Research Strategy

Research Strategy is a guided mechanism used by researchers to obtain high-quality results. This approach helps researchers make plans to achieve research outcomes and objectives effectively. It is a practical framework where researchers applied this concept to address research questions. It believes that to have a positive effect on the research process for overcoming the research doubts and issues. Researcher focus on the implementation of sustainable supply chain research strategies.

Moreover, this method has proven to be very efficient for effectively reducing research gaps. This method can be used to improve the overall efficiency of your research. The eventual need for this research is essential and trustable information to make the

right outcomes and results in the study (Bandaly *et al.*, 2016). The research strategy foresees the complete details of the investigation process. It is a very straightforward and positive classification medium for conducting research and accurately achieving objectives.

I have decided to go with the qualitative method as a constructed framework for my study, As I have discussed with people having different opinions from different departments of the automotive industry to understand the phenomenon. This research approach is a mix of exploratory and descriptive. A qualitative method has selected because my aim to explore sustainable practices in depth and gaining knowledge and understanding of barriers and drivers. The explanation behind I chooses the qualitative methodology because it allows me to examine the sustainability broadly and also empowers my knowledge of the context and issues in the Indian automotive industry (William G. Zikmund, 2003). By conducting a qualitative on sustainability in the automotive supply chain would be an ideal method describing why sustainability is an essential phenomenon in the automotive industry. The qualitative design has given out an extremely beneficial for such a descriptive and exploratory case study research to get and collect comprehensive information and sufficient data to understand research aims with an extensive mindset with applying qualitative data collection tools (Stephen Henderson, 2015).

The research approach has two stages:

Exploratory phases (Primary)- This has formed me comfortable with the background of the study, innovate and finding new questions. It consists of a literature review and analysing the secondary data and perused by interviews with supply chain professionals working in the automotive industry.

Descriptive phase (Secondary)- In this, I diffuse with the procedures to find & describe phenomenon research in detail. It includes semi-structured interviews along with the online reports of companies.

It is an arranged system that supported the scholar with an understanding of careful observations to a broad overview to find compelling results to realise the sustainability in the automotive supply chains (Bahari, 2010). Research strategy gives an overall picture of the research process. It is a systematic plan for studying a problem. It associates elements of the dissertation project, such as research concentrate areas, research approach, research techniques, etc. while analysing the answers to research questions and suggestions on how to implement the selected methodology. Research arrangement acts as a groundwork to explore solutions of the research questions using convenient research tools and techniques (Thomas Groenewald, 2004).

Thus research design bridges a link to the explanation behind the research question with reasonable research techniques to achieve research objectives (Bell, 2014). The primary research approaches available are subjective, quantitative, and mixed research.

### 3.4 Data Collection

In this research, data have collected in two ways one is the primary method and secondary method

The scholar's use methods such as interviews, personal investigation, direct observation, survey, target group, questionnaire, an opinion poll for the collection of primary data, whereas for the collection of secondary data some researchers can use methods like existing thesis, companies reports, academic articles, handbooks, journals, business magazines, online websites etc. (Gosling *et al.*, 2004). The information should be reasonable and trustable to achieve a conclusive result in the study. The researcher gathers data for the first time in many different ways like survey, interview, questionnaire, and direct considerations (Irene Korstjens, 2017). This data is known as raw data that can enforce in the research for achieving the goals and objectives.

In this research, I have adopted both primary and secondary data collection techniques to establish new subjective research data and recapture pre-existing data from the secondary sources. The primary cause behind the study is the gather of secondary



data first and deduce the explore towards primary data sources. Afterwards, the study is a mixture of exploratory and descriptive approaches, the primary data collected in the form of semi-structured interviews which could be done on zoom and online platforms keeping the COVID-19 pandemic situations in mind. In contrast, the secondary data is a continuing collection with the analysis of current literature from eBooks, published research papers, articles, journals. The researcher collects the secondary data as the research has grown with the time is based on the primary data. However, secondary data is related to academic journals, articles, handbooks and online websites. Hence, the researcher has competently concentrated on secondary data that was gathered from books, journals and scholarly articles. The primary data is more compelling rather than secondary data for communicating the research issues. For considerate happening under supply chain management, the scholar can concentrate on primary data(Korstjens and Moser, 2018). The primary data contribute the better result to the research. The primary and secondary data generally has twisted to achieve adequately for the study to know the research results. The scholar uses all the methods to carry out interviews to accomplish reliable information about sustainability in the automotive supply chain. The primary and secondary data are remarkably effective concerning the study to collect the information in the background of sustainable supply chain management. Many researchers concentrate more on primary data than the secondary data to increase the effectiveness of the outcomes of the research (Abayomi Alase, 2017). The above-selected methods have contributed more efficient results of the study for achieving the raw and trustable data for the success of the study.

### 3.5 Sources

For achieving the objectives of this research, the researcher made efforts to collect the best available data from the automotive firm's employees to assemble the primary data. I was exploring the deep understanding of sustainability in the automotive supply chain so that while I could able to ask to the point and precise questions during the interviews of the participants for the better understanding of barriers and drivers to sustainability. My main objective during the meetings was exploring the views, thoughts, experiences,

intuitions, and beliefs of individual participants. The researcher developed an Illustration questionnaire with unrestricted questions for the interview.

Questionnaires prepared with refined and focused questions which helped in analysing the real challenges and factors that hinder the sustainability in the organisation. While the researcher concentrated on the diverse participants to pursue ideas and responses in more detail and more in-depth and to avoid bias. The researcher asked the same questions for each participant to cultivate the consistency and observation and also helped to analyse coding in a content investigation. Interview questions were prepared from the research questions and purposes. The questions can be found in the appendices section of this document.

### 3.6 Sampling

The scholar determines participants on the base of a probability sampling method rather than a non-probability sampling method. Sampling is crucial for analysing & determining a proper subgroup from the target community size. The scholar has chosen simple random sampling under probability sampling. This method enhances the researcher to give each participant a bazaar scope to select in this study from the target community size, and this also helps in the prohibition of any choice related bias (Sharma, 2017).

### 3.7 Population and Sample Size

Various automotive firms are operating in multiple locations in India. There are numerous departments in the automotive manufacturing plant, and each department has its development. The researcher has acknowledged selecting supply chains professionals of the company who are only operating within India. The firms can or cannot have their functions beyond the Indian geography, but interviewee for an interview is strictly from India.

The sample size comprehends the various subject's scholar has selected from the target professionals as a portrayal of the target sample. Participants who are working in

Indian automotive firms were randomly selected & contacted via LinkedIn & social contacts for participation in an interview. Participants benchmark is as of location, employment in any Indian automotive firm and has working experience in the supply chain. Both genders male & female take part in the research. Participant's designation, working knowledge are best suited to the objectives of the study.

### 3.8 Access and Ethical Issues

The ethical information is essential to the research questions that improve the direction of the compatible results in the study (Kulju *et al.*, 2016). I have completed all activities to gather data & conduct interviews within the boundary of professional connection—some established closeness within the sphere of research and how their persuasion could be utilised. Together I have assured to manage the confidentiality of the research participants wherever the same thing they demanded. A confidential-Disclosure agreement, too was accommodated to the participants who made the request. The scholar maintained a professional decorum with everyone.

However, the ethical concerns strictly followed in gathering the primary data, secondary data. I have acknowledged plagiarism, artistic rights & confidentiality of data. Finally, all the obligations instructed by Griffith college were followed by honesty & faith. The research has ardently ensured that under any circumstance's college reputation is not hampered at any moment of time & space.

### 3.9 Approach to Data Analysis

Qualitative data analysis assumes to be a narration of tale & subject that come from the background. In the process of evaluating the information, researcher cooperates with the investigating participant by evaluating the tale description & bargaining the results of a directory (Jo Anne Ollerenshaw, 2002).

The scholar has investigated the information that was crucial to get the study objectives precisely. The researcher has included the various set of data assortment techniques, For example, content investigation of gathered and reliable data (Korstjens

and Moser, 2017). In the subject of study, the author has enforced content analysis for the interview technique to investigate the answers of participants.

Therefore, the scholar investigated qualitative technique for capturing the information with quality that improves to achieve the study results accurately. The qualitative techniques are more fruitful to make an outcome and boost the ability of the research results along with research aims. The researcher examined the primary and secondary data for gathering valid data regarding the research title. The research philosophy and research design are efficacious for information analysis in the subject of sustainable supply chain management and its implementation in the automotive industry.

The data investigation methods used by the scholar are efficient in this study for capturing improved results by decreasing ethical problems. The ethical understanding comforts to get the study objectives and discoveries accurately. The data is calculated by the scholar that is possibly competent in the outcomes.

The scholar used a deductive approach in the study, where he provided an in-depth literature review and a clear conceptual framework without data collection. The first thing author should do when analysing the data is to classify it. Therefore, the thematic analysis is a suitable study method. (Braun and Clarke, 2006) also, suggest six steps to perform thematic analysis in their paper. The first step is to cut the data by decomposing text into text segments with the help of the coding framework. Next step is to outline themes for each segment. This step is providing the scholar with a chance of rereading the text segment to decide them. The researcher had already done the first two steps when he was preparing the interview guide. For interview guide researcher selected three themes beforehand. The third step is to build the network to associate selected themes, demonstrating as thematic network. The fourth step is to find the content of text segment in the original text with the help of the thematic network. In the fifth step, after analysing the thematic text, researchers can introduce an outline of the main principal themes. In the final step includes the key findings in the overview of each thematic network and join them together into an integrated story.

## Conclusion

The previous section introduced critical methodologies, research approaches and strategies, and their interrelation to answer research questions and objectives. This study used test tools and strategies to get successful results. The Research Onion Framework has helped scholar to identify the drivers and barriers of sustainability in the automotive supply chains. This learning is more effective for researchers to succeed in the future.

## 4. Presentation and Discussion of Findings

### 4.1 Overview

This chapter of the study strives to interpret the results found in the whole research with the help of primary and secondary data. The scholar keenly focused and rechecked to analyse useful and meaningful findings. The researcher analysed the responses from the interviewees to govern the dimensions of success. The scholar has undertaken the ways to find the results and findings of the study and questions which gives asseveration of meeting the research objectives.

### 4.2 Findings

The scholar interviewed five supply chain professionals from different automobile companies involving in different functions of the supply chain in India for this report. The given is the research of the answers to the interview questions against the vision of the various study objectives. The scholar observed and rooted a pattern with the answers of participants in allusion to understand three vast objectives themes: Drivers of the sustainability in the automotive supply chain, Barriers of the sustainability in the automotive supply chain, how can these challenges be resolved in the automotive industry.

### 4.3 Drivers of Sustainability in Indian Automotive Supply chain

The scholar asked the question in the interviews what are the main drivers of sustainability in their company to investigate the main drivers of sustainable practices in the Indian cars industry. From the responses of participants, the researcher noticed that most of them just convey that government regulations and legislations are one of the primary drivers of sustainability in the supply chain. They described that most of the changes in the emission of the engine are according to the government regulations. Recently the Indian government banned BS-IV (Bharat-stage-IV) standards from April 2020 which signifies the emissions specifications of automobile set by the Indian government.

Hanu Mann and Uma Kumar (2010) also describe in their research that as the 'parent of all drivers' government legislations left no options for a company to compete with it and otherwise way out the market (Mann *et al.*, 2010). In India, government legislations may be driven by the degrading air-quality day by day, which results in every four years Indian government changes regulations by changing the engine emission standards and waste management by the automobile manufacturer. One of the participants described brand image and reputation is a significant driver of the sustainability in SCM. Nowadays in India due to increasing awareness of environmental issues like climate change and global warming is at the peak in the schools, colleges and companies which educate the customer about the sustainable products and meaning of sustainability.

Stakeholders play an essential role in implementing sustainability in the Indian automotive supply chain as every participant described the role of the internal and external stakeholders in implementing sustainability. All of them, while talking about the external stakeholders such as customer and shareholders, forces the company to be more sustainable as one respondent described that sustaining the process flow is highly relevant which can ultimately affect the market and companies' reputation. Another participant recounts that customer awareness about sustainability is increasing day by day and they prefer to buy more sustainable products that's why automobile companies have to be more sustainable to compete in the global market and maintain a reputation to attract customers. Testa endorses this notion by his study in which he describes that there is a direct relationship between shifting towards the sustainable practices and brand image of the company, the distinction of company increase with the improvement in the sustainable achievements (Testa *et al.*, 2018). Another researcher supports this belief and explains that many companies consider the reputation of companies and their brand image strength with the adoption of green initiatives. The results he found in his study are positive in the viewpoint of enhancing reputation and brand image of a company (Cosimato, 2015).

As one of the participants conveyed that involvement of the top management and boards of directors in implementing sustainability is an essential driver of sustainability.

He described how their board of director categorised the different board committees to measure, monitor and control the sustainable practices in the entire supply chain. The boards of directors inspect quarterly the organisation's regulations, agenda and execution on the sustainability. Another participant responded that improvement made in the firm's sustainable practices under the supervision of the firm's corporate social responsibility management (CSR Committee). CSSR team includes the CEO and other trustable members managers to monitor the sustainable issues in the entire supply chain and seek continuous improvement in the sustainable achievements and discuss future goals and agendas. This CSR team also guides and constitute the framework of sustainability for the best achievement of the corporate social responsibility by continuous reviewing process.

Additionally, Epstein and Adriana Buhovac describe that chief executive officer and board of directors are significant policymakers; they have to stick to sustainable goals and motivate all company's stakeholders about its most significant benefits. This action enhances processes to be done, such as inspection of social and environmental practices and provide information to the CSR management. They both also describe that sustainable approaches are typically top down. Leaders of the company should engage with the development of sustainable practices and their implementation. The directors of companies should maintain adequate and good communication to the employees about the values and expected actions and evaluate with feedback about the finished results. The power to motivate and inspire the employees towards sustainable goals is in the hand of the CEO and board of directors by deciding appropriate incentives. The leadership of top management has to be influential, coherent and robust to maintain internal trustworthiness for sustainable thirst and Therefore, they get enhanced CSR management practices across the supply chain processes (Marc j. Episton and Adriana Rejc Buhovac, 2014).

Communication is the main thing in expressing thoughts, ideas and concepts. Participants described that better communication between the employees of the company helps in improving sustainable practices. One respondent explained how in his company organises the specialised training and host international conferences on



sustainability in order better to communicate the idea of sustainability to their employees. With a better communication employee can transfer this concept to their juniors and so on. (Genç, 2017) delivers that communication performs a significant role in sustainable strategies. Where there is better communication within an organisation, it would be effortless to implement the sustainable changes in the organisation.

Moreover, communication outside the organisation with customers, suppliers, and society is a must for sustainable goals. Otherwise, the organisation may suffer from shrinks in provisions of sales of goods and services. Therefore, there is an upsurge fashion of sustainable goals on a global scale. Communication in sustainability, and it suggests the methods where information explanations and judgement to the sustainability challenges are interchanged and addressed.

Almost all the five participants, when asked about the drivers of sustainability, discussed finances and profits of the firms. Every firm wants to make more profit with the minimum utilisation of the resources and sustainability is the best tool to make more profit with the least investment. One of the participants described that by shifting on the green initiatives, his company saves at least half of the water usages and electricity from the solar plant, in this way, the company saves much money. Another participant illustrates that as he works as a purchasing manager, the company's more profit allows him to purchase more sustainable raw materials and improves sustainability in the entire supply chain. In support of this, Sanghavi states that firms transform precisely their supply chain into a sustainable one not only because it is a correct thing to do for the environment, but also for making the profit and reduce the costs. Therefore, the green supply chain is gaining popularity globally with time in every business (Sanghavi, 2015). Sustainability gives the longstanding profit to the firms. It encourages to obtain value for expenses by involving the full lifetime cost of goods, utility and enhanced resource efficiency (Al-Odeh and Smallwood, 2012).

One of the substantial drivers of sustainability in the automobile industry is green manufacturing methods such as just in time, Lean six sigma, total productive

maintenance, buffer management and many more. One respondent delineates that better buffer management helps in to reduce the less wastage of resources, better efficiency of the manufacturing plant, less inventory cost and better quality of the product. (Hedvall *et al.*, 2017) advocates this concept in his research paper and outline that buffer management is not just a great entanglement when there is a perfect synchronise between demand and supply. Demand depicts the need for resources, and supply depicts the cumulative capacity of the raw materials to fulfil the needs. An excellent match would then illustrate that supply can accomplish demand with no buffer, for example, no advance inventory or fully loaded warehouses. This type of perfect match cannot be possible because the demand keeps changing with time, and it is tough to predict demand, and the briskness of supply is limited. Therefore, it leads to inadequate delivery performance. Various types of buffers can be engaged to boost performance, but that should be used only in one condition when the contribution of the buffer is more significant than the cost of it. Hence buffer management is a vital part of green manufacturing methods for controlling and planning to lessen the asymmetry in quest of an aggressive supply.

One of the respondents, while talking about the drivers, suggest that effective inbound and outbound logistics also leads to achieving more sustainable goals. He reported that by improving the inbound and outbound logistics, the company achieved more sustainable goals.

#### 4.4 Barriers of Sustainability in Indian Automotive Supply chain

To find and understand the barriers in Indian automotive supply chain researcher asked questions to participants regarding the barriers in the supply chain and what sustainable issues or challenges their company is facing. Almost every respondent enlightens the fact that improper communication between the employees, company and its external stakeholders (suppliers, outsourcers). One interviewee illustrates that due to internal politics and inappropriate communication leads to the sunk cost and deviation from sustainable achievements. Another respondent who works as a senior manager in

the automotive company tells that employee engagement is essential for his firm. He believes that employee involvement is based on confidence, honesty and both way trust and communication among any firm and its employees and this is a technique that improves the probability of business success and successful sustainable practices and vice-versa.

While discussing the barriers of performance of sustainable practices in the supply chain, most of the respondents accord that cost is a significant barrier in the implementation of sustainability in the supply chain and all other barriers related to the cost. One of the participants explained that the financial barrier which his company is facing “financial capital is limited as compare to some big market players”. Some of them believe that the size of the company matters in achieving a sustainable goal that is smaller size is also a barrier. Another respondent described the barrier profit/finance as a barrier to the implementation of sustainability. This belief also supports by Mee Yean in his study in which he discusses that large firm has substantial revenues, cash flow, profits and they can invest significantly for pushing the social-economic objectives as well as become more eco-friendly. The firms which are more significant in size are more likely to choose green practices as compared to the smaller one. The size of the firm is one of the substantial firm characteristics to which influence the adoption of sustainability (M. Tay et al., 2015).

Some of the participants agreed on that dedication of the suppliers is an essential factor for automobile firms when it comes to sustainable achievements. One of the participants stated that “It is not good to say that they are not dedicated towards the sustainability, but yes they need to involve more in the sustainability and strictly need to improve their quality control management. They have to understand the truth that we are working in a business for the same society”. Another participant described that inadequate supplier involvement is one of the significant barriers because due to the poor quality of the raw materials from the supplier end, sometimes we need to return a whole lot of raw material, which results in wastage of time, logistics and resources. Another respondent described that his company is very strict towards supplier code of conduct and, it is tough to pressurise the suppliers to become sustainable, sometimes they just

acted to be sustainable, but in reality, they were not doing those practices. One of the respondents explained the present sustainable problem which his company is having, is quality control at supplier-end before the delivery of raw materials in the automobile company and full transparency of inspection of raw material at supplier place to avoid production line stoppage which directly impacts the production. According to Harwood and Humby also advocate that point and 25 percent of the companies demanded suppliers to achieve social and ecological regulations to minimise supply chain risks(Harwood and Humby, 2008). Company supply chain managers require to find the importance of supply chain management as a central supporter of sustainable achievements. By promoting innovation and motivation among the supply chain people and nourishing the supply base, a company can diminish the sustainability conflicts and barriers of the supply chain (Lintukangas *et al.*, 2019).

While talking about the challenges in the path of sustainability to participants, most of them discuss the lack of technological awareness and capacity. One of the respondents tells that transparency should be done at supplier end for quality check of the parts for the smooth flow of the inbound logistics, and thus, it also aims for the less lead time. That means in automobile industry need an advance technological system which can provide managers to inspect the quality of parts. Which supplier is going to deliver in the production plant, if there is any problem in quality managers can stop delivery of those parts and plan accordingly for the future that saves resources and leads towards better planning for production. Another respondent replied that there is a lack of full integration of inbound and outbound logistics in the supply chain, which hinders the planning and quality of the supply chain. There should be a technological system which enables the full traceability of every part and finished product until the end customer which enhance the responsiveness of the supply chain. Another participant described that there should be some IT for the inspection of the quality of part at different stages to reduce lead time and rejection of finished products due to quality issues. In support of the above-discussed notion (K. Dashore, 2013) illustrate that imagine the amalgamation of information and technology system into the sustainable supply chain method is the essential need for this

new notion of achieving sustainable goals effectively. It takes various new innovative software and applications to integrate the whole supply chain processes for better visibility and responsiveness. Information and technology assist the combination of sustainable practices into the supply chain functions by maximising resources utilisation. Moreover, the move of association of IT system can produce things more straightforward by innovating an efficient supply chain planning, implementation and integration.

Another significant barrier in implementing sustainability in the supply chain is the lack of alternative in choosing the suppliers. As India is a developing country, still there is much development needed to develop more sustainable suppliers. Due to less choice of sustainable supplier and increasing the market demands automobile companies are dependent on a particular country or region for specific parts which hinder the sustainability if any uncertainty comes in that country and region. One of the respondents described the sustainable problem which his company facing is “over-dependency and monopolisation of a particular region and country for specific products”. Another respondent gave the example of a current situation COVID-19, he described his company is dependent on a company, which is the in a different state in India, for a particular part. Due to lockdown that company was unable to deliver the part and hence that impact the whole supply chain, now they need to maintain the inventory of that part for an advance of one and half month except the safety stock. That increased inventory cost and disrupted planning and controlling. Another participant highlighted that some of the parts are only available at little places all across the globe which mitigating the company’s probabilities of escaping potential barrier in future and constructing it more challenging to achieve sustainable practices. Other participants stated in this context that due to non-availability of sustainable alternatives, it is tough to achieve sustainable goals. Thus, it is also one of the significant barriers. Even if the company want to adopt sustainable practices, we do not have a sufficient number of sustainable supplier options. (Gupta *et al.*, 2020) advocate above notion and reported different type of barriers in implementing sustainable development in the company, lack of sustainable supplier is one of them and further described as “Either, there are no sustainable suppliers, or the present suppliers

have lack of understanding of sustainability, or they do not support to change their previous way of working which they resist any change in their systems.

One of the respondents replied that the short-sighted approach, no mission and vision, in the long run, vying for short term achievements and profits are also leading towards the hindrance in the sustainable objectives of the company.

Some of the improper managerial practices like Risk management, in the production plant, can lead to a significant barrier in the way of sustainability. One of the respondents commented on this and described improper production risk mitigation as a significant barrier in his company. He further said the risk that goes unattended could result from missing production targets, safety incidents. Another respondent reported in this consent that safety risks, older assets, security risk can impact the supply chain negatively which can affect the employees, finances of production plants, quality of products and customers of the company.

One of the participants talked about the infrastructure and considered the infrastructure as a barrier, as Indian is a developing country. At present traffic congestion, connectivity of the internet in some areas, irregular electricity supply, improper logistics infrastructure are some significant barriers which slow down the whole supply chain and result in a less sustainable goal.

Sholar discussed reverse logistics as a barrier to sustainability during an interview. A participant told that there is no such awareness of reverse logistics in India, and automobile companies are not doing sufficient for that. I cannot say that automobile companies do not do anything, but they are making fewer efforts in the field of reverse logistics. Every year millions of cars come to scrap yards, but only a few parts can be recyclable most of the interior and electronic part just went to landfill, which is sad. Automobiles companies should do something about that, and even the government should bring strict regulations on reverse logistics.

## 4.5 Comparison between the Drivers and Barriers of sustainability

After detailed inspection and analysis of drivers and barriers of sustainability in the Indian automotive supply chain, now it is time to compare them, and know-how can Indian automotive sector increase their drivers of sustainability and mitigate the barriers. On the other hand, the Indian automotive sector can make self-evaluation and inspection to know where they lack to achieve sustainable goals. Due to increasing environmental problems, climate problems and the greenhouse effect and raise the water level in the oceans, it is imperative to make every business sustainable. As being the most significant manufacturing sector in the world, the need for sustainability in the automotive sector is essential. Indian automotive sector still lagging in achieving sustainability as compared to Chinese, European and Japanese automotive sector. The significance of this comparison between the drivers and barriers to sustainability in the Indian automobile sector, Automotive firms can know the reason behind the lagging in sustainability.

Here are some factors, which can affect sustainability in the supply chain. Companies can perform well in those factors and can make a driver. If the company's performance is not excellent in those factors, then the same factor will turn into a barrier to sustainability.

- 1.) **Communication-** Better communication between the internal stakeholders, internal stakeholders and external stakeholders is a driver to the sustainability, and improper and inadequate communication between the internal stakeholders, internal stakeholders and external stakeholders is a barrier to the sustainability.



*Figure 5: Communication Factor*

- 2.) **Top management Involvement-** Good and responsive top management practices lead towards the driver of sustainability in the supply chain. Conversely, a lack of

top management involvement in sustainable practices leads towards the barrier of sustainability in the supply chain.



Figure 6: Top Management Involvement Factor

3.) **Finances and Profits-** Availability of sufficient fund in the company to invest in sustainable practices is a driver. In contrast, less profit and finances for sustainable investment is a barrier to sustainability in the supply chain.



Figure 7: Finance and Profits Factor

4.) **Supplier involvement** – supplier involvement in sustainable practises is crucial for an automobile company, suppliers who actively take part in sustainable practices with the companies, is the driver of sustainability in the automotive supply chain. Whereas, inadequate supplier involvement and when a supplier makes no efforts towards the sustainability with the company, is the barrier of sustainability in the automotive supply chain. By improving the relationship with suppliers, the companies can improve their sustainable achievements and make their supply chain more sustainable.



Figure 8: Supplier Involvement Factor



5.) **Green Manufacturing-** The more and efficient way of adopting the green manufacturing methods such as Buffer management, lean six sigma, production risk management, HIS management and many more, the more a company achieve the sustainability. Poor green manufacturing is to act as a barrier. To be more sustainable and make their supply chain more sustainable automobile companies should strictly adopt the green manufacturing techniques, inspect and measure their performance to know the loopholes and mistakes in implementing green manufacturing methods.



*Figure 9: Green Manufacturing Methods Factor*

#### 4.6 Discussion and Conclusion

The literature review has been used to identify the drivers and challenges of sustainability in the automotive supply chain. This information will be then to develop the questionnaire for the interview to identify the crucial factors which impact the sustainable supply chain management activities. The literature review spotlighted the requirement to concentrate on suppliers, and supplier involvement in sustainable practices, reverse logistics substratum and abilities of firms and their partners to tackle these. Understanding and readiness of operations function under the firm and at the supplier is overlook but gradually trying to match the best works globally.

Ecological conflicts have one of the significant matters that every study pointed out. It is vital to talk about the environmental issue and concerns to the planet in which we are living. Association of sustainability in the industries is particularly pivotal because it is primary for making life safer for us and people who follow us. Shifting toward sustainable practices is talk of the town, and some professionals concern about the depletion of

natural resources and environment. Association of green initiatives into the supply chain in need of modern business and to save the planet.

Sustainable supply chain management is the most efficient methods which can substantially diminish the environmental impact without compromising the quality, price, working and trustability. Reverse logistics is one of the vital techniques in the green supply chain, which mainly helps to sustainable supply chain management. Although sustainable supply chain management displays a straight price and performance advantages in the automobile industry, full-function applications of sustainable supply chain management are obstructed by some social, technical, infrastructural and economical barriers. Automotive firms are integrating the approach of sustainable supply chain management in their planning, controlling and different supply chain processes. Therefore, it gets essential to elucidate the Indian Automobile companies on the advantages of sustainable practices.

Green supply chain management is examined as a challenge for firms to implement in their supply chain. Various factors are resulting in hindrances in implementing sustainable practices. However, there are some factors which are working as drivers for implementing green supply chain. Proper understanding of the problem is an essential step which sustainability needs to integrate with the business. Adequate study and efforts should be made when making decisions on the implementation of green supply chain practices. This research is an effort to investigate the drivers and barriers to sustainability in the Indian automotive supply chain.

Stakeholders such as customers, employees, the government were stated as a compelling force for the association of sustainable practices in their firms. These results are stable with the debatable that customers and society are fundamental motivators for the firms to execute sustainable practices. Firms cannot neglect the strength of these stakeholders unless they face reputational danger and surrender their brand image. Government impact is a powerful driver for enhancing sustainable practices for firms. It can be concluded that to encourage the requirement of green practices and products in

the supply chain; The government regulations can pressurise the automotive firms to implement sustainable practices.

Green supply chain approaches demand firms to shift towards the eco-friendly procurement, sustainable manufacturing, consisting in mind that procurement parts should contain recyclable materials and more renewable resources to provide the final product. Additionally, the contribution of employees, supply chain partners such as suppliers, outsourcers and customers can persuade the activities of a firm to construct enhanced sustainable development for the future. Involvement of the supplier in sustainable practices is essential for the green supply chain management. Investigation indicates the significance of the top management in the development of green initiatives, with the collaboration of employees. Manufacturing activities and processes need to line up with the green manufacturing methods such as Total production management, Lean six sigma, buffer management which will decrease the carbon footprints and enhances the efficiency.

In conclusion, various initiatives can be conducted to help companies in adopting green supply chain management. Moreover, concentrating on supply chains is a move towards the full endorsement and advancement of sustainability, since supply chain examines the final product from the treatment of raw materials to consignment to the end customer and restoration. As the association of sustainability with the business is critical for the aggressive benefit and more significant results. Automobile firms need to improve the collaboration and cross-functional association among the stakeholders.

## 5. Concluding thoughts and Suggestions for Future Research

This chapter illustrates the significant and slight conclusions of the research. The current implications of the study, limitation of the study and the future scope of this study are mentioned. Since this research is carried out on the exploratory foundation and the scholar, investigate the drivers and barriers of sustainability in the Indian automotive supply chain and the comparison of drivers and barriers.

### 5.1 Implications of findings for Research Questions

The main intention of this study has been to acquire a better knowledge of drivers and barriers for implementing sustainable practices in the supply chain by automobile industries. For the profound understanding of how sustainable practices are executed, the researcher took two research questions to enhance the knowledge of attempts that automobile firms have done in implementing the sustainable activities and how distant are their executions of different sustainable initiatives. To achieve the primary purpose, the researcher has carried out qualitative research where his objective is to investigate how automobile companies viewed the drivers and barriers for sustainable practices acceptance and the execution of sustainable managerial activities. By completing this research, the researcher has been proficient of gaining a comprehensive understanding of the subjects and answering the below questions.

- What are the drivers and barriers to sustainability in the Indian automotive supply chain?
- How can those drivers and barriers relate to each other?

Throughout the detailed investigation of the study, the scholar could deduce four primary subjects that fulfilled the foundation of his analysis. These four subjects are sustainability in the supply chain, drivers and barriers, stakeholders and implementation. The outcomes of research disclosed that there are multiple motivators and barriers to green supply chain implementation.

Olugu divides the entire manufacturing process of the automobile industry into three interrelated tasks; Upstream, Internal stream, downstream. For the application of green supply chain management, the inclusion of environmental criteria in upstream which includes a selection of the supplier and specifications of components, the internal stream consists of the assembling of vehicles and different testing with minimum use of natural resources. Downstream of the organisation should be responsible for the disposal of the waste, sale of extra stock, after completing the life of the vehicle recycle the components of a car and reuse them in future manufacturing (Olugu et al., 2011).

The government can make a difference by using their regulations and policies. The non-government organisation can play an essential role in creating awareness and squeezing organisations to follow green supply chain practices (Foerstl et al., 2015). It has cited in papers that sometimes due to cost-effective outsourcing, been getting famous in the last ten years. External stakeholders, for example, customers, competition, hope the prominent purchasing organisations to ensure social, economic and environmentally friendly production at their supplier's sites. Therefore, any irresponsible supplier activities can spoil the brand image and reputation of purchasing firms sometimes, which can result in expensive legal obligations (Carter and Jennings, 2004).

Some researchers differentiate the barriers for green supply chain management into five main areas: investment increases, rationalisation of sustainable improvement, improving perception and ethos, pressure in dealing and administration of unpredictability and establishments, and the complication of conflicts (Abbasi and Nilsson, 2012a). Some scholars introduce challenges that the automobile firms can deal in the improvement of sustainable practices in their supply chains and emphasis on communal and moralistic duty. Although investment and earnings are still the primary drivers in the advancement of the supply chain, and most of the research depicts that it must compensate for being sustainable (Abbasi and Nilsson, 2012b).

Stakeholders such as customers, employees, the government were stated as a compelling force for the association of sustainable practices in their firms. These results

are stable with the debatable that customers and society are fundamental motivators for the firms to execute sustainable practices. Firms cannot neglect the strength of these stakeholders unless they face reputational danger and surrender their brand image. Government impact is a powerful driver for enhancing sustainable practices for firms. It can be concluded that to encourage the requirement of green practices and products in the supply chain; The government regulations can pressurise the automotive firms to implement sustainable practices.

Additionally, the contribution of employees, supply chain partners such as suppliers, outsourcers and customers can persuade the activities of a firm to construct enhanced sustainable development for the future. Involvement of the supplier in sustainable practices is essential for the green supply chain management.

Lastly, the research creates a perception that if the automobile firm wants to improve its association with sustainable practices in their supply chain and benefit over other competitors in the market, then they can improve their drivers by understanding the relationship between drivers and barrier to sustainability.

## 5.2 Contributions and Limitation of Research

During this qualitative research, the researcher has been capable of a deeper understanding of what are the drivers and barriers in executing sustainability in the automotive supply chain and to identify struggles that the companies have done in implementing sustainability. Scholars have not paid proper attention to the drivers and barriers to sustainability, even though there are many types of research concentrating on what are the green and sustainable initiatives. It can be seen that there is void in the research since there are very little researches regarding the drivers and barriers in implementing the sustainability in the supply chain.

Moreover, the researcher is capable of providing some suggestions to the top management team involving in the supply chain to enhance their measures for implementing sustainability and improvising their sustainable managerial activities. This

research is up to date, as managers require to have timely wisdom of what elements motivate and hinder sustainability implementation and how these elements impact the entire sustainability practices of automotive firms that involve in the execution of sustainable practices in their supply chain based on results of this study. The researcher proposes that managers should construct sustainable relations with all of their partners of the supply chain. The automotive industry should give respect to the ability of customers, society, employees and follow the regulations when it comes to sustainability. Many sustainable managerial activities are discussed in this research. Hence this research will help the supply chain professionals, policymakers and automobile industry to develop their responsive sustainable practices in the supply chain.

The prime limitation of the research is time and ways of the interview in which study is being conducted. Unfortunately, the study is conducted at the time of pandemic COVID-19, which is hugely communicable and deliberately impacts human life. Thus, the interviews which were previously intended to be conducted in person on a broad scale is exchanged with online (zoom/WhatsApp) mode. The scholar asked semi-structured questions during the interview on the call. Responses are recorded and written for further processes such as transcription, data analysis.

Another disadvantage of this study is the selection of sampling methodology and response rate. The interviews were conducted only specifically in India to know the drivers and barriers to sustainability. Meanwhile, secondary data investigated in this study is global in context and not specific to any location to find a reliable outcome. The responding rate of respondents who were invited for the interview was very low. Out of 50 invites, only five respondents were agreed for the interview. The reason behind this can be upgoing pandemic due to which most businesses have faced a significant blow, and people got impacted.

Another limitation is the geographical foundation of this study that is study is conducted only for the Indian Automotive sectors. Five interviews were conducted in five different automobile company which is located in different cities of India.

### 5.3 Recommendation for Practice

Sustainability is a concept which is at the nascent stage, and not all firms in operations implement the sustainability in their supply chain as the study is limited only to the automobile firms. The method of implementing sustainability, drivers, barriers can be considerably different in the automobile industry of other countries. New scholars can take the different industry in different geographical locations to investigate the drivers and barriers to sustainability in that particular industry.

### 5.4 Recommendation for Future Research

This study has retained its concentration on the drivers and barriers to sustainability in the Indian automotive supply chain. This study was done as a source point for future scholars. There is no significant work done to investigate the drivers and barriers influencing suppliers to adopt sustainable supply chain management. There is not much cooperation from the diverse stakeholders to improve the supplier involvement in the sustainable supply chain management. Moreover, research is needed to investigate how the firms should select their product of parts to optimize output without negotiating with the brand of the firm. Future studies could do investigation in one big global company and conduct thoroughly study related to sustainability in the supply chain. In this situation, the scholars could do a mixed approach study based one qualitative and quantitative methods. Such as, Future researcher could do interviews with the managers and distribute a survey to a large number of employees among the company. By doing so, they will get a clear picture of sustainable practices of that specific organization.

### 5.5 Final Conclusion and Reflections

The synopsis of this research illustrates the relationship between the results acquired from the primary data and the study objective. It is established that factors which are drivers and barriers to sustainability have a profound effect on the automotive supply chain. Different automobile companies a little bit different drivers and barriers in implementing sustainability in their supply chain. However, the disadvantages cannot be



overlooked. Instead of the study, certain subjects which cover the core technical understanding of sustainability is above the range of study. The scholar suggests some future researchable topic in the field of implementing sustainability in the supply chain. The scholar provided limitation, contribution, and future fields for research in this section, and the researcher wishes that this study would work as a bridge for future researches.

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## Appendices

### Appendix A- Interview participation request- First contact (LinkedIn)

Dear ABCD,

Hope you are doing well.

My name is Vaibhav Sharma. I am pursuing MSc. in Procurement and supply chain management from Griffith College, Dublin. I am doing a dissertation, and its title is “A Descriptive Research of drivers and barriers of sustainability in Automotive supply chain (especially focused on Indian Automotive sector)”.

It is an excellent opportunity for me to know about the Indian automotive sustainable practices to protect our environment and Indian Automotive Industries doing their best to make a difference in protecting the environment and its resources. I am doing quantitative research and focusing on the few leading Automotive manufacturers, and Honda Cars India Ltd is one of them. I would like to invite you to participate in my research and give me a short interview that mainly contains a few questions.

Interviews will be carried out on the zoom or Telephonic whatever suits you most, keeping in mind the present situation of the COVID-19 scenario, and it will only take less than 20 mins. The purpose of the interview to know about the drivers and barriers of sustainability and doing an overall analysis. Your experience, understanding and knowledge about sustainable practices will help me to find accurate results, and I will not ask for any personal and confidential data. Your participation in the research is voluntary. I will ensure that all ethical norms will be followed strictly, and your identity and information will be kept confidential.

Hope to hear from you soon.

Yours sincerely,

Vaibhav Sharma

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## Appendix B- Interview Confirmation Message – briefing with questions

Dear XYZ,

Thank you so much for providing your consent to participate.

There are some questions in this message which are requested to be responded, and the same will be strictly for my study purpose. The answers which you provide or any particular information will be kept confidential through the entire research. Your identity and your company's identity will not be disclosed at any moment of the dissertation. If you have any questions, please do not hesitate to contact me.

Vaibhav Sharma  
+917042064931

The Graduate Business School at Griffith College Dublin has approved my project and can also answer any questions you might have about privacy.

### **Interview Questions:**

1. What is your role in the company? How long have you been to work in this company?
2. What kind of daily activities you do in the company?
3. Can you explain the significance of sustainability for you and your company?
4. Can you explain the role of internal stakeholders (managers, employees), external stakeholders (supplier, consumer) have on implementing sustainability in the supply chain?
5. Can you explain drivers that help in implementing sustainability?
6. Can you explain the barriers to implementing sustainability?
7. What sustainable issues should be addressed in your company?
8. Can you describe the ongoing improvements and future implementation tasks?
9. Is there something that you think should be considered in this study?

## Appendix-C Interview with Purchasing Manager

1. I am working as a Purchase Manager. I am Looking after cost and sourcing of direct original equipment parts. I associated with the current organisation since last 5years.
2. I look after all techno-commercial related discussions with supplier and outsourcing partners, ranging from request for quotation, analysis for new models to Forex, raw material indexation of Mass Production parts.
3. Sustainability is pretty significant in any organisation's operations. We are a company that seeks the recognition of a sustainable society. Our company views the environment, safety, quality and society as essential themes to pursue. Our company persists in producing and offering new values through innovation and challenge in ways unique to Honda.
4. In implementing sustainability in any organisation, each stakeholder has its unique role and responsibility. Efforts and inputs of all lead to symbiotic growth and a good ecosystem. If we talk about the employees can help in, to develop and implement a robust supply chain route, to develop a product which meets the quality and expectation of the consumer, to keep a check on various factors (internal/ external) which might pose as risk and threaten to the operations, and identifying and implementing countermeasures for the same. On the other hand, suppliers have their own different tasks to such as, suppliers have the responsibility to meet the targets of quality and delivery set by the customer and planning, and implement all the checkpoints and practices which would help them to meet their targets, Tier-1 Suppliers are customers for the Tier-2 suppliers, and Tier-2 are for Tier-3. Each supplier has the responsibility to implement practices and guidelines for best suited to achieve a robust and smooth supply chain, only then the whole value chain of supply can achieve sustainability
5. According to my working knowledge, the main drivers of sustainability are profitability and finances, quality, development, delivery, management. These are the main drivers of sustainability in our company. More profit allows us to purchase more sustainable products from suppliers. Moreover, the rest of the drivers are factors by improving them with the help of efficient managerial practices any company leads towards sustainability.
6. Improper and inadequate profit and finances, quality, development, delivery management are the main barriers in implementing sustainability in the supply chain. Usually, the short-sighted approach, no mission and vision in the long run and vying for short term achievements and profit also leads towards less sustainable goals.

7. The main sustainable issues which we are facing are production risk mitigation and over dependency and monopolisation of a particular region and country for specific components and parts.
8. Sorry, I cannot disclose this information
9. No, your study looks fine, I just want to suggest you something, if you are targeting a specific industry, then the questions should be more specific for that industry not generic in nature.

## Appendix-D Interview with Process Specialist

1. My journey has started with this company since 2018, and it is almost 2.5 years by now. I have been associated with Bodyshop in this company, working as a Process Specialist for BIW assembly, Robotic welding control and Jig & Fixture Management.
2. Being a BIW assembly process specialist, our significant activity is ensuring the line process to achieve the production plan given by the production control team. -Aligning with parts control team and confirming the availability of parts along with receiving quality concerning vendors. Monitoring and continuous improvement planning for the productivity growth by line balancing, inventory control, buffer management and time study
3. Sustaining the process flow is highly important, which can ultimately affect the market and companies' reputation. Yes, each and every person plays a significant role in this. To give an example, as per the market demand, sales and marketing team decides the requirement of production units to the company. That is where the production planning team comes into the picture to plan for the production and makes the specification sequence requirements. Accordingly, 'We', the process and production team will be manufacturing the cars. To meet the demands, Process team will ensure the line capacity and condition for meeting the plan, where production teams will produce in terms of Units per hour and maintain sufficient buffer at different stages. It is nothing but, the process team sustains the process flow for the production and Production team sustains the units count by buffer management.
4. We have many internal stakeholders to discuss, instead of categorising the designation wise, it would be better to understand in another way. Majorly, Planning team, logistics, parts team, quality, process and production teams. Planning team makes the confirmation and request of parts to the vendors. Logistics, which includes the transportation of complete material and their timely managing of delivery of parts to the company's warehouse. Parts team who confirms and maintain the buffer stock and handover the inventory into the production line before usage of the parts into the line, receiving quality confirms at different levels either by sampling method or part by a part method. That is when the production team uses the parts into the line for manufacturing. In every team, we have a different level of employees, who plans, manages, controls and executes the activities. Coming to external stakeholders, we have to receive material from vendors who are considered as first external stakeholders maintaining the buffer stock at the supplier/vendor end, and logistics (transportation) of parts to the company end are the significant factors which affect the sustainability of supply chain where the other

primary stakeholders are the dealers to whom we send the finished cars as per the booking order through the outbound logistics team.

5. Buffer management, inventory control, transportation for inbound and outbound logistics are the main drivers of sustainability as per my working knowledge and area.
6. Poor planning, inadequate communication, low quality and rejection of parts are the barriers of sustainability. Insufficient finances and profits also result in low sustainable goals. Less number of sustainable suppliers which is also a significant barrier.
7. Quality control at supplier end before transportation and transparency of inspection to avoid line stoppage which directly impacts the production rate
8. Inspection of parts at supplier end by sampling method, improvement of part quality at different stages
9. Market forecast, Vendor establishment from User, Types of operational process planning, Material flow management methods.

## Appendix-E Interview with Senior Manager

1. I work as a senior manager in this company, and I joined this company as a management intern and worked for five months then I got a promotion and worked as a management trainee for one year. Afterwards, again I got a promotion and working as a senior manager in SHE (safety, health, environment) and sustainability.
2. My main activities are to support the SHE management system at seven manufacturing plants under the guidance of Dupont Standards, supporting all manufacturing locations in implementing safety standards such as HIRA (DO you know about HIRA? HIRA is a tool of risk assessment which is used for to identify which hazards pose the most significant risk in terms of how often they are to happen and how great their intensity), implementing initiatives on safety, environment and sustainability, monthly reviewing and monitoring the plant's sustainability performance. I often prepare a sustainability report for review at the corporate level and ensure sustenance & continuous improvement of safety culture at the company.
3. Sustainability is the core of the company's business, and we are pledged to provide a better quality of life of people by conveying the sustainable mobility solutions as per our mission statement we are a company that continuously invent across passenger and commercial vehicles to afford sustainable mobility solutions for society and goods. Our mission statement clearly tells that our purpose of survival and heartfelt promise to bring sustainable innovation into every process to improve the quality of life of society.
4. See, all the stakeholders have their roles and duties in implementing sustainability in any business. They are two pillars of sustainability. If one does not work well, the sustainable goals will definitely get affected. On the one hand, directors and managers find the new innovative ways of implementing sustainable practices in the working environment as in daily activities. The main focus of our board of directors and CEO are to achieve further sustainable goals in the company according to the government policies and regulations. Our managers are doing it so well, and every six months we have an inspection committee for CSR, which precisely measure and inspect the sustainable growth in our company. On the other hand, If I talk about external stakeholders, they do have an essential role in the implementation of sustainability. We have more than 118 suppliers in total, and we have a specific code of conduct for them according to which they have to work. We generally measure sustainability performance by continuous communication with suppliers on environmental, social and governance side of our diverse and multi-layered supply chain.



5. According to my working knowledge in this company, I think the primary driver of sustainability is financial resources which our company have. We are investing sufficient and required amount of fund in sustainable practices. On the other hand, the government is also doing a great job to make the Indian automotive sector more sustainable, every year our government enforced updated guidelines specifically for the automobile companies, which helps in sustainability. Another primary driver of sustainability is the communication between the employees. In our company, we have a unique way of communication with our employees. First of all, as I already discussed about the awareness of our top management towards the implementation of sustainability. For proper and comfortable communication, we organised meetings every month where every employee can put their viewpoints and doubts on sustainable practices. We also organised some extracurricular activities to increase awareness about sustainability. Another driver of sustainability is adopting and execution of just in time, six sigma concepts effectively to reduce the cost without reducing the quality, In fact, these manufacturing concepts helps to improve the quality and make the manufacturing more smooth and helps to attain sustainable goals.

6. I think employee engagement is essential for sustainability. I beliefs that employee involvement is based on confidence, honesty and both way trust and communication among our and our employees, and this is a technique that improves the probability of business success and successful sustainable practices. However, I usually noticed that in some production plant, we are facing a significant problem in implementing sustainability due to different opinions between the new managers and older employees of the company. One significant barrier of sustainability is the lacking of sustainable practices from the supplier end. However, our company have a stringent supplier code of conduct. However, still, it is tough to motivate the suppliers to adopt sustainable, sometimes they just acted to be sustainable, but in reality, they were not doing those practices. Another barrier for sustainable development is shortages of sustainable suppliers, as it is tough to find the sustainable suppliers of particular parts which are a significant barrier in the path of sustainability. I also considered the infrastructure as a barrier, as Indian is a developing country. At present traffic congestion, connectivity of the internet in some areas, irregular electricity supply, improper logistics infrastructure are some significant barriers which slow down the whole supply chain and result in a less sustainable goal

7. We are trying to reduce the consumption of non – renewable energy and trying to produce more energy via solar energy and another source of renewable energy. On the other hand, we are also trying to reduce water utilisation by the company.

8. We are working on energy conservation in indoor testing, as we check the quality of our finished products, we tested the performance and reliability of vehicles in labs. Our ongoing improvement is to reduce electricity consumption. We also proposed closed-loop life cycle prototype for our upcoming vehicles.

9. I think everything is fine in this research. One thing I want to suggest dependability on renewable energy is the most effective sustainable practices in the automobile industry as I discussed in the improvement which we are doing in our company.

## Appendix-F Interview with Assistant Manager

1. I am working in this company as an Assistant Manager. My primary duties are strategic planning and execution of transmission assembly operations in the company. I am working for the last three years with this company.
2. My daily duties are to assist transmission assembly operations, manufacturing and industrial engineering operations and new product introduction, which includes product validation, process planning and facility preparedness.
3. Sustainability is a very vulnerable concept for my company and me as well. We all should think about the environment and community in which we all are living. Our company understands the impact of the environmental and social impact of its actions, and we believe that green technology is the need of the hour to achieve both.
4. Every stakeholder has a different responsibility in implementing sustainable practices in the supply chain. In our company, our board of directors with chairman implement sustainability in company policies and code of conduct. Managers assigned activities and work to employees according to, implement and communicate those sustainable goals in the practical working. Employees need to do follow and complete the work which their managers asked them to do. On the other hand, customers have the most power in forcing the company towards sustainable goals. Moreover, suppliers need to align with the sustainable goals of the company only then the company can attain sustainable practices.
5. I think government regulations and policies forces automobile companies to adopt sustainable practices. For example, most of the changes in the emission of the engine are according to government regulations. Recently the Indian government banned BS-IV (Bharat-stage-IV) standards from April 2020 which signifies the emissions specifications of automobile set by the Indian government. All automobiles companies need to modify their engines according to these emissions. Customers pressure is also a driver of sustainability. Nowadays customers awareness about sustainability is increasing day by day, and they prefer to buy more sustainable products that's why automobile companies have to be more sustainable to compete in the global market and maintain a reputation to attract customers. I think green manufacturing methods is also a driver of sustainability. For example, we increase the manufacturing capacity of transmission assembly by

debottlenecking and adopting flexible manufacturing concepts which allow us to reduce the reduction in investment and operational cost, which directly leads to sustainability.

6. I think inadequate communication between the managers and employees is a barrier in implementing sustainable practices. Sometimes due to internal politics and inappropriate communication between the employees, leads to the sunk cost and deviation from sustainable achievements. Cost is also a barrier, as sometimes it is very expensive to adopt some sustainable practices in the production plant. Supplier involvement is also a big issue in implementing sustainable practices. It is not fair to say that they are not dedicated to sustainability. However, yes, they need to involve more in sustainability and strictly need to improve their quality control management. They have to understand the truth that we are working in a business for the same society. We also have a lack of alternatives in sourcing the parts, for example in current situation COVID-19, he described his company is dependent on a company, which is the in a different state in India, for a particular part. Due to lockdown that company was unable to deliver the part and hence that impact the whole supply chain, now they need to maintain the inventory of that part for an advance of one and half month except the safety stock. That increased inventory cost and disrupted planning and controlling. Infrastructure which we are getting is also a barrier; for example, Indian is a developing country. At present traffic congestion, connectivity of the internet in some areas, irregular electricity supply, improper logistics infrastructure are some significant barriers which slow down the whole supply chain and result in a less sustainable goal. Some issues can act as a barrier, like safety risks, older assets, security risk can impact the supply chain negatively which can affect the employees, finances of production plants, quality of products and customers of the company.

7. Right now, we are working on the reverse logistics, as due to increasing environmental problem in India, as we do not have a proper reverse logistics for the automobiles.

8. Sorry, I am not allowed to discuss this thing with you.

9. No.

## Appendix-G Interview with Head Engineer

1. I joined this company back in 2001, but in my current position, I had been working for almost nine years. I am the head engineer in the quality department.
2. Basically, I am in charge of the inspection of quality processes for the company, and I also run evaluations of products and engine testing. I also have to deal with managers to assure the implementation of quality standards. I also supervised
3. Sustainability in my company is crucial to remain competitive in the market. The vision and values that have motivated our company are defined by three fundamental approaches: an absolute sense of responsibility, recognition of possibilities and respect to humankind. All of our management policies are established on these fundamental values to producing a new future through innovative thinking and continuous new frontiers.
4. Customer's sustainability expectations are requirements which extend the government policies and forces sustainability into the automobile industry as far as employees of the company the power and responsibility of sustainability are strongly dependent on the job level of employees. Therefore, top management has the most power, following them managers and then employees. Suppliers have to prioritise the degree to which they can fulfil their customer's sustainability demand as well as they need to fulfil the cost of sustainability.
5. The main drivers of sustainability in the automotive supply chain
  - Government legislation and policies according to which every automobile maker needs to process their working under those guidelines and policies
  - All improvement made in the firm's sustainable practices has made under the supervision of the firm's corporate social responsibility management (CSR Committee). CSSR team includes the CEO and other trustable members managers, monitor the sustainable issues in the entire supply chain and seek continuous improvement in the sustainable achievements and discuss future goals and agendas. This CSR team also guides and constitute the framework of sustainability for the best achievement of the corporate social responsibility by continuous reviewing process.

- One of the participants described that by shifting on the sustainable initiatives, his company saves at least half of the water usages and electricity from the solar plant, in this way, the company saves much money. Profit is also a driver to sustainability.
  - Methods like effective inbound and outbound logistics also lead to achieving more sustainable goals. By improving the inbound and outbound logistics, the company achieved more sustainable goals.
  - Lack of communication between employees that is employee engagement is essential for the firm. I believe that employee involvement is based on confidence, honesty and both way trust and communication among any firm and its employees and this is a technique that improves the probability of business success and successful sustainable practices and vice-versa. Sustainability comes at a price. Initially, you need to spend more on sustainable goals because sustainability is a long process. Suppliers are not entirely dedicated to sustainable improvements, because the quality of parts which suppliers delivered is not sufficient, they need to be more aware of the sustainable process so that they can overcome the quality issue and thus we can also avoid the problems like stoppage of production line due to improper quality of supplier end products. There should be some technology which can provide managers to inspect the quality of parts, which supplier is going to deliver in the production plant if there is any problem in quality managers can stop delivery of those parts and plan accordingly for the future that saves resources and leads towards better planning for production. Another barrier is, there is no such awareness of reverse logistics in India, and automobile companies are not doing sufficient for that. I cannot say that automobile companies do not do anything, but they are making fewer efforts in the field of reverse logistics. Every year millions of cars come to scrap yards, but only a few parts can recyclable most of the interior and electronic part just went to landfill, which is sad. Automobiles companies should do something about that, and even the government should bring strict regulations on reverse logistics.
6. We are facing a problem in developing eco-friendly vehicles, in developing the Lot tracking system which will enable us to control the risk of defects while manufacturing.
  7. Developing a hydrogen-based society, creating shared value strategy system
  8. Looks good.

## Appendix H – Content Analysis Via MAXQDA

### Code segregation as per the objective

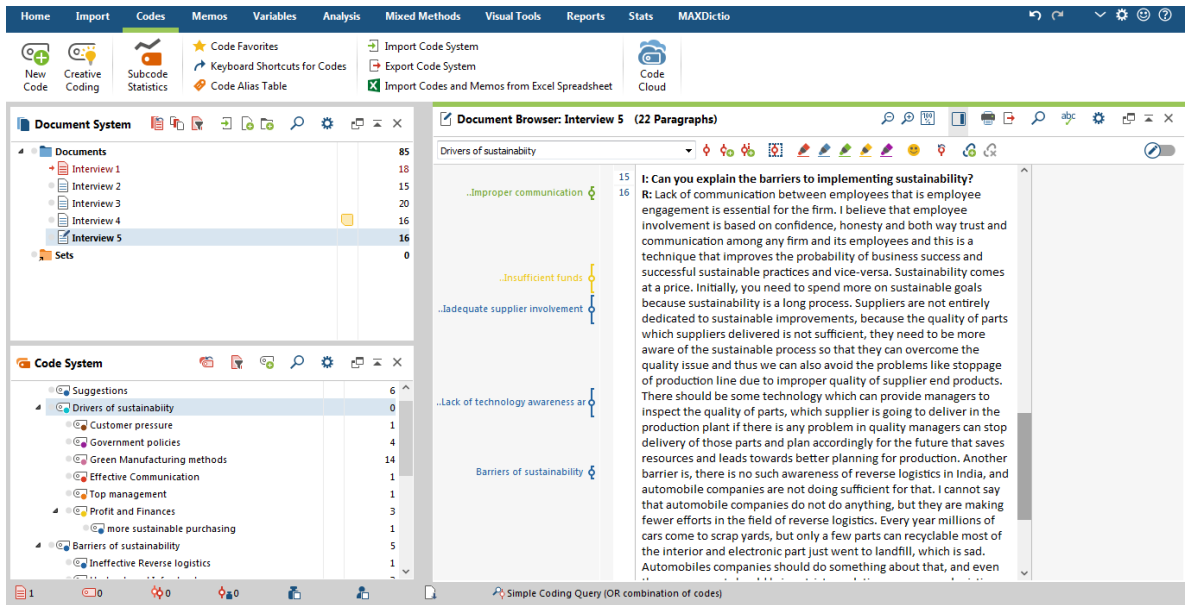
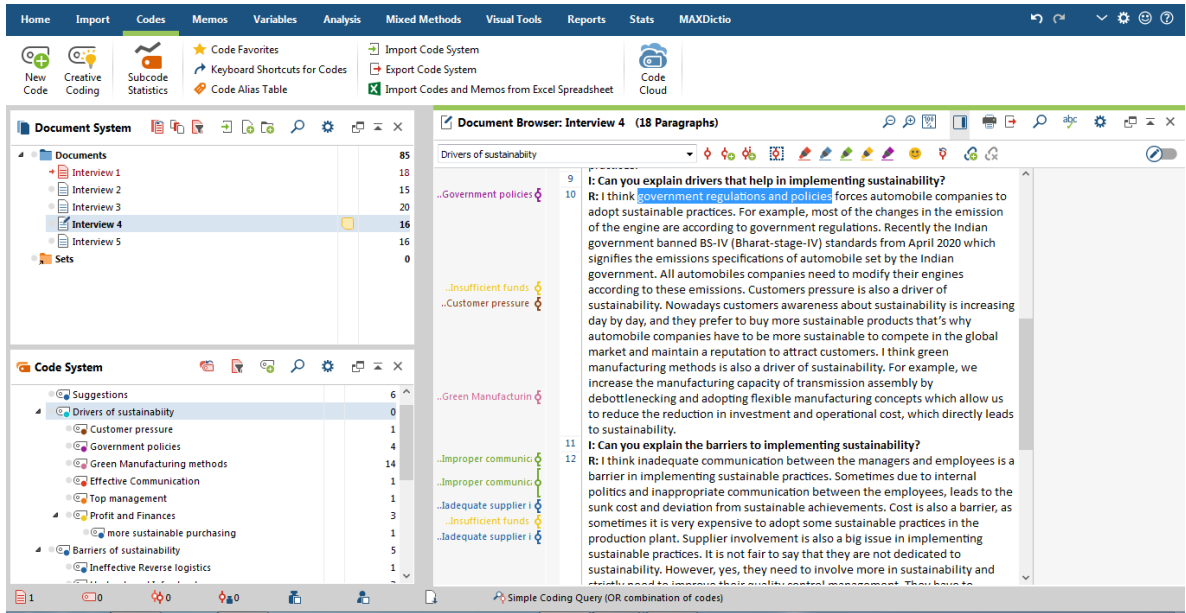
The screenshot displays the MAXQDA software interface. The top menu bar includes Home, Import, Codes, Memos, Variables, Analysis, Mixed Methods, Visual Tools, Reports, Stats, and MAXDictio. Below the menu, there are several tool icons: New Code, Creative Coding, Subcode Statistics, Code Favorites, Keyboard Shortcuts for Codes, Code Alias Table, Import Code System, Export Code System, Import Codes and Memos from Excel Spreadsheet, and Code Cloud.

The main workspace is divided into three panes:

- Document System:** A tree view showing a hierarchy of documents. Under 'Documents', there are five interview files (Interview 1 to Interview 5) and a 'Sets' folder. The word counts for each are: Interview 1 (18), Interview 2 (15), Interview 3 (20), Interview 4 (16), Interview 5 (16), and Sets (0).
- Code System:** A tree view showing a hierarchy of codes. Under 'Code System', there are 'Suggestions' (6) and 'Drivers of sustainability' (0). 'Drivers of sustainability' is expanded to show sub-codes: Customer pressure (1), Government policies (4), Green Manufacturing methods (14), Effective Communication (1), Top management (1), Profit and Finances (3), more sustainable purchasing (1), Barriers of sustainability (5), and Ineffective Reverse Logistics (1).
- Document Browser: Interview 5 (22 Paragraphs):** A text editor showing the content of Interview 5. The text is segmented into paragraphs, with codes applied to specific parts. The code 'Drivers of sustainability' is applied to the first paragraph. The code 'Barriers of sustainability' is applied to the second paragraph. The code 'Lack of technology awareness at' is applied to the third paragraph. The code 'Inadequate supplier involvement' is applied to the fourth paragraph. The code 'Insufficient funds' is applied to the fifth paragraph. The code 'Improper communication' is applied to the sixth paragraph.

The status bar at the bottom indicates 'Simple Coding Query (OR combination of codes)'.

### Code for Objectives



## Coding maps based on objectives



