BARRIERS THAT IMPEDE THE IMPLEMENTATION OF CIRCULAR ECONOMY PRACTICES FOR THE AUTOMOTIVE INDUSTRY IN MALAYSIA

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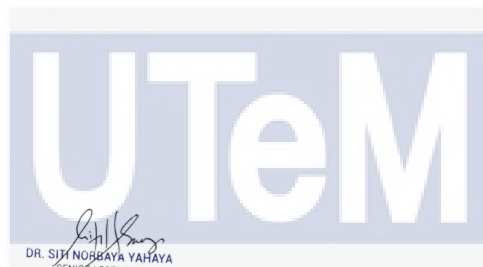
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I/We, hereby declared that I/WE had read through this thesis and in my/our opinion that this thesis is adequate in terms of scope and quality which fulfil the requirements for the award of Bachelor of Technology Management with Honours

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I hereby declare that the work has been done by myself and no portion of the work in this research project proposal has been submitted in support of any application for any other degree or qualification of this or any other university or institute of learning.

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DEDICATION

I would like to dedicate this research to my beloved parents who have raised me up, siblings, companion in love who always give encouragement and guidance through my journey to complete study. Besides, I would like to thank Dr. Siti Norbaya Binti Yahaya who guide me all the way to complete my thesis.

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ABSTRACT

Researchers and practitioners have been paying close attention to the circular economy (CE) since it addresses both social and environmental benefits. It also allows for the optimization of the manufacturing process by developing sustainable products that retain as much of their value as feasible. The researcher focuses on the constraints that obstruct the application of circular economy practises in the Malaysian automobile industry in this research paper. Apart from China, little attention has been paid in the literature to the hurdles to CE adoption in Malaysia. Moreover, the pandemic COVID-19 that disrupted the supply chain in automotive industries are the foundation of issue that led to this study. Governmental, economic, and social barriers are identified as the barriers that impede the implementation of CE for automotive industry in Malaysia. This study employs a quantitative method. Primary data will be collected by a survey that will be distributed to all Malaysian that using motor vehicles. In addition, 384 respondents will be chosen using probability sampling. To verify data consistency, a pilot test and reliability analysis will be conducted. Statistical Package for Social Sciences will also be used to analyse the results gathered from respondents (SPSS). To evaluate the researcher's hypothesis, descriptive statistics, Pearson's correlation coefficient, and multiple regression analysis are utilised. From the result, governmental, economic and social barriers have significant relationship in influencing barriers to the implementation of CE practices and governmental barrier is the most significant barrier influencing barriers to the implementation of CE practices Researchers might use the proposed new conceptual framework to conduct future research or add other variables to the study.

Keywords: circular economy, remanufacturing, closed-loop supply chain

ABSTRAK

Penyelidik dan pengamal telah memberi perhatian kepada ekonomi pekeliling (CE) kerana ia menangani kedua-dua faedah sosial dan alam sekitar. Ia juga membolehkan pengoptimuman proses pembuatan dengan membangunkan produk mampan yang mengekalkan nilainya sebanyak mungkin. Pengkaji memberi tumpuan kepada kekangan yang menghalang pengaplikasian amalan ekonomi pekeliling dalam industri automobil Malaysia dalam kertas penyelidikan ini. Selain China, sedikit perhatian telah diberikan kepada literatur tentang halangan kepada penerimaan CE di Malaysia. Selain itu, pandemik COVID-19 yang mengganggu rantaian bekalan dalam industri automotif adalah asas kepada isu yang membawa kepada kajian ini. Halangan kerajaan, ekonomi dan sosial dikenal pasti sebagai halangan yang menghalang pelaksanaan CE dalam industri automotif di Malaysia. Kajian ini menggunakan kaedah kuantitatif. Data utama akan dikumpul melalui tinjauan yang akan diedarkan kepada semua rakyat Malaysia yang menggunakan kenderaan bermotor. Selain itu, 384 responden akan dipilih menggunakan pensampelan kebarangkalian. Untuk mengesahkan ketekalan data, ujian rintis dan analisis kebolehpercayaan akan dijalankan. Pakej Statistik untuk Sains Sosial juga akan digunakan untuk menganalisis keputusan yang dikumpul daripada responden (SPSS). Untuk menilai hipotesis penyelidik, statistik deskriptif, pekali korelasi Pearson, dan analisis regresi berganda digunakan. Daripada hasilnya, halangan kerajaan, ekonomi dan sosial mempunyai hubungan yang signifikan dalam mempengaruhi halangan kepada pelaksanaan amalan CE dan halangan kerajaan adalah halangan paling ketara yang mempengaruhi halangan kepada pelaksanaan amalan CE Penyelidik mungkin menggunakan rangka kerja konsep baru yang dicadangkan untuk menjalankan penyelidikan masa hadapan atau menambah pembolehubah lain kepada kajian.

Kata kunci: ekonomi sirkular, pembuatan semula, rantaian bekalan gelung tertutup

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CHAPTER 1

INTRODUCTION

1.1 Introduction

An overview of the research process was provided in this chapter. Background, problem statement, aims, questions, scope, constraints, and significance are all evaluated in the study's introductory section.

1.2 Research Flow
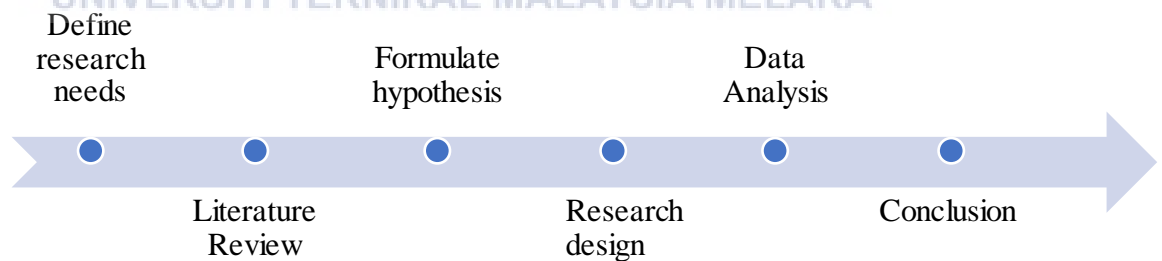
1.3 Background of Study

The notion of circular economy has been mentioned since the 1970s with the aid of using numerous authors and schools of philosophy. The common idea has been improved and evolved with the aid of using numerous schools of philosophy from the "Cradle to Cradle" framework, performance economy, biomimicry, industrial ecology, and blue economy.

1.3.1 Cradle to Cradle

In Ellen Mac Arthur Foundation, the "Cradle to Cradle" notion and certification procedure has been evolved by German chemist Michael Braungart and American architect Bill McDonough. According to this notion, there are two primary classes after taking into account all substances entailed in industrial and business approaches to be nutrients that are technical and biological. The layout for effectiveness in name of manufacturing goods with positive effects has been the earlier attention in the "Cradle to Cradle" foundation.

"Cradle to Cradle" theory has 3 essences that are natural systems, utilisation clean energy source and rejoice diversity respectively. Because everything in a biological ecosystem can be used as a resource, it's possible that there is no such thing as waste. Technical nutrients should be reused repeatedly without degradation in quality, whereas biological nutrients must be returned to the soil in a sustainable manner. According to "use clean and renewable energy," this type of energy is preferred since it satisfies all four criteria: it is emission-free, cheap to operate, uses abundant resources, and is environmentally friendly. Lastly, variety is every other method essential to conquer the demanding situations and meet the possibilities supplied through specific geographies.

1.3.2 Performance Economy

In a study titled "The Potential for Substituting Manpower for Energy," Walter Stahel, an architect and economist, lays out a broad perspective on an economy that

operates in loops (or a circular economy). Job growth, economic competitiveness, resource conservation, and trash avoidance were all considered.

Stahel founded the Product Life Institute in Geneva over 25 years ago, after spending the late 1970s developing a "closed-loop" approach to manufacturing. Its primary focus is on preventing waste, increasing product longevity, reusing materials, and repurposing products.

1.3.3 Biomimicry

Janine Benyus, writer of "Biomimicry: Innovation Inspired by Nature" defines her approach as a brand-new subject that research nature's high-quality thoughts and then imitates those designs and techniques to resolve human problems". She believed that humans ought to discover answers to human demanding situations through emulating nature's styles and strategies.

1.3.4 Industrial Ecology

Taking a holistic approach, industrial ecologists model their production processes after biological systems. To accomplish this, we must first consider the global impact of our actions before focusing on the local ecological limits we face. The goal of this method is to eliminate wasteful by-products by creating closed-loop systems that utilise waste as an input. Given its multidisciplinary nature, this approach is sometimes referred to as the "science of sustainability." Emphasizing natural capital recovery make certain specializes in social well-being wherein the concepts of industrial ecology also can be carried out withinside the services sector.

1.3.5 Blue Economy

Begun by Belgian businessman and former Ecover CEO Gunter Pauli, the Blue Economy is an open-source movement that brings together specific case studies. These were originally assembled in a report of the same name, which was then presented to the Club of Rome. The Blue Economy's 21 guiding principles emphasise the

importance of gravity as the primary source of energy and require that decisions be made in light of local conditions and physical or ecological factors.

According to Bursa Malaysia (2019), Malaysia will introduce the "Malaysian Circular Economy Roadmap for Plastics" through 2020 as a part of the 2018-2030 roadmap closer to zero single-use plastics. The roadmap objective is to offer a path for policy and stakeholders inclusive of state governments. Dr. Ong Kian Ming, The International Trade and Industry Deputy Minister said that Malaysia is now getting ready to take the following step toward sustainability. He additionally stated that authorities will make sure Malaysia does now no longer leave out the large ability of a circular economy and recycling. Malaysia additionally requires a feasible, effective, and advanced waste control system for the country.

According to the Malaysian Investment Development Authority, MIDA (2021), the circular economy appears at the infant level. MIDA inspires the producers to begin to remodel commercial enterprise models wherein all products manufactured are without difficulty recyclable, repurposed, or reused utilizing sustainable sources of raw substances. This may additionally apply in designing parts or elements that may be effortlessly disassembled, reassembled, and retrofitted. Designing for zero waste and zero pollution, maximising the lifespan of products and materials, and restoring and protecting ecological systems are the pillars upon which the circular economy rests. The intention is to allow the goods to retain to circulate long as they could and decrease the usage of raw sources to provide new products.

There were several studies have examined the drivers, practices, and barriers toward circular economy in terms of supply chain perspective (Govindan and Hasanagic, 2018), the benefits, opportunities, and barriers of circular economy in the manufacturing sector (Kumar et al., 2019), breaking circular economy barriers (Grafstrom and Aasma, 2021), and the drivers and barriers to circular economy implementation in Pakistan's automobile industry (Agyemang et al., 2018). However, most of the studies were conducted outside of Malaysia and there is a scarcity in circular economy research in developing countries such as Malaysia.

1.4 Problem Statement

The surging Covid-19 infection rate and lockdowns in Southeast Asia are worsening (GlobalData, 2021). The arrival of the notably infectious Delta variant causes numerous countries in Southeast Asia including Malaysia, Indonesia, Vietnam, and Thailand to suffer from their worst because of new lockdowns.

Japanese and United States automobile producers have been suffering from the lockdowns that seriously disrupted the car component producers throughout the region as they may be an increasing number depending on providers primarily based totally in low-cost countries throughout Southeast Asia.

Thus, the issue of shortages in electronic components and semiconductors will costing OEMs in manufacturing and logistics. Other than that, the headlines more focusing on semiconductors and computer chips but overlooked the reality that many different commodities are presently in short supply, including leather, fabrics, steel, rubber, and lots more (Chow, 2021). According to Ortego et al. (2020), a conventional passenger automobile requires around 50 different varieties of metals, however, their practical recycling is almost absent.

In addition, there is an issue where there may be no circular economy roadmap specifically for the automotive industry in Malaysia. The finest attempt in Malaysia, according to Kasturi Nathan, Head of Board Advisory Services KPMG in Malaysia, is a "reuse economy" that involves recycling but still consumes new virgin materials (KPMG, 2022).

The automotive industry has been stretched to its limits in order to address the issues of supply problems in electronic parts and semi - conductor, a vague roadmap for the industry, and economic instabilities caused by the COVID-19 pandemic. These factors have made it urgent to switch to a more sustainable usage and production life cycle.

These issue even more worse when the know-how of the capability sustainability synergy among developing countries stays slow-moving regardless of the growing interest toward sustainable improvement and circular economy throughout the world (Isa, Sivapathy, & Adjrina Kamarruddin, 2021).

1.5 Research Objectives

The aim of this study is to examine the barriers in implementing circular economy practices for the automotive industry. The objectives developed in this study was based on problem statement above as follows:

1. To identify the barriers to circular economy experienced by automotive industry.
2. To evaluate the relationship between the barriers toward the implementation of circular economy practices for automotive industry.
3. To examine the most significance barriers that impede the implementation of circular economy practices for the automotive industry.

1.6 Research Questions

The purpose of this study is to answer following questions:

1. What are the barriers to the implementation of circular economy practices experienced by automotive industry?
2. What is the relationship between the barriers toward the implementation of circular economy practices for automotive industry?
3. What are the most significant barriers that impede the implementation of circular economy practices for the automotive industry?

1.7 Scope and Limitations of Study

The research is about the barriers to the implementation of circular economy practices experienced by automotive industry. The scope of this study comprises the circular economy practices experienced by automotive industry. This research will be conducted in Malaysia and adopt a survey method by distributing questionnaire only. This study view Malaysia from the aspect of potential development and being aligned with the new demand requiring sustainability.

However, there are several limitations in this study. The limited sample size, n=19 probably cannot achieve the generalisability of the research. Lastly, the lack of study on circular economy or remanufacturing in Malaysia has slowed the growth of the circular economy and resulted in a lack of research base for circular economy studies in Malaysia.

1.8 Significance of Study

From research perspective, this study is expected to be significant in terms of barriers that impede the implementation of circular economy for automotive industry in Malaysia and to encourage more circular economy studies to be conducted specified in automotives. Besides, this study will bring benefits to automotive and parts manufacturers to act as a reference for them to have a deeper level of understanding about potential of circular economy in Malaysia.

1.9 Summary

The chapter's overview of the research project is presented here. The researcher has provided a brief overview of the study's context, a clearly stated problem statement, the study's stated goals, and the questions that will be explored. It is from this problem definition that the research aims, and questions are derived. In addition, the researcher has outlined the study's limitations and scope. Finally, the importance of the study is described by outlining the study's objectives and the benefits that have resulted from it.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Because of the expanding population, a rising economic structure, and a more complex way of life of humans, the exploitation of natural resources has increased in order to meet the increasing demand. As a result, businesses face several operational issues. The shortage of resources is resulting in higher input costs, and as a result, the product is considerably less viable within the market. Most manufacturing organisations continue to operate under the classic linear economy paradigm, in which traditional procedures of material reuse and recycling are inefficient and waste precious resources (**P. Kumar and colleagues, 2020**)

2.2 Recycling of End-of-Vehicle (ELVs)

End-of-life vehicles (ELVs) are vehicles that have reached the end of its lifespan and can no longer be used (Harun et al., 2021). ELVs are classified into two types based on their occurrence: natural and unnatural. In the case of a natural event, that is a vehicle which has met the end of its useful life once it has been wrecked or that could no longer work effectively. This occurs after the vehicle has already been in operation for at least ten (10) years. That is a vehicle that could no longer be utilised as a consequence of physical damage due to an accident, arson, or vandalism. There are further vehicles that cannot be used due to economic concerns, such as car owners neglecting to renew vehicle tax, expensive maintenance costs, or a market shortage of replacement parts. (Raja Mamat et al., 2016).

Table 2.2: **For the period 2010 to YTD March 2022, a summary of passenger and commercial vehicles produced and built in Malaysia is provided.**

Source: Malaysian Automotive Association (MAA)

YEAR	TOTAL VEHICLES
2010	567,715
2011	533,515
2012	569,620
2013	601,407
2014	596,418
2015	614,664
2016	545,253
2017	499,639
2018	564,791
2019	571,632
2020	485,186
2021	481,651
YTD March 2022	154,160

Malaysia's fast population expansion and industrialization have boosted garbage generation, which has become a serious threat to the environment (Wong, Al-Obaidi, & Mahyuddin, 2018). Malaysia, as an automotive production country, has taken various steps to guarantee proper ELV handling. In 2009, the government enacted the "Vehicle Lifespan Policy" in response to the high average lifespan of cars and the low rate of auto disposal. Therefore, the first step toward full ELV adoption is to demand an annual inspection as a prerequisite for vehicle tax renewal for all fifteen (15) year old or older cars (MITI 2009). However, the execution of the law was met with intense public condemnation. Then it was established that policy was implemented without sufficient monitoring (Azmi et al., 2013).

On February 16, 2014, the Malaysia Automotive Institute (MAI) and the Ministry of International Trade and Sector (MITI) released six roadmaps for the growth of the local automotive industry, one of which is the Malaysia Automotive Remanufacturing Roadmap (MARR). Nonetheless, there are significant challenges in Malaysia's remanufacturing businesses. (Ngu, Lee, Bin Osman, 2020)

The majority of buyers in Malaysia have incorrect assumptions and misunderstandings regarding remanufactured items and the remanufacturing process. The quality of refurbished items had been misconstrued as being comparable to old or repaired products. This situation is owing to Malaysia's unclear, confused, and incomplete definition of remanufacturing (Govindan, Jimeniz Parra, Rubio, Vicente Molina, 2019; Singhal, Jena, Tripathy, 2019).

Even though MITI have already established a broadly accepted as well as comprehensive definition of the remanufacturing cycle under the "National Remanufacturing Policy" by the end of 2019, MITI Malaysia had described the remanufacturing process as "the remanufacturing process is in compliance with appropriate technical requirements, including engineering, quality, and testing requirements established by OEM" (MITI Malaysia, 2019). However, because modern cars have complex embedded systems and electronic control unit (ECU) systems, remanufacturers in Malaysia are having trouble gaining access to specific technological data, performance standards, toolkits, examination, and machineries created by Original Equipment Manufacturer (OEM). This is because specialised tools

and diagnostics systems are both costly and hard to procure in the market. (Steinhilper and Brent, 2003).

Furthermore, most OEMs are always afraid to disclose their resources with remanufacturers since they see remanufacturers as a possible rival. Local manufacturers are also concerned that the widespread availability of remanufactured items may reduce the sales volume of newly made items (Ijomah & Childe, 2007).

As according to Sharma, Garg, Sharma P.B. (2016), remanufacturing is a labour-intensive business, with labour costs accounting for 34% to 45% of overall remanufacturing costs. Malaysia is highly competitive in comparison to other industrialised countries owing to the accessibility of a steady, well-educated personnel with a low median income. Malaysian remanufacturers, on the other hand, are having problems finding highly experienced technicians and engineering management specialists in industry 4.0 practise (Choudhary and Singh, 2011).

Furthermore, the bulk of Malaysian remanufacturers are small and medium-sized standalone remanufacturers (Andrew-Munot et al., 2015). In comparison to huge OEM remanufacturers, these unrestrained reproducers offer the advantages of flexibility, quick responsiveness to client requests, and a quick and easy judgement chain due to their basic organisational processes and procedures (Abe and Proksch, 2017; Chang & Cheng, 2019; Ian Burke & Jarratt, 2004; Terziovski, 2010; Williamson, Lynch-Wood, Ramsay, 2006).

However, unrestrained Malaysian manufacturers confront a lack of readily available finance and R&D resources (R&D). They also lack remanufacturer business organisations or sector engagement to help them build partnerships with reproducers and OEMs, federal agencies, consumers, vendors, and other stakeholders. (Ijomah & Childe, 2007).

2.3 Definition of Circular Economy

The industrial system's closed-loop architecture is the core of the circular economy (CE), which improves resource efficiency (P. Kumar et al., 2020). In order to decrease the overall number of useable resources and energy input as well as waste production, CE is a theory that tries to increase the effectiveness of aid by delaying, closing, and minimising material and energy loops. (Agamuthu & Mehran, 2020). In terms of sustainability, the circular economy seems to be the most ecological post-production business model. It makes use of nature, human, cultural, and manmade resources to enhance the environmental, social, and economic variables that contribute to sustainable (Walter Stahel R, 2019).

Circular economy in Malaysia seems to be an ambiguous long-term goal due to weak legislative framework, however, there have been widespread practises of greener production at company levels in Malaysia. In Malaysia, the legislative framework for waste control in terms of the circular economy, which includes the Solid Waste Management (SWM) Act, is still in its infancy, having been introduced in 2007. This Act stresses supply segregation and reuse in municipal waste (Agamuthu and Mehran, 2020).

Brunei, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam comprise the Association of Southeast Asian Nations (ASEAN). ASEAN is already a manufacturing powerhouse, accounting for about 5% of global production in terms of value-added, with leading positions in industries such as autos, semiconductors, chemicals, fabrics, foodservice, and metal supplies (Anbumozhi, Kimura, & Economic Research Institute for ASEAN & East Asia, 2018).

The idea of CE is frequently ambiguous and varies based on practitioner, field, and geographical region (Kirchherr, Reike, Hekkert, 2017; Korhonen, Honkasalo, Seppala, 2018); Geissdoerfer, Savaget, Bocken, Hutlink, 2017), as well as cultural, social, and political context. For example, in industrialised countries such as the United States, the United Kingdom, and the European Union, the CE idea focuses on the 3Rs, which are reduce, reuse, and recycle of resources, waste management, and promoting sustainable development for ecological sustainability (Costa, Guillaume, Agarwal, 2010). While wealthy Asian countries such as South Korea and Japan focus mostly on

creating public knowledge about consumer responsibility for material usage and waste (Winans, Kendall, Deng, 2017). China, on the other hand, embraced the CE idea to encourage urban development and attain a balanced economic growth of development in both the rural and urban areas (Winans et al., 2017). The CE push in China is heavily focused on the replacement of traditional industrial culture with revolutionary technology and processes that considerably boost production efficiency and profitability (Geng, Fu, Sarkis, Xue, 2012).

The decision to pursue a circular economy concept shows that the firm has begun to focus on environmental management and product lifecycle issues and may differentiate traditional supply chain operations from greener closed-loop supply chains. Closed-loop supply chains emerged as a result of the application of contemporary industry standards specialising in sustainability or eco-performance issues. This is expected to work with suppliers to reduce the negative consequences of processes and products.

Designs and operational are not the only difficult conditions in closed-loop supply networks, but they also have significant ramifications for the distribution networks. They should combine traditional supply networks into even more green closed-loop system supply chain operations focusing on green distribution, as well as reverse supply chain activities such as product refurbishing, checking out and classifying, and remarketing. Although reverse logistics structures have been used since the 1920s, the strategic goal of incorporating the concept of a closed-loop supply network into a mainstream firm's operation remains insufficient.

Closed loop or reverse systems are generally handled as a silo, disconnected from the companies operate, in which not uncommon place operations are but to be created and were no longer comprehended in other circumstances due to differences in product complexity and managerial importance perceptions (De Angelis, Howard, & Miemczyk, 2018).

2.4 Underpinning Theories

Underpinning theory is any theoretical or background work that has been done in the field that will support the research.

a) **'Six Pillars' Framework** (Pomponi and Moncaster, 2017)

According to Pomponi and Moncaster's (2017) research, it is best to integrate the use of several fields in order to successfully achieve the aims of overall sustainability studies.

According to their framework, the peripheral arrowed arcs stand for the necessity of a comprehensive strategy and a coordinated collaboration of research activities in each of the six pillars. Second, the inner dashed lines emphasise how crucial it is to have real-world connections between each pillar and the others. The framework also provides for sub-groups of two, three, four, and five dimensions because not all research dimensions may be required in some circumstances. The impact of basic innovation may be just as significant as that of forward-thinking state policy, therefore top-down and bottom-up initiatives are viewed equally.

The barriers that have been found in their investigation are being extracted from these two underlying hypotheses. The conceptual framework that will assist to provide insights into what types of barriers influence the implementation of the circular economy for the automobile industries in Malaysia will be built using the barriers that were extracted.

2.5 Barriers to Circular Economy

A shift to the CE method or any other business model for economic sustainability demands a significant shift for the entire organisation, along with all stakeholders. This transition is truly largely unpredictable since the present mode of operation may be altered as a result of the new solution provided by the CE model. Because the CE model necessitates the collaboration of suppliers and manufacturers, supply networks are critical to its implementation. Coordination and cooperation across the supply chain are crucial, as upstream partners secure sustainable inputs while downstream stakeholders collaborate on environmental management strategies such as returned items, reuse, and recycling. Due to a variety of constraints, businesses are unwilling to move forward with the circular economy (Jaeger & Upadhyay, 2020).

Manufacturing industries are defined as those that use sophisticated machinery and digital instruments to enhance their production. These businesses include the construction, automotive, defence and weapons industries, energy (electrical and petroleum), computer, and aerospace sectors. In these areas, large machine, raw metals, computerised and intricate industrial devices, drills and cranes, and certain other haulage equipment and appliances are employed (GSI, 2018). It is vital for these businesses to have a secure method of converting or disposing of hazardous metal and electrical waste.

The manufacturing industry is an economic cornerstone that is critical to long-term economic growth, but it is constrained by tradition, making change difficult and expensive (Herman, 2016; Lieder and Rashid, 2016). Furthermore, Consumers desire value co-creation, connection, and long-term operations, which is blurring the barrier among both manufacturing and service industries. The CE is more advanced than the linear model, which provides barriers to transitioning to CE (Hopkinson, Zils, Hawkins, & Roper, 2018).

A transition to the CE model or any business strategy for financial sustainability involves a significant shift for the entire company, including all stakeholders. This shift is rather uncertain because the existing mode of operation will change as a result of current CE model solution. (Ritzén & Sandström, 2017).

According to Govindan & Hasanagic, (2018) studies, they have classified the selected barriers into eight (8) clusters as follows:

Table 2.4 (a): Clusters of the barriers for circular economy.

Clusters	Issues
a) Governmental concerns	• Absence of established performance evaluation methods • Ineffective recycle programmes for achieving high quality • New legislation enacted with inadequate cooperation • Current rules which do not promote the circular economy
b) Monetary concerns	• Economic and financial barriers to creating a circular economy distribution network
c) Technological concerns	• Technological restrictions, handling unpredictability when a product reaches the end of its useful life • regulating quality control across the course of a product's life

	• design issues in order to generate or maintain durability
d) Expertise and competence concerns	• an absence of reliable information • a general lack of understanding • a poor skill • a lack of customer knowledge of the worth of refurbished items.
e) Management issues	• Lack of senior management support • Have a greater priority in companies and within the structured structure
f) Circular economy structure concerns	• Alternative solutions to the circular economy structure may be preferable.
g) Social and cultural concerns	• A lack of passion for implementing the circular economy • Consumer attitudes regarding reusing things and the excitement of acquiring a new product.
h) Market issues	• Externalities that prohibit businesses from taking use of refurbished items, such as ownership rules and a lack of regulatory requirements for refurbishing products.

A comprehensive review, which is a systematic technique of acquiring available material, was employed. According to their findings, the vast bulk of published circular economy research consists of reviewed literature, reports, research papers, and conceptual frameworks. The majority of works focused on China as opposed to other geographical settings. As a consequence of their expanding population, the fast loss of non - renewable sources, and the nation's societal issues (Ghisellini, Cialami, Ulgiati, 2016) China is unquestionably more devoted to adopting the circular economy. A multi-perspective framework has been designed to offer the most comprehensive picture and to explain how various drivers, barriers, and practises influence each other in terms of stakeholders. Suppliers, organisations, and consumers comprise the internal environment, while the government and others comprise the external environment (Govindan & Hasanagic, 2018).
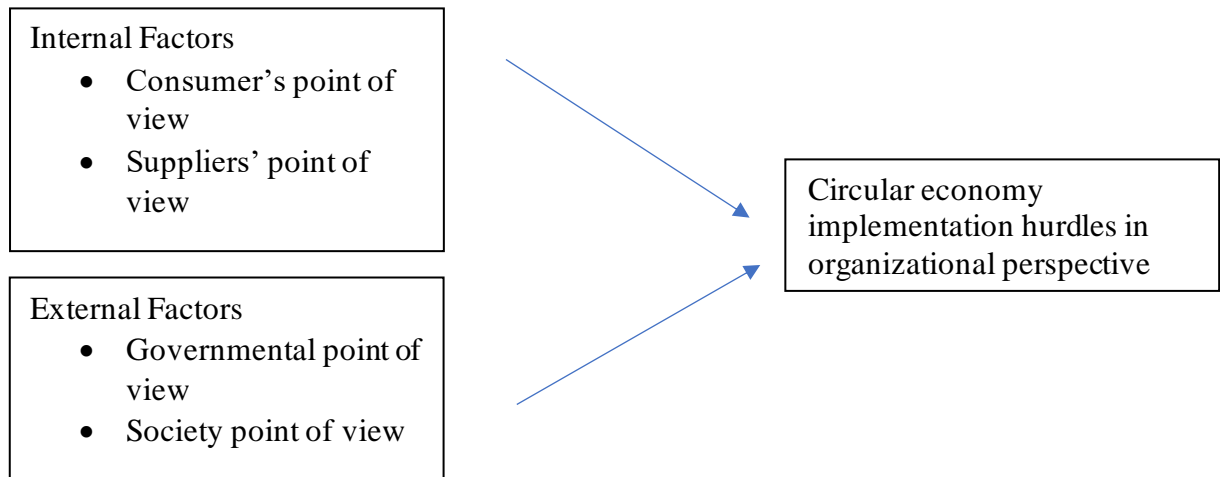
Framework developed by Govindan & Hasanagic, (2018).

The biggest hurdles of using CE principles in the Pakistan automotive business, according to Agyemang et al. (2019) are "unawareness," "cost and financial constraint," and "lack of competency." The drivers and potential barriers therefore provide basis for automotive sector company management and other stakeholders in Pakistan to formulate policies and strategies to address hurdles that impede CE implementation, as well as to publicise and facilitate successful enterprise implementation and transition to CE systems.

This holistic paradigm has the potential to be utilized as a conceptual platform for future research, particularly on emerging economies. Internal and external constraints to micro-level CE adoption have been identified as perceived barriers (Mont, Plepys, Whalen, & Nußholz, 2017). Based on their findings, the framework for the constraints to CE adoption in Pakistan's automotive sector is as follows:

Table 2.4 (b): List of the potential barriers from previous studies (Agyemang et al., 2019)

No	Internal barriers
1	Lack of expertise
2	Unaware/none
3	Top management/Resistance to change
4	Cost and financial constraint
5	Lack of technical and technological capacity
6	The learning process and associated risk
7	Lack of resource
8	Profit and market demand level
9	Feasibility of CE implementation
10	Quality of finished product
11	Unused material
	External barriers
1	Government policies
2	Lack of industrial support
3	Lack of supply chain integration and effects of supply chain complexity

2.5.1 Governmental perspective

There are various hurdles to enterprises implementing a circular economy in their supply chain, according to the results of (Govindan & Hasanagic, 2018). One of them is the government's aversion to experimenting with better financial and economic mechanisms for businesses. The lack of financial assistance from the government in the form of banks, tax reductions, and subsidies stifles interest in using green technologies to create a circular economy (Su, Heshmati, Geng, Yu, 2013). Poor legislation, for example, is a major barrier to China's implementation of the circular economy. The law is not properly enforced, and there are sophisticated, corrupt systems in place. As a result, effective methods for redefining efficiency and methods through particular metrics, as well as taking the required steps to make the supply chain visible, must be developed.

Municipal governments, on the other hand, should collect trustworthy data on the state of the circular economy in their provinces, which should subsequently be provided to national governments for planning purposes. Such mechanisms or cooperation of national and provincial governments do not exist at the moment. This frustrates local government policymakers since they have no notion what needs to be fixed or what goals they should pursue. Because there are differences between prosperous and poor regions, instead of relying on national measures, the government should develop local metrics for each region.

Furthermore, developed nations (EU) generally outsource their goods to low-wage and emerging economies, leading in waste production. As a result, regulating the whole supply chain, including second and third-tier suppliers, is crucial. However, these challenges are mostly neglected in proposed legislation and programmes; there are no real plans for implementing the circular economy with subcontractors. Only the target firm receives 6R techniques.

Government policies have a significant effect on how firms plan for the future. The majority of locations have disparate regulatory regimes. The government's and local governments' responsibilities in adopting CE are unclear. Several studies have found that this convoluted arrangement leads to poor local government accountability and the adoption of inefficient laws (Benton, Hazell, and Hill, 2015; Geng & Doberstein, 2008; Su et al., 2013; Li & Yu, 2011; (Naustdalslid, 2014); Winans et al.,

2017). As a result, the necessary CE legislation and regulations cannot be adopted. Enterprises struggle to implement CE due to disconnected systems and, as a result, a lack of legislative backing.

As a result, businesses choose to remain with their present strategy rather than take chances, restricting CE's growth. In addition, several authorities lack a full understanding of CE procedures ((Benton et al., 2015; Geng & Doberstein, 2008; (Naustdalslid, 2015). They are not able to take the lead, guide firms, or implement suitable legal guidelines due to the fact they are ignorant of the advantages of CE. They can't articulate a solid vision, targets, aims, goals, or measurements, either (Pan, Du, Huang, Liu, Chang, Chiang, 2015). The lack of technical expertise of CE among policymakers also impedes the implementation of standard efficiency assessment, collection of data, computation, submission, and punishment procedures (Su et al., 2013). In addition, taxes that are levied by the government serve as a deterrent. Due to the high expense of CE in most places, existing tax regulations prevent businesses from utilising it (Benton et al., 2015; Geng & Doberstein, 2008; (Naustdalslid, 2015).
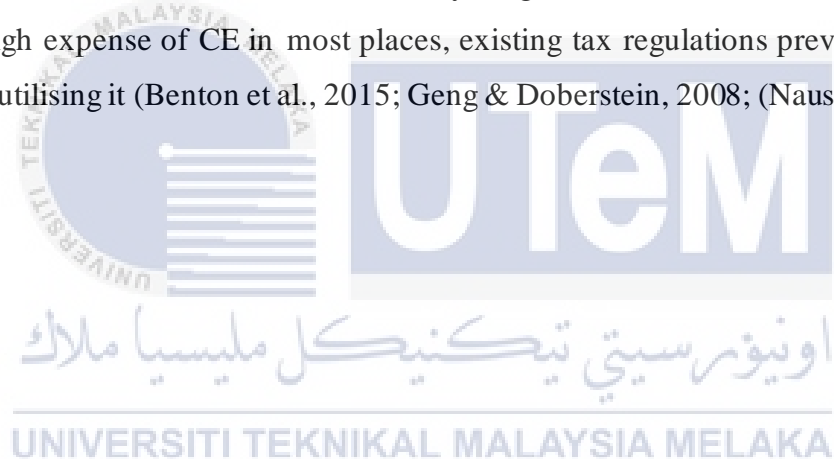
2.5.2 Economic perspective

CE is an expensive process that involves a significant expenditure right from the start. (Liu & Bai, 2014). It does not, however, repay you right away. It, on the other hand, benefits the economy in the long run. Managers who are under time constraints are less likely to engage in CE activities and are more likely to invest in other company operations (Liu & Bai, 2014; Benton et al., 2017; Park, Sarkis, Wu, 2010) .

Due to a lack of monetary support channels and government subsidies entrenched in budgeting systems from banks and governments, companies avoid implementing CE despite their willingness to do so (Geng & Doberstein, 2008; Liu & Bai, 2014; Su et al., 2013). With the exception of big businesses, it is an expensive practise that they cannot afford.

Government aid is essential to convert the traditional sequential economic model into a closed-loop system, and governments must provide a favourable environment for CE implementation. In order to guarantee a regular supply of materials and satisfy customer expectations, CE also needs collaborative business models. Due to a lack of reliable information (Su et al., 2013; Pomponi & Moncaster, 2017; Winans et al., 2017; Pan et al., 2015) as well as the significant costs associated with the development of eco-industrial chains, companies are unable to develop a faster feedback mechanism to adapt themselves (Liu & Bai, 2014). As a result, they will engage in improper behaviour, lowering their revenues. Furthermore, the high costs and uncertainties associated with CE may have an impact on a company's profitability. Companies avoid remanufacturing methods because of all these ambiguities, which raise questions about their long-term survival and profitability.

Furthermore, issues in financing CE business strategies, initial investment outlay expenses, and low raw material costs are also economic barriers to CE adoption. Market accessibility is hampered by two factors. Tura, Hanski, Ahola, Stahle, Piiparinen, Valkokari, (2019) assert that there is a deficiency in the pricing system for product recovery, which is most obvious in the market for recycled products. This market fails owing to the combined effects of difficulties such as fluctuating supply, fluctuating standards of quality, and a lack of economic incentives.

It's also possible that an organisation has a certain aim in mind and isn't allowed or has no motivation to expand out. Because of the consumer perception of recycled materials, switching to CE processes would not result in a price-performance ratio that is sufficiently beneficial. (Kinnunen & Kaksonen, 2019). Inexpensive raw material prices are one reason for low potential advantages, as well as evidence of poorly integrated externalities, as described in the literature (Kirchherr et al., 2018). Lock-in effects in linear economy infrastructure, in addition to the fact that externalities are not internalised by taxation or government subsidies, result in lower apparent raw material prices (Masi, Kumar, Garza-Reyes, Godesell, 2018).

The availability of raw materials reacts relatively fast to price fluctuations than supply of recyclable resources since coal plants may operate when resource prices rise. The supply of recycled materials is inelastic since it is dependent on prior consumption trends. As a result, recycled material prices fluctuate more, creating uncertainty (Blomberg & Söderholm, 2009). Uncertainty inhibits motivation to put the money in recyclable materials markets, and replacement to recycled material markets stays low.

High initial investment costs were also commonly cited as the most major constraints (Masi et al., 2018). Any significant change in a society needs switching costs, which might vary. Attempting to renegotiate contracts, altering technology to accept new inputs, and investing significant development expenses for product creation are just a few examples. According to Rizos, Behrens, Kafyeke, Hirschnitz-Garbers, and Ioannou, (2015); Centre for European Policy Studies (Brussels, Belgium), insufficient evidence of benefits magnifies the difficulty of securing capital for SMEs.

2.5.3 Social/Cultural perspective

A resistive corporate tradition, an absence of awareness among consumers, and a lack of coordination throughout the supply chain might all be barriers to CE adoption. Managerial opposition, CE initiatives separated from key operations, and low engagement in management planning are all signs of a CE resistant organisational culture. Changes in the direction of CE were resisted by top and intermediate management because they would conflict with their incentive structures (Mangla et al., 2018). While CE initiatives may occur inside a larger organisation, Mangla et al. (2018) observed that not all divisions are aware of the benefits. Some firms claim that a CE is not now part of their innovation strategy, and that they lack precise CE objectives, indicating a lack of strategic participation.

(Singh & Giacosa, 2019) developed a paradigm to explain low consumer knowledge and interest in CEs, indicating that psychological ownership of products, dominating status-quo bias, and a consumerist lifestyle to satisfy desires and status were all key contributors to negative attitudes about CEs. CE was a minor issue in customers' judgement process, according to Rizos et al. (2015), and many cited a lack of awareness of the concept's relevance as well as the circularity of their previous purchases.

Industrial symbiosis and the exchange of by-products are hampered by the confidentiality of production techniques and quantities (Masi et al., 2018). Collaboration all through the supply chain is seen as intrusive in business models, is not economically productive, and has impeded the supply chain's competitiveness (Agyemang et al., 2018).

Furthermore, there is still an evident customer resistance to purchasing things (Abbey, Meloy, Guide, Atalay, 2015; Hazen, Boone, Wang, Khor, 2017). Consumers have a prevalent misconception that remanufactured items are of poorer quality than their newly made counterparts (Abbey et al., 2015; Guiot & Roux, 2010). The reduced pricing of second-hand items has long been connected with compensating for their perceived inferior quality and consequently encouraging the market's need for remanufactured goods (Debo, Toktay, Van Wassenhove, 2005). Consumers' lack of

product understanding may be one of the challenges to the circular economy's mainstream adoption. This is due to the fact that a consumer's brand awareness effects their assessment criteria for a particular product (Barrutia & Gilsanz, 2013), which in turn determines their purchase behaviour. According to Matsumoto, Chinen, Endo (2017), 80% of US customers have heard of remanufactured car parts, however only 20% of Japanese consumers have heard of the term "remanufactured auto parts." A prior research by Hazen, Overstreet, Jones-Farmer, and Field (2012) discovered a relationship between customers' "tolerance for ambiguity," or the amount of tolerance when there is a complete lack of information regarding remanufacturing, and their readiness to pay for a product, indicating that understanding about the product or process leads to increased buy intention of a product.

Milios & Matsumoto (2019) discovered that 58.6 percent of respondents had never heard of remanufactured car parts, and an even greater percentage of the sample (76.4 percent) had never purchased remanufactured auto parts for personal use. Furthermore, as compared to the experience of Japanese drivers, who seldom engage in such operations, the personal participation of the respondents with replacing damaged auto parts with identical remanufactured parts is very low (14.8 percent) (Matsumoto et al., 2017). This is because automotive parts are often updated in Japan during obligatory inspections, generally before a problem arises.

2.6 Proposed Conceptual Framework

In this study, the suggested conceptual framework is to depict a diagram of the constructs and variables, as well as the interrelationships between variables. Government, economic, and social factors comprise the independent variable. The link between independent and dependent variables is depicted in the framework below.

Independent variables
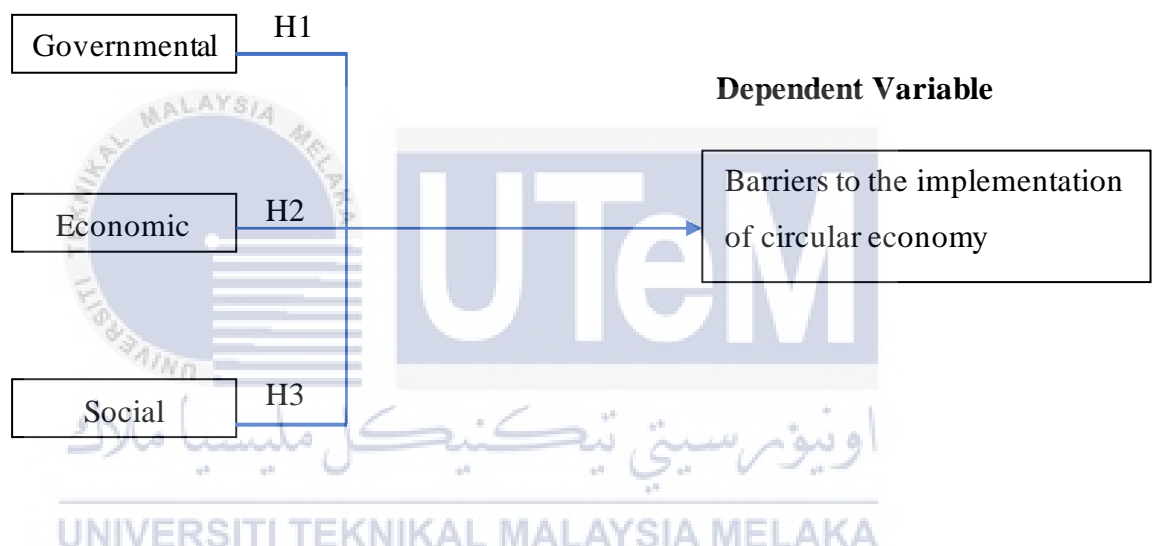
Figure 2.6: Proposed Conceptual Framework

2.7 Summary

This chapter provides an overview of the relevant theory on the study issues. This chapter focuses on the governmental, economic, and social aspects. A literature review is important in research because it serves as a reference for gaining insights and a good understanding by evaluating past papers studied by previous researchers. The literature reviews explain the dependent and independent variables as well as their connection.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research can be characterized as an organized procedure with a specific goal of discovering information (Saunder Mark N.K., Lewis, Thornhill, 2019). It is described in business and management research as conducting systematic research to learn about business and management. According to Kothari (2004), a research methodology is a method for solving a problem of the study in a methodical manner. It has also been defined as a science that studies how scientific research is conducted.

Researchers address the research methodologies utilized and strategies for answering research questions in this chapter, which addresses the research design and research strategy. Furthermore, the data gathering methods for the hurdles to the implementation of circular economy (CE) for the automobile industry in Malaysia will be presented. This chapter also provides a pilot test, a reliability test, and a questionnaire development test. The analysis performed to test the study's hypothesis was also identified.

3.2 Hypothesis Development

Based on the conceptual framework proposed, the hypotheses that are developed for this research are shown below.

Hypothesis 1:

H1: There is a significant relationship between governmental barrier and the implementation of CE for automotive industry.

H0: There is no significant between governmental barrier and the implementation of CE for automotive industry.

According to the research from Govindan and Hasanagic (2018), the government's aversion to experimenting with better financial and economic mechanisms for businesses. The lack of financial assistance from the government in the form of banks, tax reductions, and subsidies stifles interest in using green technologies to create a circular economy (Su et al., 2013). Poor legislation, for example, is a major barrier to China's implementation of the circular economy. The law is not properly enforced, and there are sophisticated, corrupt systems in place.

According to research from Kumar et al. (2019), several studies have found that this convoluted arrangement leads to poor local government accountability and the adoption of inefficient laws (Benton, Hazell, and Hill, 2015; Geng & Doberstein, 2008; Su et al., 2013; Li & Yu, 2011; Naustdalslid, 2014; Winans et al., 2017). As a result, the necessary CE legislation and regulations cannot be adopted. Enterprises struggle to implement CE due to disconnected systems and, as a result, a lack of legislative backing.

Hypothesis 2:

H1: There is a significant relationship between economic barrier and the implementation of CE for automotive industry.

H0: There is no significant relationship between economic barrier and the implementation of CE for automotive industry.

In Kumar et al. (2019), lack of monetary support channels and government subsidies entrenched in budgeting systems from banks and governments, companies avoid implementing CE despite their willingness to do so (Geng & Doberstein, 2008; Liu & Bai, 2014; Su et al., 2013). With the exception of big businesses, it is an expensive practise that they cannot afford. Their research confirmed Benton et al. (2015) that the adoption of the circular economy is hampered by an insufficient financial support system.

In Grafstrom and Aasma (2021), issues in financing CE business strategies, initial investment outlay expenses, and low raw material costs are also economic barriers to CE adoption.

Hypothesis 3:

H1: There is a significant relationship between social barrier and the implementation of CE for automotive industry.

H0: There is no significant relationship between social barrier and the implementation of CE for automotive industry.

In Grafstrom and Aasma (2021), a resistive corporate tradition, an absence of awareness among consumers, and a lack of coordination throughout the supply chain might all be barriers to CE adoption in terms of social perspectives.

Managerial opposition, CE initiatives separated from key operations, and low engagement in management planning are all signs of a CE resistant organisational culture. Changes in the direction of CE were resisted by top and intermediate management because they would conflict with their incentive structures (Mangla et al., 2018). (Singh & Giacosa, 2019) developed a paradigm to explain low consumer knowledge and interest in CEs, indicating that psychological ownership of products, dominating status-quo bias, and a consumerist lifestyle to satisfy desires and status were all key contributors to negative attitudes about CEs.

3.3 Research Design

According to Kothari (2004), A research design is the conceptual framework within which research is carried out; it serves as the basis for information collection, evaluation, and analysis. Saunders et al. (2019) stated that the purpose of research can be exploratory, descriptive, or explanatory. Exploratory studies are an excellent way to explore what is going on and obtain insights into a certain problem. Aside from that, descriptive studies are used to produce an accurate description of events, people, or circumstances. Explanatory studies, on the other hand, are investigations that establish a cause-and-effect relationship between variables.

The research design in this study is explanatory studies. Explanatory studies are being used to gather information on the impediments to the implementation of the circular economy in Malaysia's automobile industry.

3.4 Methodological Choices

The methodological options for research include qualitative research, quantitative research, and mixed approaches. Quantitative research examined the relationship between variables, that are numerically measured and evaluated using a number of statistical and graphical techniques. Using a variety of data gathering techniques and analytical procedures, qualitative research investigates participants', meanings, and relationships with one another in order to generate a conceptual framework and theoretical contribution. Mixed methods research combines quantitative and qualitative approaches in a number of ways, ranging from simple, simultaneous forms to more complicated, sequential forms (Saunders et al., 2019).

The quantitative method will be utilized in this research to obtain information from respondents in this study. To collect data, the research design employs quantitative methodology by only distributing questionnaires to the respondents.

3.5 Data Collection

The organized method of obtaining and assessing information on specific variables for the purpose of answering specific research questions, test hypotheses, and analyzing outcomes is known as data collection (Kabir, S.M.S., 2016). This study gathered information and data from both primary and secondary sources. Primary data are those that are obtained for the first time and hence have a unique nature. Meanwhile, secondary data are ones that have previously been acquired by someone else and have been statistically processed (Kothari, 2004).

Primary data can be obtained through experiments, survey, questionnaire, interview, and observations (Kabir, S.M.S., 2016). Primary data for the study is gathered through a survey of Malaysian car manufacturers and assemblers via questionnaire. Secondary data is collected and easily acquired from other resources. Secondary data is useful to researchers because most of the preliminary work has already been completed. Secondary data for the study are gathered through academic publications, journal papers, books, and academic journals.

3.6 Questionnaire Development

Respondents were chosen for this study to complete the questionnaire. The survey questionnaire was standardized and included various questions about the hurdles to the implementation of the circular economy in Malaysia's automobile industry. The questions will be classified into three categories: governmental, economic, and societal impediments. The questionnaire will allow respondents to react using a Likert Scale, which shows their degree of agreement or disagreement.
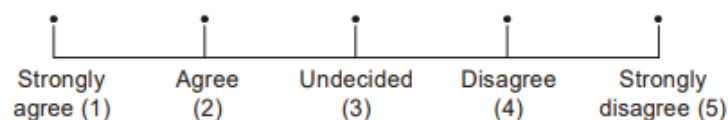
Fig. 5.3

Figure 3.6: Likert Scale

Source: (Kothari, 2004)

3.7 Sampling Techniques

There are two sorts of sampling techniques: probability sampling and non-probability sampling (Saunders et al., 2019). The possibilities or probability of each case being chosen from the target population are specified and generally equivalent for all cases and feasible to address the research questions and achieve objectives with probability sampling. Non-probability samples are those in which the probability of each example being chosen from the target is unknown, making it difficult to find answers to the research questions or address objectives.

Probability sampling is used in this study, and basic random sampling is used to select random samples. Simple random sampling would still be appropriate for a geographically distributed location as an alternate data collection strategy, such as the Internet, mail questionnaires, or video conferencing (Saunders et al., 2019). The target respondents of the survey are for the motor vehicles users in Malaysia. 17.7 million of vehicle registration in Malaysia until 2021. According to Krejcie & Morgan (1970), when the population is more than 1 million people, the sample size is 384. Therefore, 384 respondents are selected as source of data and evaluation to answer questionnaires.

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.   *S* is sample size.

Table 3.7: Krejcie & Morgan (1970)

3.8 Location of Research

The primary location of the study is based all over Malaysia. According to the Malaysian Automotive Association (MAA), there are 22 manufacturers and assemblers in Selangor, Johor, Pahang, Negeri Sembilan, Melaka, Pulau Pinang, Kedah, Sarawak, Perak, and Kuala Lumpur.

3.9 Data Analysis

The organized process of analyzing data using statistical or logical techniques is known as data analysis. Pilot Test and Cronbach's Alpha are two data analysis tools utilized in this study to illustrate and describe the data acquired. The data is then analyzed using Pearson's correlation coefficient and multiple regression analysis.

3.9.1 Pilot Test

A pilot test is a previous study used to verify the stability and validity of the questions created by the researcher. The goal of the pilot test is to ensure that the questionnaire is feasible and that respondents can comprehend and respond to questions. Furthermore, the pilot test is utilized to determine whether the researcher can acquire the desired data. The pilot test sample is 10% of the total sample size which are 384 respondents for a population more than 1 million according to Krejcie & Morgan table, 38 questionnaires to be sent to potential respondents. Respondents to the pilot test will provide feedback on the questionnaires' complexity or applicability. Based on the findings of the pilot study, researchers can make changes to the confusing items and errors, allowing study participants to more successfully answer the question. As a result, the researcher can obtain an accurate result and contribute to the significance of the study.

3.9.2   Reliability

The consistency of measure in the outcomes is defined as reliability. Cronbach's alpha is used in this study to assess the study's internal consistency. Cronbach's alpha ranges between 0 and 1. Cronbach's alpha values in the 0.7 range are deemed acceptable reliability coefficients. The greater the value of Cronbach's alpha, the greater the reliability. The researcher will assess the dependability of each independent and dependent variable.

No	Coefficient of Cronbach's Alpha	Reliability Level
1	More than 0.90	Excellent
2	0.80-0.89	Good
3	0.70-0.79	Acceptable
4	0.6-.69	Questionable
5	0.5-0.59	Poor
6	Less than 0.59	Unacceptable

Figure 3.9.2: Cronbach's alpha coefficient range

Source: (George & Mallery, 2003)

3.9.3   Validity

The degree of precision in measuring what it is designed to measure is referred to as validity. A high validity value indicates that the research result is trustworthy. The independent factors in this study include governmental, economic, and social hurdles, and the dependent variable is the barriers to adopting the circular economy. To verify the validity of a questionnaire, Exploratory Factor Analysis (EFA) is used.

3.9.4   Pearson's Correlation Coefficient

In this study, Pearson's correlation coefficient is utilized to determine the strength of correlation between two numerical variables. This coefficient makes various assumptions, including that the variables have a linear correlation, that two

variables are related – independent and dependent variables – and that both variables have independent causes to form a normal distribution. Pearson's correlation coefficient has a value between +1 and -1. The positive number shows that there is a positive correlation between two variables, whereas the negative value indicates that there is a negative correlation between two variables. The closer the coefficient value is to zero, the greater the variance in the data from the best fit line. A coefficient value of 0 indicates that there is no relationship between two variables.

Figure 3.9.4: Pearson's Correlation Coefficient

Source: (Saunders et al., 2019)

3.9.5 Multiple Regression Analysis

Multiple regression is a statistical technique that uses ANOVA to anticipate the relationship between a given dependent variable and a set of independent variables. The correlation between one continuous dependent variable and two or more independent variables is explained by multiple regression analysis. The regression analysis in this study focused on three independent variables: governmental, economic, and social barriers. The regression equation is created to demonstrate how the independent variables fit together and to investigate the relative influence of each determinant of total variance. The multiple regression equation is as follows:

$$\text{Equation: } Y = a + bX_1 + cX_2 + dX_3 + e$$

Y = dependent variable (the barriers that impede the implementation of circular economy)

a = constant/intercept

b = Influence of X_1 (governmental)

c = Influence of X_2 (economic)

d = Influence of X_3 (social)

X_1, X_2, X_3 = independent variables

e = error

3.9.6   Statistical Package for Social Sciences (SPSS)

The Statistical Package for Social Sciences (SPSS) is used to analyze the data. It is often used by researchers to analyze complicated statistical data. SPSS is a statistical software tool that can generate tabular reports, charts, and other advanced statistical analyses. SPSS is utilized because it can reliably execute highly complex data operations and analyses.

3.10   Summary

The researcher detailed the procedures utilized in collecting information and data in this chapter. Quantitative research only uses a single data collection technique to conduct the research. The study collected data from both primary and secondary sources. The survey method of distribution of questionnaires is utilized to perform the research. Pilot tests, Cronbach's alpha, reliability analysis, Pearson's correlation coefficient, multiple regression analysis, and SPSS are being used in analysis of data to meet research objectives and analyze study results.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 Introduction

The outcomes and conclusions of the data analysis carried out for the research project are reported in Chapter 4. 202 respondents provided the information throughout a two-month period. The statistical package for social sciences (SPSS) will be used to analyse the data to determine the outcomes of the research objectives and the viability of the research hypotheses. Charts and tables will be used to display the results.

Additionally, the data from the pilot test are presented in this chapter together with the demographic information about the respondents and their answers to the various questions. Next, regression analysis is used to evaluate the hypothesis after describing the strength of the association between independent and dependent variables using Pearson Correlation Coefficient analysis.

4.2 Pilot Test

The goal of the pilot study is to determine whether or not the questionnaire can be administered and completed successfully by the target population. A random sample of 38 people, or 10% of the total, was chosen for this investigation. If the result of Cronbach's Alpha for your data is more than or equal to 0.7, you can be certain that your questionnaire is reliable.

4.2.1 Reliability

Repeated measurements of the same event tend to yield consistent results, and this is what we mean by reliability. Internal consistency refers to the degree to which all of the items on a scale measure the same thing. The reliability of a scale can be estimated with the assistance of Cronbach's Alpha, which provides an index of the internal consistency of the components making up the scale. Higher levels of internal consistency among scale items correspond to smaller values of Cronbach's Alpha.

There are a total of 22 questions, all of which are graded on a Likert scale from 1 to 5 (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Cronbach's alpha describes how strongly one item in the independent variable is related to the dependent variable.

4.2.1.1 Governmental Barrier

Table 4.2.1.1.1: Case Processing Summary of Governmental

Source: (Develop from Research)

Case Processing Summary

		N	%
Cases	Valid	28	73.7
	Excludedᵃ	10	26.3
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.2.1.1.2: Reliability Statistics of Governmental

Source: (Develop from Research)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.939	.941	9

Table 4.2.1.1.2 illustrates Cronbach's Alpha for nine questions for governmental barriers. The reliability statistics have value of 0.939 which is greater than 0.7. Hence, the question for this independent variable is reliable and can be used for the actual questionnaire.

4.2.1.2 Economic Barrier

Table 4.2.1.2.1: Case Processing Summary of Economic

Source: (Develop from Research)

Case Processing Summary

		N	%
Cases	Valid	33	86.8
	Excluded^a	5	13.2
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.2.1.2.2: Reliability Statistics of Economic

Source: (Develop from Research)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.872	.873	3

Table 4.2.1.2.2 illustrates Cronbach's Alpha for three questions for economic barriers.

The reliability statistics has value of 0.872 which is greater than 0.7. Hence, the question for this independent variable is reliable and can be used for the actual questionnaire.

4.2.1.3 Social Barrier

Table 4.2.1.3.1: Case Processing Summary of Social

Source: (Develop from Research)

Case Processing Summary

		N	%
Cases	Valid	36	94.7
	Excludedª	2	5.3
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.2.1.3.2 Reliability Statistics of Social

Source: (Develop from Research)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.904	.905	4

Cronbach's Alpha for four questions in social barriers is shown in Table 4.2.1.3.2. Cronbach's Alpha, a measure of reliability, for this set of data was greater than 0.7, coming in at 0.904%. It is safe to use the independent variable in the final survey.

4.2.1.4 Barriers to the Circular Economy Implementation

Table 4.2.1.4.1: Case Processing Summary of Barriers to The CE Implementation

Source: (Develop from Research)

Case Processing Summary

		N	%
Cases	Valid	27	71.1
	Excluded[a]	11	28.9
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.2.1.4.2: Reliability Statistics for Barriers to The CE Implementation

Source: (Develop from Research)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.913	.916	6

The 0.763 Cronbach's Alpha value shown in Table 4.2.1.4.2 indicates that the dependent variable, obstacles to implementing CE, has a high degree of internal consistency. Therefore, the questions construct in dependent variable is reliable and can be used for the actual questionnaire.

4.2.1.5 Reliability Analysis

Table 4.2.1.5.1: Case Processing Summary for All Variables

Source: (Develop from Research)

Case Processing Summary

		N	%
Cases	Valid	26	68.4
	Excluded[a]	12	31.6
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.2.1.5.2: Reliability Statistics for All Variables

Source: (Develop from Research)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.974	.975	22

Cronbach's Alpha is displayed in Table 4.2.1.5.2 based on the total number of I and d variables. Cronbach's alpha totals 0.974, which is over 0.7 and indicative of strong reliability. Therefore, the questions construct in independent variables and dependent variable are reliable and can be used for the actual questionnaire.

4.2.2 Validity

Validity is defined as the degree of accuracy in measuring what it is planned to measure. High validity value specifies high extent of trustworthiness in the research result. According to Chan & Idris (2017), Exploratory Factor Analysis is conducted to identify the structure of dormant dimensions of the variables in the objects of instrument. Therefore, EFA is used to determine validity of the questionnaire.

4.2.2.1 Validity for Independent Variables

Table 4.2.2.1.1: Table for KMO and Bartlett's Test – All Independent Variables

Source: (Develop from Research)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.801
Bartlett's Test of Sphericity	Approx. Chi-Square	491.743
	df	120
	Sig.	.000

From the Table 4.2.2.1.1, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is excellent, 0.801 because the value is higher than 0.6 (Yong & Pearce, 2013). When the value is closer to 1, the more suitable the method to analyze the data and the factors are reliable to each other. Then, Barlett's test of sphericity is significant $\chi 2$ (df =120) because p-value is less than 0.000 hence the items listed in independent variables have pattern relationships among the variables because the p-value is less than 0.05 with approximate Chi-Square value 491.743.

4.2.2.2 Validity for Dependent Variables

Table 4.2.2.2.1: Table for KMO and Barlett's Test – Dependent Variables

Source: (Develop from Research)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.840
Bartlett's Test of Sphericity	Approx. Chi-Square	106.756
	df	15
	Sig.	.000

From the Table 4.2.2.2.1, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is excellent, 0.840 because the value is higher than 0.6 (Yong & Pearce, 2013). When the value is closer to 1, the more suitable the method to analyze the data and the factors are reliable to each other. Then, Barlett's test of sphericity is significant $\chi 2$ (df =15) because p-value is less than 0.000 hence the items listed in independent variables have pattern relationships among the variables because the p-value is less than 0.05 with approximate Chi-Square value 106.756.

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4.3 Respondents' Profile

4.3.1 Respondents' Gender

Table 4.3.1: Gender – All Respondents

Source: (Develop from Research)

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	87	43.1	43.1	43.1
	2	115	56.9	56.9	100.0
	Total	202	100.0	100.0	
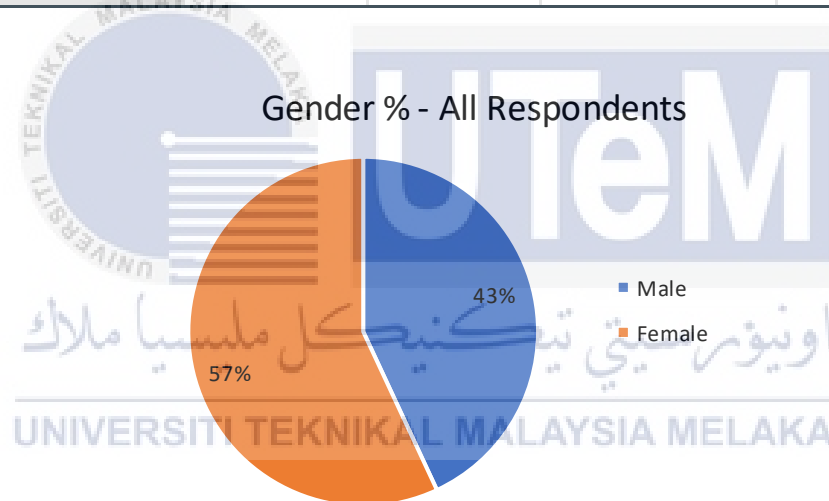
Figure 4.3.1: Respondent's demographic gender

Source: (Develop from Research)

The following table displays, by frequency and percentage, the demographic information of the respondents' gender. As can be seen in the figure, there are a total of 202 respondents, with 87 male respondents, representing 43% of the total, and 115 female respondents, representing 57% of the total.

4.3.2 Respondents' Age Group

Table 4.3.2: Age Group – All Respondents

Source: (Develop from Research)

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	45	22.3	22.3	22.3
	2	79	39.1	39.1	61.4
	3	39	19.3	19.3	80.7
	4	39	19.3	19.3	100.0
	Total	202	100.0	100.0	
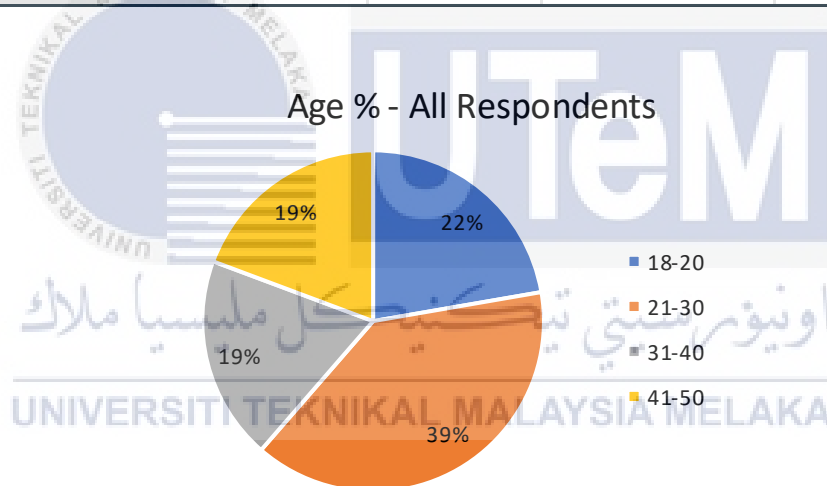
Figure 4.3.2: Respondents' Age Group

Source: (Develop from Research)

The data on the respondents' ages, broken down by range, are presented in table 4.3.2. There are 202 respondents total, and 45 of those respondents (22%) are between the ages of 18 and 20. The respondents who are between the ages of 21 and 30 years old make up 79 respondents (39%) and represent the age group with the highest percentage of respondents. In addition, there are 39 responders in the age range of 31 to 40 years old, which accounts for 19% of the total. There are 39 responders who have indicated that they are between the ages of 41 and 50 (19%).

4.3.3 Respondents' Race

Table 4.3.3: Race – All Respondents

Source: (Develop from Research)

Race

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	88	43.6	43.6	43.6
	2	60	29.7	29.7	73.3
	3	53	26.2	26.2	99.5
	4	1	.5	.5	100.0
	Total	202	100.0	100.0	
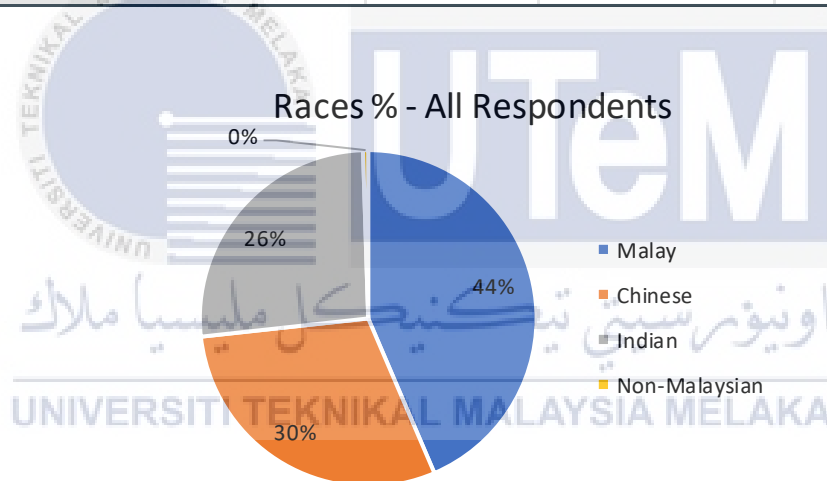
Figure 4.3.3: Race – All Respondents

Source: (Develop from Research)

Table demonstrates races of respondents. Among the respondents, 88 respondents (44%) are Malays which is the highest group of races of respondents. There are 60 respondents (30%) are Chinese which is the second highest group of races of respondents while 53 respondents (26%) are Indians. Lastly, there is 1 respondent from non-Malaysian that contributes to less than 1%. Figure illustrates the percentage of respondents' demographic of races.

4.3.4 Respondents' Education Level

Table 4.3.4: Education Level – All Respondents

Source: (Develop from Research)

Education level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	19	9.4	9.4	9.4
	2	72	35.6	35.6	45.0
	3	101	50.0	50.0	95.0
	4	10	5.0	5.0	100.0
	Total	202	100.0	100.0	
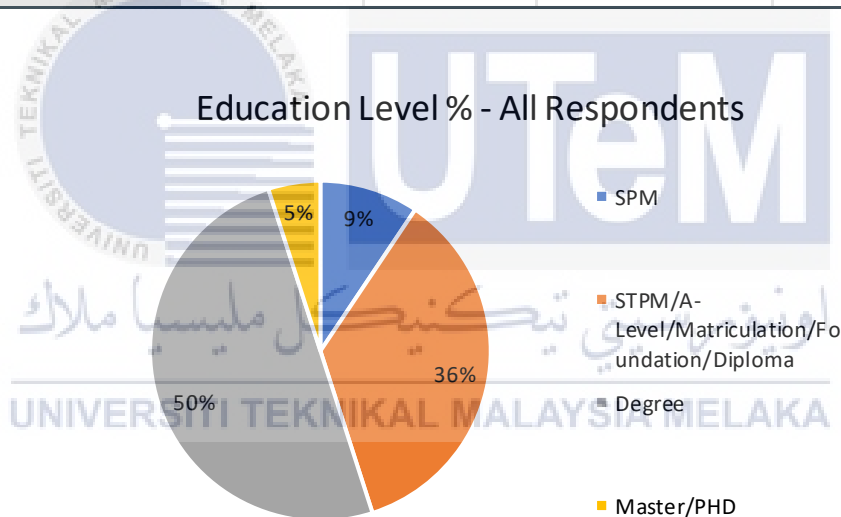
Figure 4.3.4: Education Level – All Respondents

Source: (Develop from Research)

Table 4.3.4 shows the education level of total 202 respondents. There are 19 respondents (9%) education level is SPM. Besides, 72 respondents (36%) have education level from STPM/A-Level/Matriculation/Foundation/Diploma while 101 respondents (50%) have education level from Degree which is the highest group of education level of respondents. There are 10 respondents (5%) has education level

from Master/PHD. Figure 4.3.4 display respondent's demographic of education level from all respondents.

4.3.5 Respondents' Occupational

Table 4.3.5: Occupational – All Respondents

Source: (Develop from Research)

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	82	40.6	40.6	40.6
	2	51	25.2	25.2	65.8
	3	15	7.4	7.4	73.3
	4	54	26.7	26.7	100.0
	Total	202	100.0	100.0	
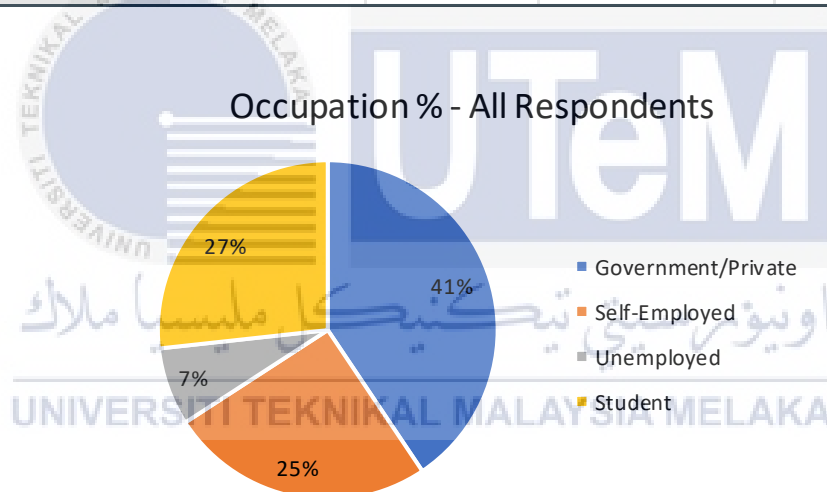
Figure 4.3.5: Occupational – All Respondents

Source: (Develop from Research)

Based on the table, there are 82 respondents (41%) out of 202 respondents are working in Government or Private sector which is the highest group of occupational. Besides, 51 respondents (25%) are self-employed while 5 respondents (7%) are unemployed. Lastly, 54 respondents (27%) are students. Figure 4.3.5 display respondent's demographic of occupational group from all respondents.

4.3.6 Respondents' CE Familiarity

Table 4.3.6: CE Familiarity – All Respondents

Source: (Develop from Research)

CE Familiarity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	119	58.9	58.9	58.9
	2	83	41.1	41.1	100.0
	Total	202	100.0	100.0	
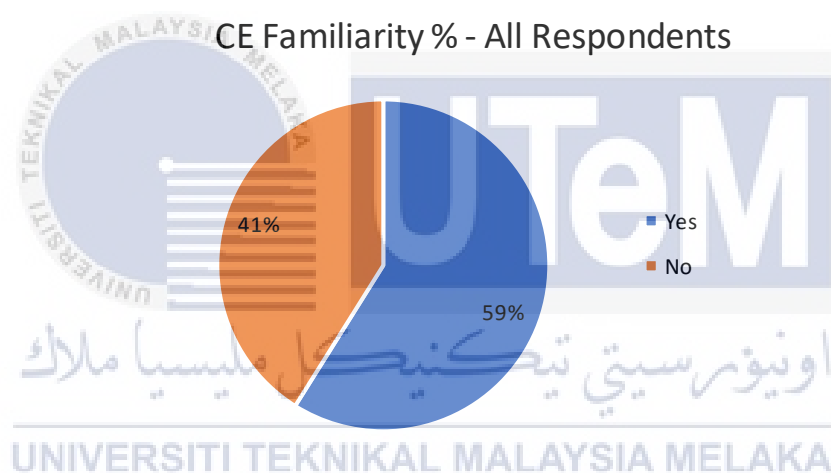
Figure 4.3.6: CE Familiarity – All Respondents

Source: (Develop from Research)

Based on the chart, 119 respondents (59%) out of 202 respondents are familiar with the circular economy (CE). Meanwhile, 83 respondents (41%) are not familiar with the CE. Figure 4.3.6 illustrates the respondents' demographic of CE Familiarity.

4.3.7 Respondents' Type of Motor Vehicles

Table 4.3.7: Types of Motor Vehicle – All Respondents

Source: (Develop from Research)

Type of Motor Vehicle	Frequency	%
1	88	32%
2	187	68%
3	1	0%
Total	276	100%
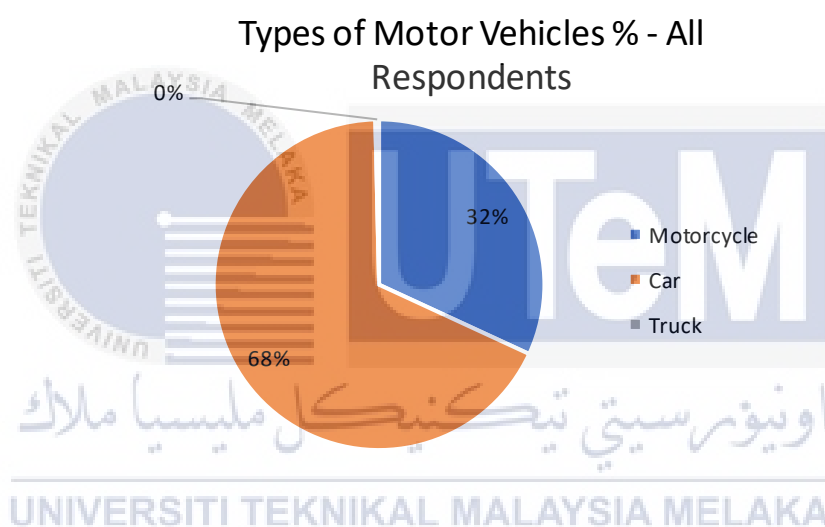
Figure 4.3.7: Types of Motor Vehicle – All Respondents

Source: (Develop from Research)

Based on the chart above, 88 respondents (32%) are using motorcycle. Meanwhile, 187 respondents (68%) are using cars and it shows that most of the respondents are using cars. Lastly, only 1 respondent is using a truck and that only contribute less than 1%.

4.3.8 Respondents' Condition of Motor Vehicle

Table 4.3.8: Condition of Motor Vehicle – All Respondents

Source: (Develop from Research)

Condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	81	40.1	40.1	40.1
	2	98	48.5	48.5	88.6
	3	23	11.4	11.4	100.0
	Total	202	100.0	100.0	
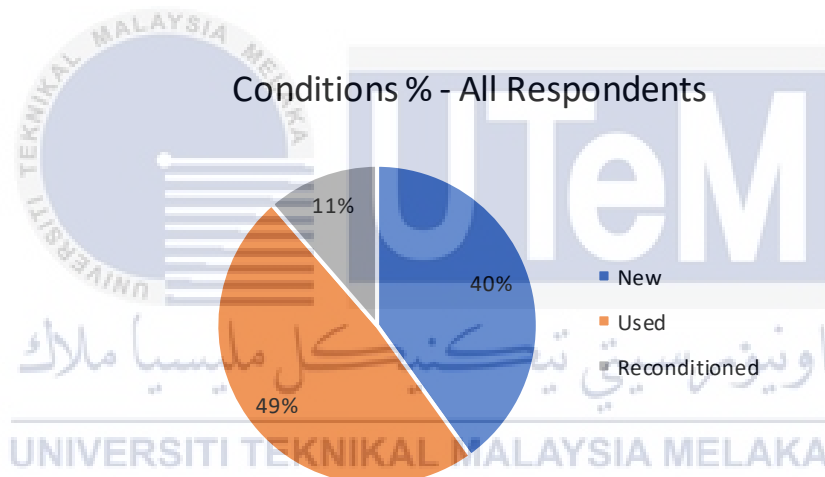
Figure 4.3.8: Condition of Motor Vehicle – All Respondents

Source: (Develop from Research)

Based on the chart above, 81 respondents (40%) are owning a new motor vehicle. Meanwhile, 98 respondents (49%) are owning a used motor vehicle which is the highest group of conditions for the vehicle. Lastly, there are 23 respondents (11%) are owning a reconditioned motor vehicle.

4.4 Descriptive Analysis

4.4.1 Descriptive Analysis for Independent Variable (Governmental Barrier)

Table 4.4.1: Summary of Governmental Barrier

Source: (Develop from Research)

Frequency

Item	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
BG1	Technical aspects (administrative, production techniques, collection techniques etc.) must change in the CE process.	2 1%	2 1%	23 11%	103 51%	72 36%
BG2	Promote incentives (decreased taxes and subsidies to recycled materials etc.) is needed for the changes in CE process.	2 1%	2 1%	21 10%	102 50%	70 35%
BG3	Involve stakeholders and managers in decision-making and provide transparent data to overcome resistance to change.	2 1%	5 2%	34 17%	89 44%	68 34%
BG4	Promote innovative, broad, and long run policies at national level to overcome fear of instability.	3 1%	6 3%	20 10%	92 46%	80 40%

BG5	Policy maker is the responsible party to pursue successful transition of CE.	2 1%	16 8%	34 17%	74 37%	68 34%
BG6	Public administration is the responsible party to pursue successful transition of CE.	1 0%	14 7%	29 14%	83 41%	68 34%
BG7	Regulatory measures is the necessary policy instruments as the drive towards CE.	2 1%	4 2%	22 11%	101 50%	69 34%
BG8	Policy instruments to increase awareness of consumers is necessary as the drive towards CE.	1 0%	4 2%	13 6%	93 46%	88 44%
BG9	Selective tax systems applied to consumption is the necessary policy instruments as the drive towards CE.	1 0%	7 3%	21 10%	95 47%	76 38%

Table 4.4.1 shows the response of 202 respondents on independent variable, governmental barriers that impede the implementation of CE practices based on each statement. Item BG1 states that the technical aspects such as administrative, production technique, collection techniques and many more must change in the CE process as when this item does not been overcome, it will become a hindrance. According to the findings, 36% of respondents have a neutral opinion towards the statement, 51% of respondents agree with the statement, and 36% of respondents

strongly agree with the statement. However, one percent of those polled disagree with the statement, and one percent of those polled strongly disagree with the argument.

For the adjustments that must be made to the CE process, the item BG2 must outline the promotion of incentives. These incentives must include decreased taxes and subsidies for recycled materials, among many others. According to the findings of the survey, fifty percent of respondents hold the view that the statement is accurate, whereas thirty-five percent of respondents hold the view that the statement is accurate. There are 10% of respondents who say that they have no opinion on the remark, yet 1% of respondents disagree with it, and 1% of respondents strongly disagree with it.

Next, item BG3 explains that respondents will prefer to involve stakeholders and managers in decision-making and provide transparent data to overcome resistance change. From the table, 34% strongly agree and 44% agree on the statement followed by 17% of respondents are neutral on the statement but there are 2% respondents disagree and 1% respondents strongly disagree on the statement.

Besides, item BG4 describes promote innovative, broad, and long run policies at national level to overcome fear of instability. 40% of respondents strongly agree and 46% of respondents agree with the statement followed by 10% of respondents claim that they feel neutral on the statement. On the other side, 3% of respondents disagree and 1% strongly disagree with the statement.

Item BG5 describes policy maker is the responsible party to pursue successful transition of CE. 34% of respondents strongly agree and 37% of respondents agree on the statement followed by 17% of respondents claim that they feel neutral on the statement. On the other side, there are 8% of respondents who disagree and 1% strongly disagree with the statement.

Item BG6 describes public administration as the responsible party to pursue successful transition of CE. 34% of respondents strongly agree and 41% of respondents agree on the statement followed by 14% of respondents claim that they feel neutral on the statement. On the other side, 7% of respondents disagree and 0% strongly disagree with the statement.

Item BG7 describes regulatory measures as the necessary policy instruments as the drive towards CE. 34% of respondents strongly agree and the majority, 50% of respondents agree on the statement followed by 11% of respondents claim that they feel neutral on the statement. On the other side, 2% of respondents disagree and 1% strongly disagree with the statement.

Item BG8 describes policy instruments to increase awareness as necessary as the drive towards CE. 44% of respondents strongly agree and 46% of respondents agree on the statement followed by 6% of respondents claim that they feel neutral on the statement. On the other side, 2% of respondents disagree and 0% strongly disagree with the statement.

Item BG9 describes selective tax systems applied to consumption as the necessary policy instruments as the drive towards CE. 38% of respondents strongly agree and 47% of respondents agree with the statement followed by 10% of respondents claim that they feel neutral on the statement. On the other side, 3% of respondents disagree and 0% strongly disagree with the statement.
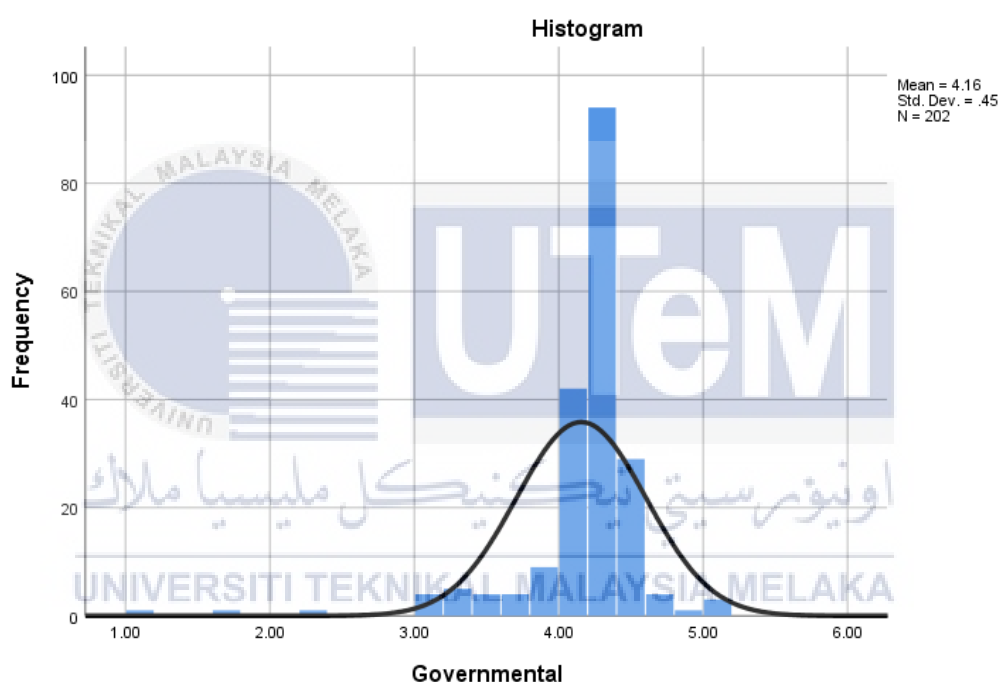
Figure 4.4.1: Independent Variable (Governmental Barrier)

Source: (Develop from Research)

The Figure 4.4.1 shows the shape of frequency distribution of governmental barrier influencing the implementation of CE practices. The respondents must rate based on self-consciousness on the Likert scale provided on the statement. Most of the respondents rated agree with governmental barrier influencing the implementation of CE practices where the mean value is equal to 4.16 while the standard deviation value is 0.45.

4.4.2 Descriptive Analysis for Independent Variable (Economic Barrier)

Table 4.4.2: Summary of Economic Barrier

Source: (Develop from Research)

Item	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
BE1	Investment in suitable circular infrastructure (to promote easy transport, storage, marketing etc.) is needed for the changes in CE process.	1 0%	13 6%	43 21%	66 33%	73 36%
BE2	Economic actors are the responsible party to pursue successful transition of CE.	2 1%	4 2%	75 37%	83 41%	38 19%
BE3	Policy instruments for financial supports from companies is necessary as the drive towards CE.	3 1%	7 3%	79 39%	66 33%	47 23%

Based on the table above, it shows the responses of 202 respondents on economic barrier. Item BE1 states that investment in suitable circular infrastructure such as to promote easy transport, storage, marketing, and many more is needed for the changes in CE process and there are 36% respondents strongly agree followed by 33% respondents agree with the question. 21% of respondents claim that they feel neutral on the statement. However, 6% of respondents disagree continued with 0% respondents strongly disagree with the statement.

The item BE2 describes economic actors are the responsible party to pursue successful transition of CE. 19% respondents strongly agree, and 41% respondents agree on the statement. The table also shows that 37% of respondents are neutral on

the statement. On the other hand, 2% respondents disagree and 1.6% strongly disagree on BE2 statement.

Item BE3 describes policy instruments for financial support from companies is necessary as the drive towards CE. 23% respondents strongly agree, and 33% respondents agree on the statement. The table also shows that 39% of respondents are neutral on the statement. On the other hand, there are 3% respondents disagree and 1% strongly disagree on BE3 statement.
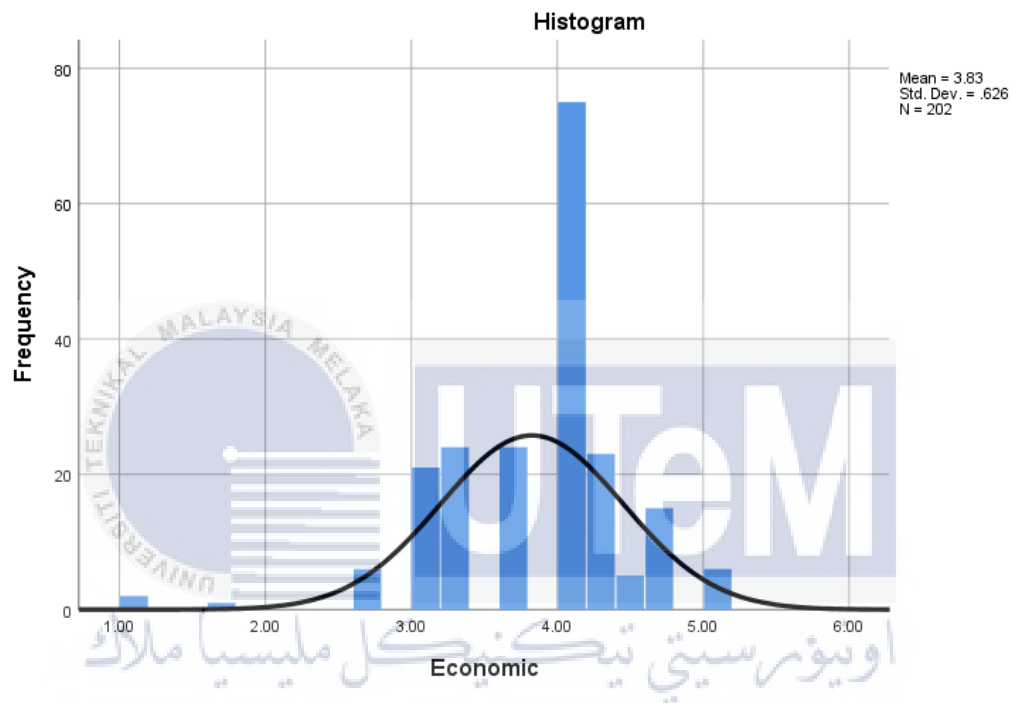
Figure 4.4.2: Independent Variable (Economic Barrier)

Source: (Develop from Research)

The Figure 4.4. shows the shape of frequency distribution of economic barrier influencing the implementation of CE practices. The respondents must rate based on self-consciousness on the Likert scale provided on the statement. Most of the respondents rated agree with the economic barrier influencing the implementation of CE practices where the mean value is equal to 3.83 while the standard deviation value is 0.63.

4.4.3 Descriptive Analysis for Independent Variable (Social Barrier)

Table 4.4.3: Summary of Social Barrier

Source: (Develop from Research)

Item	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
BS1	Increase dissemination of circular concepts to overcome low awareness and know-how.	2 1%	8 4%	14 7%	104 51%	72 36%
BS2	Citizens/consumers is the responsible party to pursue successful transition of CE.	3 1%	5 2%	41 20%	71 35%	82 41%
BS3	Public opinion is the responsible party to pursue successful transition of CE.	3 1%	1 0%	70 35%	61 30%	67 33%
BS4	Policy instruments to develop a cultural approach favouring waste prevention is necessary as the drive towards CE.	4 2%	7 3%	53 26%	59 29%	79 39%

Table 4.4.3 shows the result of social barrier influencing the implementation of CE practices. Item BS1 points out respondents are opined that increased dissemination of circular concepts to overcome low awareness and know-how can influence the implementation of CE practices. 36% respondents strongly agree, and 51% respondents agree with the statement. In addition, 7% of respondents are neutral with the statement. However, 4% respondents disagree, and 1% respondents strongly

disagree that increased dissemination of circular concepts to overcome low awareness and know-how can influence the implementation of CE practices.

Item BS2 describes citizens or consumers as the responsible party to pursue successful transition of CE. 41% respondents strongly agree, and 35% respondents agree on the statement. The table also shows that 20% of respondents are neutral on the statement. On the other hand, 2% respondents disagree and 1% strongly disagree on BS2 statement.

Item BS3 describes public opinion as the responsible party to pursue successful transition of CE. 33% of respondents strongly agree and 35% respondents agree with the statement. The table also shows that 30% of respondents are neutral on the statement. On the other hand, there are 0% respondents disagree and 1% strongly disagree on BS2 statement.

Item BS4 describes policy instruments to develop a cultural approach favouring waste prevention is necessary as the drive towards CE. There are 39% respondents strongly agree and 29% respondents agree on the statement. The table also shows that 26% respondents are neutral on the statement. On the other hand, 3% respondents disagree and 2% strongly disagree on BS4 statement.
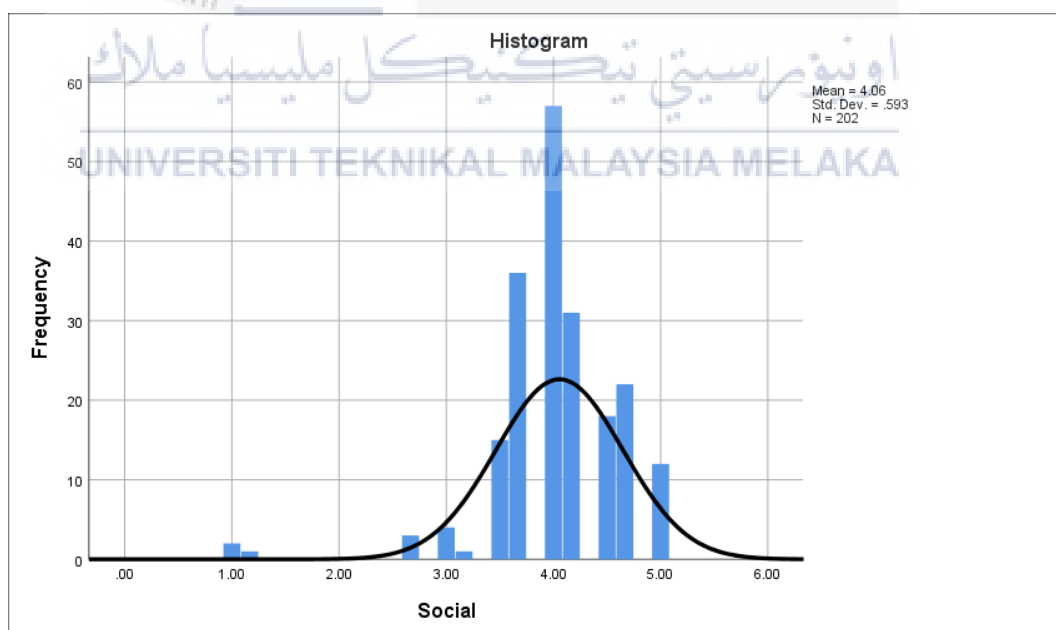
Figure 4.4.3: Independent Variable (Social Barrier)

Source: (Develop from Research)

Figure 4.4.3 shows the shape of frequency distribution of economic barrier influencing the implementation of CE practices. It illustrates the response of

respondents by Likert Scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly disagree according to respondents' self-conscious in rating. Most of the respondents agree that economic barriers influence the implementation of CE practices. The mean value is 4.06 while the standard deviation is 0.593.

4.4.4 Descriptive Analysis for Dependent Variable (Barriers to the Implementation of CE Practices)

Table 4.4.4: Summary of Barriers to the Implementation of CE Practices

Source: (Develop from Research)

Item	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
DV1	Lack of policies/regulations are one of the obstacles from engaging in CE.	3 1%	0 0%	27 13%	77 38%	89 44%
DV2	Lack of infrastructure is one of the obstacles from engaging in CE.	1 0%	5 2%	32 16%	79 39%	81 40%
DV3	Resistance to change is one of the obstacles from engaging in CE.	3 1%	2 1%	40 20%	80 40%	75 37%
DV4	Low awareness and know-how is one of the obstacles from engaging in CE.	1 0%	3 1%	47 23%	85 42%	64 32%
DV5	Unfavourable prices are one of the obstacles from engaging in CE.	4 2%	3 1%	40 20%	64 32%	84 42%
DV6	Lack of collaboration is one of the obstacles from engaging in CE.	2 1%	1 0%	29 14%	78 39%	85 42%

Table 4.4.4 shows descriptive statistics result of the dependent variable, barriers to the implementation of CE practices. Item DV1 describes that respondents opined that lack of policies and regulations are one of the obstacles from engaging in CE. 44% of respondents strongly agree with the statement and 38% of respondents agree. Aside, 13% feel neutral with item CS1. However, 0% respondents disagree whereas 1% respondents strongly disagree that lack of policies and regulations are one of the obstacles from engaging in CE.

The item DV2 describes lack of infrastructure as one of the obstacles from engaging in CE. 40% of respondents strongly agree and 39% respondents agree with the statement. The table also shows that 16% of respondents are neutral on the statement. On the other hand, 2% respondents disagree and 0% strongly disagree on DV2 statement.

Item DV3 describes resistance to change as one of the obstacles from engaging in CE. 37% respondents strongly agree, and 40% respondents agree on the statement. The table also shows that 20% of respondents are neutral on the statement. On the other hand, there are 1% respondents who disagree and 1% strongly disagree on DV3 statement.

The item DV4 describes low awareness and know-how as one of the obstacles from engaging in CE. 32% of respondents strongly agree and 42% respondents agree on the statement. The table also shows that 23% of respondents are neutral on the statement. On the other hand, 1% of respondents disagree and 0% strongly disagree with the DV4 statement.

The item DV5 describes Unfavourable prices are one of the obstacles from engaging in CE. 42% respondents strongly agree, and 32% respondents agree on the statement. The table also shows that 20% of respondents are neutral on the statement. On the other hand, there are 1% respondents disagree and 2% strongly disagree on DV5 statement.

The item DV6 describes Lack of collaboration as one of the obstacles from engaging in CE. 42% of respondents strongly agree and 39% respondents agree with the statement. The table also shows that 14% respondents are neutral on the statement. On the other hand, there are 0% respondents disagree and 1% strongly disagree on DV6 statement.
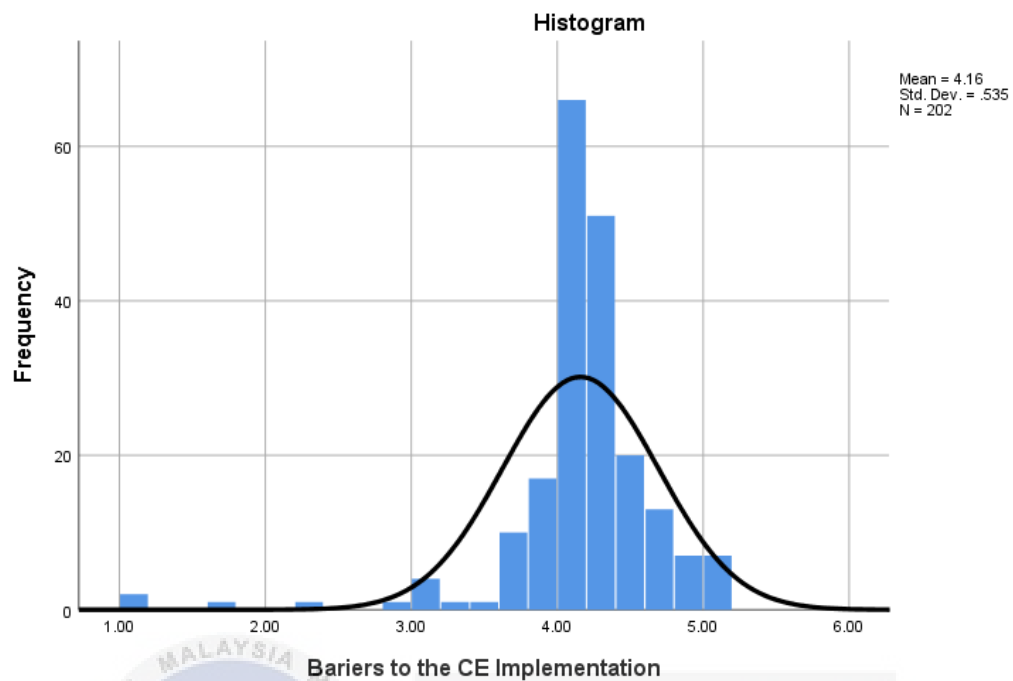
Figure 4.4.4: Dependent Variable (Barriers to the CE Implementation)

Source: (Develop from Research)

Figure 4.4.4 shows the shape of frequency distribution of barriers to the implementation of CE practices. It illustrates the response of respondents by Likert Scale where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly disagree according to respondents' self-conscious in rating. Most of the respondents agree that economic barriers influence the implementation of CE practices. The mean value is 4.16 while the standard deviation is 0.535.

4.5 Descriptive Statistics

Table 4.5: Descriptive Statistics for Each Independent Variables

Source: (Develop from Research)

Statistics

		Governmental	Economic	Social
N	Valid	202	202	202
	Missing	0	0	0
Mean		**4.1556**	**3.8259**	**4.0561**
Median		4.2222	4.0000	4.0000
Std. Deviation		.44974	.62611	.59330
Minimum		1.00	1.00	1.00
Maximum		5.00	5.00	5.00

The table shows the descriptive statistics of each independent variable (governmental, economic, and social). Based on the table, all of the independent variables have almost similar values of mean. The governmental barrier has the highest mean at 4.16 subsequently followed by social barrier at 4.06 and economic barrier has lowest mean at 3.83. From the table obtained, it can be clearly seen that the majority of the respondents rated agree on the questionnaire that the independent variables influence the implementation of CE practices.

In contrast, standard deviation specifies how the data spread from the mean. From the study, economic barrier has the highest standard deviation at 0.63 followed by social barrier at 0.59 while the lowest standard deviation is governmental barrier at 0.45. The standard deviation value indicates that the data does not deviate from the mean.

4.6 Pearson's Correlation Analysis

Table 4.6: Correlations of Independent Variables and Dependent Variable

Source: (Develop from Research)

Correlations

		Governmental	Economic	Social	Barriers to the CE Implementation
Governmental	Pearson Correlation	1	.541**	.626**	.743**
	Sig. (2-tailed)		.000	.000	.000
	N	202	202	202	202
Economic	Pearson Correlation	.541**	1	.487**	.562**
	Sig. (2-tailed)	.000		.000	.000
	N	202	202	202	202
Social	Pearson Correlation	.626**	.487**	1	.633**
	Sig. (2-tailed)	.000	.000		.000
	N	202	202	202	202
Barriers to the CE Implementation	Pearson Correlation	**.743****	**.562****	**.633****	1
	Sig. (2-tailed)	.000	.000	.000	
	N	202	202	202	202

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

Pearson's Correlation Analysis is used in Table 4.6 to show how governmental, economic, and societal constraints relate to the challenges of implementing CE practises. Pearson's Correlation Analysis is a statistical method for determining the

degree to which two variables are linearly related to one another. Values for Pearson's Correlation Coefficient might be between plus one and minus one. If the value is positive, then there is a positive correlation between the two variables, and if it's negative, then there is a negative correlation. If the coefficient value is 0, then there is no correlation between the two variables. Pearson's Correlation Coefficient is denoted by r.

Significant correlations are shown in the table to range from 0.562 to 0.743. Governmental barriers have the greatest coefficient value of the three independent variables, with a r value of 0.743. The association between legislative restrictions and obstacles to the adoption of CE practices is quite strong and beneficial. Two asterisks at the two-tailed test and p-values for all the variables below the 0.01 significance level signify a statistically significant correlation.

Next, social barrier has the second highest correlation coefficient value, r at 0.633. It indicates that social factors have moderate positive correlation with barriers to the CE implementation. Furthermore, the r-value of economic barrier is 0.562 which clearly shows moderate positive relationship between economic barrier and barriers to the CE implementation.

Therefore, there is a significant relationship between independent variables which consist of governmental barrier, economic barrier, and social barrier and dependent variable which is the barriers to the CE implementation. Thus, the researcher conducts further analysis on the independent variables with multiple linear regression analysis.

4.7 Simple Linear Regression Analysis

To examine the impact of each independent variable on the dependent variable, the researcher chose to do a linear regression analysis. To examine the relationship between independent factors and dependent variables, the hypothesis testing result will be achieved by linear regression analysis.

4.7.1 Simple Linear Regression Analysis for Governmental Barrier

Table 4.7.1.1: Model Summary of Governmental Barrier

Source: (Develop from Research)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.743[a]	.553	.550	.35838	.553	247.145	1	200	.000

a. Predictors: (Constant), Governmental

b. Dependent Variable: Bariers to the CE Implementation

The table 4.7.1.1 shows the result of linear regression model summary of economic factor. The value of R represents the correlation between governmental barrier and barriers to the CE implementation. Based on the table, R-value is at 0.743 which means strong correlation between governmental barrier and barriers to the CE implementation. Calculated by multiplying the R-value by itself, R squared shows how much of the observed variation in the dependent variable can be accounted for by the independent ones. The table shows an R-squared value of 0.553, which indicates that governmental interpretation accounts for approximately 55.3% of the variance in implementation barriers.

Table 4.7.1.2: ANOVAᵃ of Governmental Barrier

Source: (Develop from Research)

ANOVAᵃ

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.742	1	31.742	247.145	.000ᵇ
	Residual	25.687	200	.128		
	Total	57.428	201			

a. Dependent Variable: Bariers to the CE Implementation

b. Predictors: (Constant), Governmental

Analysis of Variance (ANOVA) is used for hypotheses testing to see how well the model fits into the data. The significant of p-value is 0.000 which is lesser than 0.05 indicates that governmental barrier well explained barriers to the implementation of CE practices. Therefore, alternative hypothesis is accepted at alpha = 0.05.

Table 4.7.1.3: Coefficientsᵃ of Governmental Barrier

Source: (Develop from Research)

Coefficientsᵃ

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.487	.235		2.074	.039
	Governmental	.884	.056	**.743**	15.721	**.000**

a. Dependent Variable: Barriers to the CE Implementation

From the table, beta values are used to predict dependent variable from independent variable. The coefficient of governmental barrier shows there is significant relationship with barriers to the implementation of CE practices. The result shows p-value is 0.000 while β is 0.743 which represents governmental barrier does affect the implementation of CE practices. Therefore, alternative hypothesis (H1) is accepted, and null hypothesis (H0) rejected.

4.7.2 Simple Linear Regression Analysis for Economic Barrier

Table 4.7.2.1: Model Summary of Economic Barrier

Source: (Develop from Research)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
					Change Statistics				
1	.562[a]	.316	.312	.44331	.316	92.215	1	200	.000

a. Predictors: (Constant), Economic

b. Dependent Variable: Barriers to the CE Implementation

By referring to the table, the value of R equals to 0.562 which indicates moderate positive correlation between economic barrier and barriers to the CE implementation. The coefficient determination, R square has value at 0.316 which indicates that there is 31.6% of variation in barrier to the implementation explained by economic barrier.

Table 4.7.2.2: ANOVA[a] of Economic Barrier

Source: (Develop from Research)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.123	1	18.123	92.215	.000[b]
	Residual	39.306	200	.197		
	Total	57.428	201			

a. Dependent Variable: Barriers to the CE Implementation

b. Predictors: (Constant), Economic

The table 4.7.2.2, the p-value is equal to 0.000 is less than 0.05 represents there is significant relationship between economic barrier and barriers to the CE

implementation. Therefore, alternative hypothesis (H2) is accepted at alpha equal to 0.05.

Table 4.7.2.3: Coefficients^a of Economic Barrier

Source: (Develop from Research)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.324	.194		12.005	.000
	Economic	.480	.050	**.562**	9.603	**.000**

a. Dependent Variable: Barriers to the CE Implementation

From table 4.7.2.3, the coefficient of independent variable has significant relationship with barriers to the CE implementation toward economic barrier because the p-value is less than 0.05. The result shows p-value is 0.000 while β is 0.562 which represents economic barrier does affect barriers to the CE implementation. Hence, alternative hypothesis (H2) is accepted, and null hypothesis (H0) rejected.

4.7.3 Simple Linear Regression Analysis for Social Barrier

Table 4.7.3.1: Model Summary of Social Barrier

Source: (Develop from Research)

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.633^a	.400	.397	.41500	.400	133.444	1	200	.000

a. Predictors: (Constant), Social

b. Dependent Variable: Barriers to the CE Implementation

Based on the table above, the R-value is at 0.633 which indicates moderate positive relationship between social barrier and barriers to the CE implementation. The coefficient determinant, R square valued at 0.40. There are 40% of variation in social barrier that influence barriers to the CE implementation.

Table 4.7.3.2: ANOVA^a of Social Barrier

Source: (Develop from Research)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.983	1	22.983	133.444	.000^b
	Residual	34.446	200	.172		
	Total	57.428	201			

a. Dependent Variable: Barriers to the CE Implementation

b. Predictors: (Constant), Social

From table 4.7.3.2, ANOVA shows that social barrier is significant as the p-value is 0.000 (less than 0.05). It represents that there is a significant relationship between social barrier and barriers to the CE implementation. Therefore, alternative hypothesis (H3) is accepted at alpha equal to 0.05.

Table 4.7.3.3: Coefficientsª of Social Barrier

Source: (Develop from Research)

Coefficientsª

	Model	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.847	.202		9.134	.000
	Social	.570	.049	**.633**	11.552	**.000**

a. Dependent Variable: Barriers to the CE Implementation

By referring to table 4.7.3.3, the coefficient of independent variable indicates that there is significant relationship between social barrier and barriers to the CE implementation due to the p-value is less than 0.05. The result shows that β value at 0.633 which represents that social barrier does affect barrier to the CE implementation. Thus, the null hypothesis (H0) has been rejected while alternative hypothesis (H3) is accepted.

4.8 Multiple Linear Regression

Table 4.8.1: Model Summary of Multiple Linear Regression

Source: (Develop from Research)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics R Square Change	F Change	df1	df2	Sig. F Change
1	.787[a]	.620	.614	.33215	.620	107.515	3	198	.000

a. Predictors: (Constant), Social, Economic, Governmental

b. Dependent Variable: Barriers to the CE Implementation

Table 4.8.1 shows the model summary from usage of multiple linear regression analysis. The results show the value of R is 0.787 which indicates all of the three independent variables are strongly correlated. The coefficient of determination, R square is at 0.62 indicates that 62% of total variation in barriers to the CE implementation can be explained by the independent variables (governmental, economic, social). The value of R Square is greater than 0.5 which is considered a good value because there is less variance towards barriers to the CE implementation as the independent variables in regression model. However, 38% remain unexplained in the variation. Hence, there are other significant reasons that affecting barriers to the CE implementation not included for this research.

Table 4.8.2: ANOVA[a] of Multiple Linear Regression

Source: (Develop from Research)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.584	3	11.861	107.515	.000[b]
	Residual	21.844	198	.110		
	Total	57.428	201			

a. Dependent Variable: Barriers to the CE Implementation

b. Predictors: (Constant), Social, Economic, Governmental

Based on the table, the significance value, p-value is 0.000 which is less than the alpha value, 0.05 is statistically significant. The F-value is 107.515 is significant because when the F-value is higher, alternative hypotheses are well fit in the model and accepted. Therefore, the significance of overall model is F (3,198) = 107.515, p<0.05. It shows that overall multiple regression model is significant at 5% level of significant.

Table 4.8.3: Coefficients^a of Multiple Linear Regression

Source: (Develop from Research)

Coefficients^a

Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	.252	.221		1.139	.256
	Governmental	.597	.071	.503	8.389	.000
	Economic	.151	.046	.177	3.306	.001
	Social	.209	.052	.232	4.012	.000

a. Dependent Variable: Barriers to the CE Implementation

According to the table, each independent variable in the research has a contribution in influencing barriers to the CE implementation. The governmental barrier is the strongest predictor variable where β = 0.597, t (202) = 8.389, p < 0.05. The unstandardized beta, β also has the highest value compared to other independent variables. It can be clearly seen that governmental barriers have the highest influence of positive relationship with barriers to the CE implementation.

Next, social factor has subsequent stronger predictor where β = 0.209, t (202) = 4.012, p<0.05. The unstandardized beta, β of social factor is the second highest positive value among the variables. From the result, social barrier is the second highest factor influencing barriers to the CE implementation.

Then, economic barrier is the lower predictor variable where β = 0.151, t (202) = 3.306, p<0.05. The unstandardized beta, β of economic is the lowest positive among

the variables. From the result, economic barrier has lowest positive value of all independent variables and is the third barrier influencing barriers to the CE implementation. Based on the result, each of the independent variables has a different level of contribution towards dependent variable and provide significant prediction towards barriers to the CE implementation. The relationship between dependent variables and independent variables can be determined by the multiple regression equation.

$$\text{Equation: } Y = a + bX_1 + cX_2 + dX_3 + e$$
$$Y = 0.252 + 0.597X_1 + 0.151X_2 + 0.209X_3$$

Y = dependent variable (the barriers that impede the implementation of circular economy)

a = constant/intercept

b = Influence of X_1 (governmental)

c = Influence of X_2 (economic)

d = Influence of X_3 (social)

X_1, X_2, X_3 = independent variables

e = error

From the multiple regression equation, there is a positive relationship between all independent variables and dependent variables. The regression equation is formed to predict the value of barriers to the CE implementation for new case, multiply independent variables score and add values to the constant. For every increase in unit in independent variable, the researcher expects value increase in dependent variable holding all the variables in constant. Governmental barrier is the strongest predictor from the result obtained as $\beta = 0.597$, $t(202) = 8.389$, $p < 0.05$. Therefore, the most significant barrier influencing the implementation of CE practices is the governmental barrier.

In conclusion, the regression equation is:

Barriers to the CE Implementation = 0.252 + 0.597 (Governmental) + 0.151 (Economic) + 0.209 (Social). Therefore, the regression equation is established to show how the variables are associated to each other.

4.9 Hypothesis Testing

In order to draw a conclusion from two alternative, and sometimes contradictory, hypotheses, a statistical method known as "hypothesis testing" is often employed. It is common practise in statistics to suggest both a null hypothesis and an alternative hypothesis to explain the data's likely range of outcomes (Khan, Abas & Mir, Mohammad., 2021).

Where:

H_0 is null hypothesis.

H_1 is alternative hypothesis.

The null hypothesis will be rejected, and the alternative hypothesis will be accepted if the significance value is less than 0.05. If so, the researcher can draw the conclusion that the independent variables and the dependent variable are not homogeneous.

4.9.1 Hypothesis Testing 1

> H1: There is significant relationship between governmental barrier and the implementation of CE for automotive industry.
> H0: There is no significant between governmental barrier and the implementation of CE for automotive industry.

Given the results in table 4.7.1.3, the alternative hypothesis (H1) is accepted, and the null hypothesis (H0) is rejected because the significance value is less than 0.05. As a result, there is a strong correlation between official obstruction and difficulties in implementing CE procedures. These findings are consistent with those of earlier studies, which also revealed that governmental impediments have a major impact on the difficulty of implementing CE practices. Mangla et al. (2019) highlights the importance of government policies as a barrier to CE adoption, and Agyemang et al. (2019) research confirms this, indicating that governmental hurdles are also crucial in defining the barriers that hamper the implementation of CE practices (2018). Findings from the studies indicate that governmental barriers affect the spread of CE practices.

4.9.2 Hypothesis Testing 2

H1: There is significant relationship between economic barrier and the implementation of CE for automotive industry.
H0: There is no significant relationship between economic barrier and the implementation of CE for automotive industry.

Based on table 4.7.2.3, the significance value is less than 0.05 which indicates the alternative hypothesis, H1 is accepted and null hypothesis, H0 is rejected. Therefore, there is a significant relationship between economic barrier and barriers to the implementation of CE practices. The results are parallel with previous studies where previous researchers found economic factors have significant effect on barriers to the implementation of CE practices. From Kumar et al. (2019), the findings obtained that barriers from the economic perspective are also important in determining the barriers that impede the implementation of CE practices as noted in the study of CE by Benton et al. (2015). The studies highlight that economic barrier has an effect on implementation of CE practices.

4.9.3 Hypothesis Testing 3

H1: There is significant relationship between social barrier and the implementation of CE for automotive industry.
H0: There is no significant relationship between social barrier and the implementation of CE for automotive industry.

The alternative hypothesis (H2) is accepted while the null hypothesis (H0) is rejected because the significance value is less than 0.05, as shown in Table 4.7.2.3. As a result, there is a strong connection between social barriers and other obstacles in the way CE practices being put into place. The findings agree with those of earlier research. Kumar et al. (2019) state that social barriers have an effect on the spread of CE practices. Several authors in academic literature agree with this finding, including Benton et al. (2015), Su et al. (2013), Naustdalslid (2014), Winans et al. (2017), and Geng et al. (2009). Evidence from these studies shows that social barriers can hinder the spread of CE methods.

4.9.4 Hypothesis Testing Result

Table 4.9.4: Hypothesis Testing Result

Source: (Develop from Research)

Independent Variables	P-value	Result
Governmental	0.000	Accepted H1
Economic	0.000	Accepted H2
Social	0.000	Accepted H3

From table 4.9.4, the hypothesis result illustrates that there are significant relationships between all of the independent variables with the dependent variable. The result shows that all the significant value is below 0.05 where $p < 0.05$. As a result, null hypothesis (H0) of each independent variable is rejected while the alternative hypothesis of each independent variable is accepted.

4.10 Summary

As a summary, this chapter discusses data analysis and the results of the research. SPSS Version 26.0 was used to obtain data and result from 202 respondents to study the critical barrier influencing barriers to the CE implementation. There are several different statistical tools used for data analysis.

Cronbach's Alpha was used to examine the questionnaire's internal consistency in a reliability analysis performed during the pilot phase of testing. Pie charts, tables, and figures display the profile data and variables for the survey's respondents. After doing a linear regression analysis, the researchers concluded that there is a substantial association between the independent variables (government, economic, and social) and obstacles to the implementation of CE, therefore accepting all of the alternative hypotheses and rejecting the null. Meanwhile, analysis with Pearson's Correlation Coefficient reveals a robust positive association between the study's independent variables and its dependent ones. Finally, the results of a multiple regression analysis indicate that restrictions imposed by the government are the primary factor limiting the spread of CE.
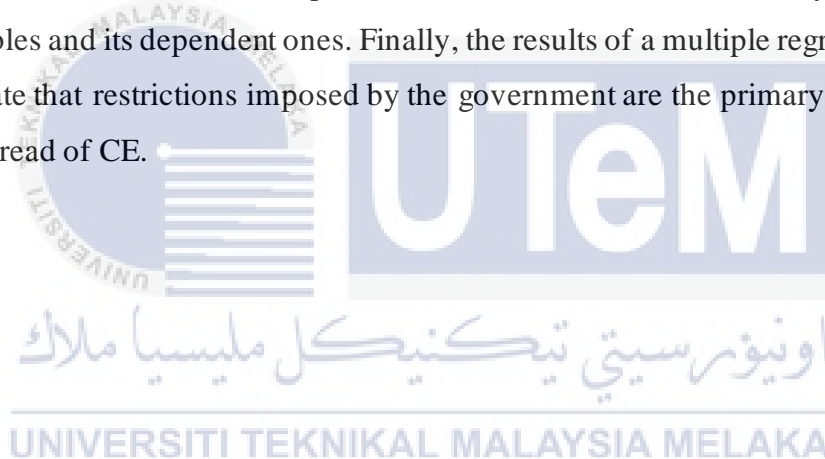
CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Introduction

The researcher will provide an overview of the study's findings in this section. Based on the stated goals of the study, a conclusion and set of suggestions are formulated. The findings from the research provide the basis for the suggestions for further study. Researchers in the future can use this study's results and findings to perform their own investigation of credit cards.

5.2 Summary of Findings

In previous chapter, the study had achieved the research objectives which are to identify barriers influencing barriers to the CE implementation, to study the relationship between governmental, economic, and social barriers with barriers to the CE implementation and to examine the most significant barrier influencing barriers to the CE implementation.

5.2.1 Research Objective 1

RO 1: To identify the barriers to circular economy experienced by automotive industry.

The first objective of this study is to identify the barriers in implementing CE practices for the automotive industry. In the previous chapter, the researcher had suggested three critical barriers that impede the implementation of CE practices which are governmental, economic, and social barriers. The first objective had been achieved through Literature Review in Chapter 2. The critical factors had been proved by previous researchers. Therefore, the researcher comes out with the independent variables (governmental, economic, and social) that impede the implementation of CE practices for automotive industry.

Govindan & Hasanagic (2018) stated that governmental barrier that include absence of established performance evaluation methods, ineffective recycle programs for achieving high quality, and current policies which do not promote the circular economy that impede the implementation of CE practices. Economic barrier that includes fluctuation of price for recycled materials that creates uncertainty (Blomberg & Söderholm, 2009) and high initial investment costs (Masi et al., 2018) are inhibits motivation to put the money in recyclable materials markets and become the most major constraints respectively. Singh & Giacosa (2019) developed a paradigm to explain low consumer knowledge and interest in CEs, indicating that psychological ownership of products, dominating status-quo bias, and a consumerist lifestyle to satisfy desires and status were all key contributors to negative attitudes about CEs. This is due to the fact that a consumer's brand awareness effects their assessment criteria for a particular product (Barrutia & Gilsanz, 2013) which in turn determines their purchase behaviour.

Moreover, from Table 4.2.2.1.1, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is excellent, 0.801 because the value is higher than 0.6 (Yong & Pearce, 2013). When the value is closer to 1, the more suitable the method to analyze the data and the factors are reliable to each other. Then, Barlett's test of sphericity is significant $\chi 2$ (df =120) because p-value is less than 0.000 hence the items listed in independent variables have pattern relationships among the all-independent variables because the p-value is less than 0.05 with approximate Chi-Square value 491.743.

5.2.2 Research Objective 2

RO 2: To evaluate the relationship between the barriers toward the implementation of circular economy practices for automotive industry.

The second research objective can be achieved through Pearson's Correlation Coefficient Analysis by Statistical Package for Social Sciences (SPSS) software. The findings display that all the independent variables which are governmental, economic, and social barriers are positively associated to the dependent variable which is the consumer spending by using credit cards. In addition, the results of the analysis show that all of the independent variables have significant relationships and positively associated with barriers to the implementation of CE practices for automotive industry. From the Pearson's Correlation Analysis, the independent variables (governmental, economic, and social barriers) have moderate to strong positive relationship with barriers to the implementation of CE practices because they have respective R-value between 0.743, 0.562 and 0.633 based on table 4.6. The governmental barrier has the highest correlation followed by social barrier and economic barrier.

In Kumar et al. (2019), lack of monetary support channels and government subsidies entrenched in budgeting systems from banks and governments, companies avoid implementing CE despite their willingness to do so (Geng & Doberstein, 2008; Liu & Bai, 2014; Su et al., 2013). With the exception of big businesses, it is an expensive practise that they cannot afford. Their research confirmed Benton et al. (2015) that the adoption of the circular economy is hampered by an insufficient financial support system.

In Grafstrom and Aasma (2021), issues in financing CE business strategies, initial investment outlay expenses, and low raw material costs are also economic barriers to CE adoption.

5.2.3 Research Objective 3

RO 3: To examine the most significance barriers that impede the implementation of circular economy practices for the automotive industry.

The third research objective is to examine the most significant barriers that impede the implementation of CE for the automotive industry. This objective can be achieved through Multiple Linear Regression analysis from SPSS. Based on table 4.8.3, the governmental barrier is the most significant barrier that impedes the implementation of CE practices for the automotive industry.

Agyemang et al. (2019).'s research backs up the conclusion that policy decisions made at the federal level are a major roadblock to expanding the use of CE. Businesses' chances of making the switch from a linear to a circular economy were cited as a major reason for the interviewees' negativity. There is also a dearth of effective collaboration mechanisms to fully help businesses and a scarcity of resources among government entities that assist industries in making the change. The study found that governmental barriers had the greatest impact on CE practices adoption.

5.3 Research Implication

Even though only three factors are being examined, the researcher hypothesized that additional factors could influence the barriers to the implementation of CE practices for automotive industry. Therefore, the researcher proposed a new theoretical framework for further study.

Through a review of the literature, analysis of Pearson's correlation coefficients, and testing of the relationship between the independent factors (governmental, economic, and social) impacting barriers to the implementation of CE, the researcher was able to complete the study's objectives. In summary, governmental, economic, and social barriers influence the barriers to the CE implementation and governmental barrier is the most significant barrier that can impede the implementation of CE practices.

The critical barriers that can impede the implementation of CE practices is crucial to have in depth understanding on barriers for automotive industry and automotive and parts manufacturer to gain insights potential of CE in Malaysia. For consumers, they can increase awareness of their own by having a good understanding about the potential of CE so that this will create a new culture of mindset and perception towards remanufactured products. As Malaysia's fast population expansion and industrialization have boosted garbage generation, which has become a serious threat to the environment (Wong, Al-Obaidi, & Mahyuddin, 2018), Malaysian

government enacted few policies in response to the high average of lifespan of cars and the low rate of auto disposal (MITI, 2009).

5.4 Research Limitation

There are several limitations that have been met by researchers during the study. The limitation could be improved for future study. The first limitation is time constraint where the researcher is only able to obtain only 202 respondents from the targeted respondents which is 384 respondents according to Krejcie & Morgan table. However, the researcher knows that the targeted respondents can be achieved if the researcher distributed the questionnaire earlier. For future research, the researcher should distribute the questionnaire earlier to achieve the targeted respondents in order to obtain generalizability of results.

Next, the limitation is the responses from consumers. The potential respondents may refuse to answer the questionnaire due to personal reasons. Some of the respondents may not answer the questionnaire based on their own experiences and may not understand the questions well before they answer. This can cause the data may not be able to provide enough evidence on barriers to the CE implementation. The researcher designed the questionnaire based on problem statements to obtain precise and accurate data to make significant study.

5.5 Recommendation for Future Research

For future research, the researcher proposed a new conceptual framework as this study only consists of three independent variables (governmental, economic, and social). It was the researcher's opinion, however, that other, equally weighty elements can play a role in shaping the obstacles that prevent CE practices from being put into reality. It's also worth noting that people's lack of knowledge stands as a significant roadblock to CE's widespread adoption in the automotive sector. The most common obstacle to CE in the automotive industry is a lack of awareness, which might be investigated in future studies. In order to generalize the results, future researchers can simply increase the sample size of the study.

Based on the study of Milios & Matsumoto (2019), Individuals' perceptions towards refurbished goods are a significant roadblock to the widespread adoption of CE procedures. Because procurers tend to prioritize/prescribe the utility or product

they are familiar with, a new study by Wasserbaur and Milios (2019) in Swedish municipalities found that selection bias and user preferences of the procurement officers occur frequently during the drafting of tender specifications. This is consistent with findings from studies by Sporrong and Bröchner that indicate procurement officials have personal preferences that are reflected in the methods they use to make purchases. The researcher constructs a new research framework for future research as below.

Independent variables
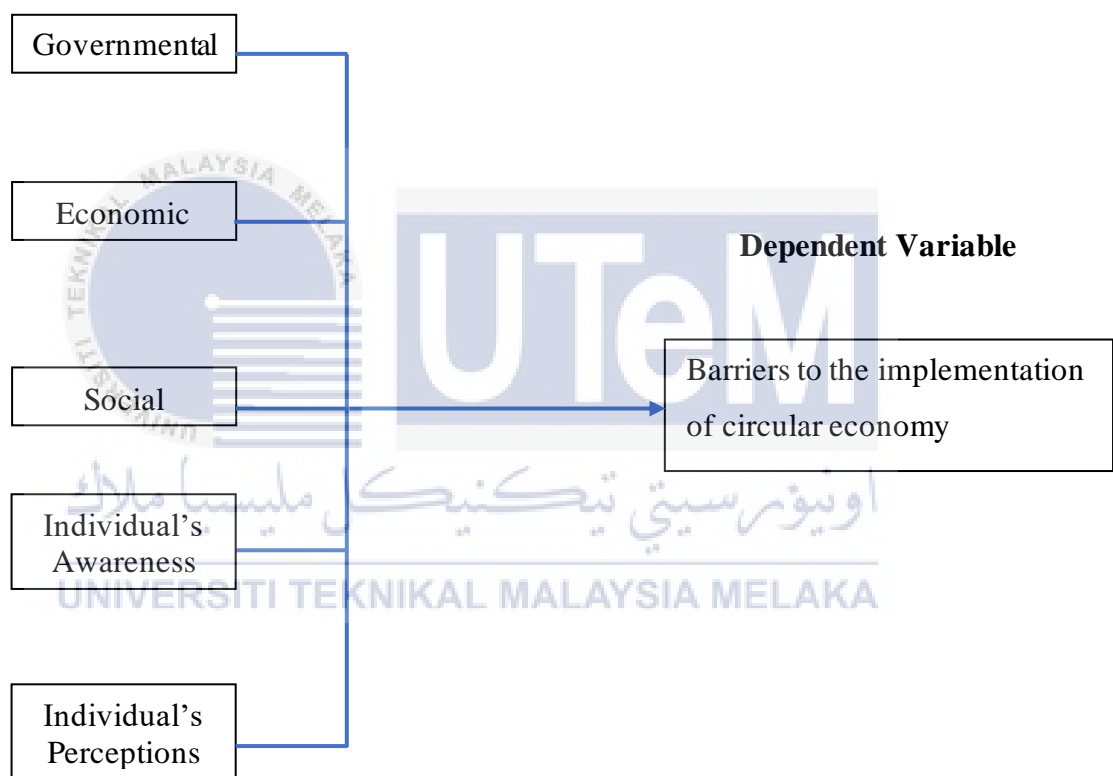
Figure 5.5: New Conceptual Framework

Section A: Demographic Information

For this section, the aim is to get some background information about the respondents.
For each item, please indicate your opinion and response by choosing your answer on space given below.

- Gender
    - Male
    - Female
- Age
    - 18-20
    - 21-30
    - 31-40
    - 41-50
- Education level
    - SPM
    - STPM/DIPLOMA
    - DEGREE
    - MASTER/PHD
- Race
    - Malay
    - Chinese
    - Indian
    - Non-Malaysian
    - Other
- Occupation
    - Government/Private Sector
    - Self employed
    - Unemployed
    - Student
- Are you familiar with the idea of circular economy in sustainability?
    - Yes
    - No
- What kind of motor vehicle are you currently using?
    - Motorcycle
    - Car
    - Truck
- What is the condition of your motor vehicle that you are currently using?
    - New
    - Used
    - Reconditioned*

*: a used car imported from overseas from other right hand drive markets such as UK, Japan, and South Africa

Section B: Barriers to the Implementation of Circular Economy
For this section, the aim is to explore the main barriers for accelerating the transition to Circular Economy from respondents.
Please tick (/) your answer in the appropriate blank to demonstrate your agreement with each statement using the following 5-stage Likert Scale:
1 – Strongly Disagree
2 – Disagree
3 – Neutral
4 – Agree
5 – Strongly Agree

Circular Economy (CE) is a systems-focused approach that keeps materials, products, and services in circulation for as long possible by reducing material use, redesigns materials, products, and services to be less resource intensive, and recaptures "waste" as a resource to manufacture new materials and products. (United States Environmental Protection Agency, 2022)

Section B: Barriers to The Implementation of Circular Economy	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Independent Variables					
Barriers from the Governmental Perspective					
BG1 Technical aspects (administrative, production techniques, collection techniques etc.) must change in the CE process.					
BG2 Promote incentives (decreased taxes and subsidies to recycled materials etc.) is needed for the changes in CE process.					
BG3 Involve stakeholders and managers in decision-making and provide transparent data to overcome resistance to change.					
BG4 Promote innovative, broad, and long run policies at national level to overcome fear of instability.					
BG5 Policy maker is the responsible party to pursue successful transition of CE.					
BG6 Public administration is the responsible party to pursue successful transition of CE.					
BG7 Regulatory measures is the necessary policy instruments as the drive towards CE.					
BG8 Policy instruments to increase awareness of consumers is necessary as the drive towards CE.					

B G 9	Selective tax systems applied to consumption is the necessary policy instruments as the drive towards CE.					
Barriers from the Economic Perspective						
B E 1	Investment in suitable circular infrastructure (to promote easy transport, storage, marketing etc.) is needed for the changes in CE process.					
B E 2	Economic actors are the responsible party to pursue successful transition of CE.					
B E 3	Policy instruments for financial supports from companies is necessary as the drive towards CE.					
Barriers from the Social Perspective						
B S 1	Increase dissemination of circular concepts to overcome low awareness and know-how.					
B S 2	Citizens/consumers is the responsible party to pursue successful transition of CE.					
B S 3	Public opinion is the responsible party to pursue successful transition of CE.					
B S 4	Policy instruments to develop a cultural approach favouring waste prevention is necessary as the drive towards CE.					
Dependent Variable						
Barriers to the Implementation of Circular Economy						
D V 1	Lack of policies/regulations are one of the obstacles from engaging in CE.					
D V 2	Lack of infrastructure is one of the obstacles from engaging in CE.					
D V 3	Resistance to change is one of the obstacles from engaging in CE.					
D V 4	Low awareness and know-how is one of the obstacles from engaging in CE.					
D V 5	Unfavourable prices are one of the obstacles from engaging in CE.					
D V 6	Lack of collaboration is one of the obstacles from engaging in CE.					

Section C: Awareness about Circular Economy
For this section, the aim is to investigate the awareness of the respondents regarding Circular Economy and Sustainable Development.
Please tick (/) your answer in the appropriate blank to demonstrate your agreement with each statement using the following 5-stage Likert Scale:
1 – Strongly Disagree
2 – Disagree
3 – Neutral
4 – Agree
5 – Strongly Agree

Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (The United Nations: Sustainable Development Goals)

	Section C: Awareness About Circular Economy	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Meaning of Sustainable Development						
MSD1	Sustainable Development is an economic, social, and environmental equilibrium.					
MSD2	Sustainable Development is to meet the needs of the present without compromising the well-being of future generations.					
MSD3	Sustainable Development is to meet environmental integrity requirements.					
Meaning of Circular Economy						
MCE1	Circular Economy is reduced, recycle, reuse process and economic activity.					
MCE2	Circular Economy is a more sustainable way to produce and consume.					
MCE3	Circular Economy is a zero-waste economy.					
MCE4	Circular Economy is where an economy able to regenerate itself					
Important Aspect/s in Circular Economy						
IACE1	Recycling phase is an important aspect in Circular Economy.					
IACE2	New product design is an important aspect in Circular Economy.					
IACE3	New business model is an important aspect in Circular Economy.					

IACE4	Sustainable supply chain/reverse logistics is an important aspect in Circular Economy.					
IACE5	Eco-industrial parks and Smart cities are the important aspects in Circular Economy.					
Expectations From Circular Economy						
EXCE1	Environmental benefits are the important expectations from CE.					
EXCE2	Economic benefits are the important expectations from CE.					
EXCE3	New business opportunities are the important expectations from CE.					
EXCE4	Employment opportunities are the important expectations from CE.					
Circular Economy Implementation						
CEI1	Circular Economy will always coexist with linear economy.					
CEI2	We are half way the way to the goal.					
CEI3	We are almost close to the goal.					
CEI4	It is still far from the goal.					

B. Gantt Chart for PSM I

YEAR	2021/2022														
TASK/WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Attending PSM 1 briefing	■														
Attend first meeting with supervisor					■										
Topic discussion					■	■									
Drafting topic proposal					■										
Forming introduction, problem statement, research objectives & questions					■										
Submit draft topic proposal to supervisor					■										
Topic confirmation						■									
Start doing literature review													■		
Read journals for literature review													■		
Studying & finding secondary data													■		
Identifying variables & developing conceptual framework													■		
Attend second meeting with supervisor													■		
Determining methodology used in the research						■	■	■	■	■	■				
Start doing research methodology											■	■			
Submit draft to supervisor													■		
Revised Chapter 1 to 3													■		
Submission FYP 1														■	
Preparing Slide														■	
Presentation of FYP														■	

C. Gantt Chart for PSM II

YEAR	2023/2024														
TASK/WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Constructing of questionnaire	■														
Revised for Questionnaire		■													
Questionnaire Distribution			■	■	■	■									
Data Collection			■	■	■	■									
Data Analysis							■	■	■						
Chapter 4- Findings and Discussion							■	■	■						
Revised Chapter 4													■		
Chapter 5 – Conclusion													■		
Revised Chapter 5													■		
Final Edit FYP Report 2														■	
FYP Presentation 2														■	
FYP Report Submission 2															■

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