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MAKERERE UNIVERSITY BUSINESS SCHOOL

**STRATEGIC PLANNING, TECHNOLOGICAL ADOPTION AND INNOVATION IN
THE PLASTICS RECYCLING INDUSTRY IN UGANDA**

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**A DISSERTATION SUBMITTED TO MAKERERE UNIVERSITY BUSINESS
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MAKERERE UNIVERSITY**

PLAN A

MARCH, 2022

DECLARATION

I **Omngot Francis**, hereby declare that this dissertation is my own original piece of work and has not been submitted for any Degree or examination in another University or any other Institution of higher learning. In all cases where other people's ideas have been used, they have been duly acknowledged by complete references.

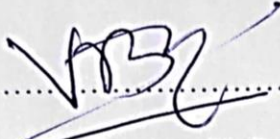
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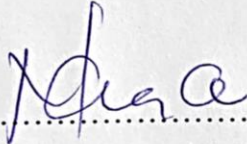
APPROVAL

This is to certify that this dissertation has been approved and submitted with our approval as University Supervisors.

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DEDICATION

This work is dedicated to my beloved parents Mr. and Mrs. Onange who have supported me throughout my academic journey and to my siblings Benjamin, Boniface, Hilda and Imelda.

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I would like to acknowledge and express sincere gratitude to all the people whose contributions have made this research a success. Special appreciation goes to my supervisors Prof. Vincent Bagire and Ms. Grace Nalweyiso for their invaluable encouragement, time and guidance through the research process.

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ABSTRACT

The purpose of the study was to examine the relationship between Strategic Planning, Technological Adoption and Innovation in the plastics recycling industry. The research problem was anchored around slow innovation in the industry which has created many problems that have far reaching effects on many different stakeholders. The objectives were to examine the relationship between strategic planning and innovation, to examine the relationship between technological adoption and innovation, to examine the relationship between strategic planning and technological adoption and to examine the mediating role of technological adoption on the relationship between strategic planning and innovation. The study adopted a cross sectional and quantitative approach. Data was obtained using a sample approach from 36 plastics recycling firms. A questionnaire was used to obtain data from three staff of each firm. Results show that both strategic planning and innovation are significantly and positively related ($r = .706$, $p < .01$), technological adoption and innovation are significantly related ($r = .734$, $p < .01$), strategic planning and technological adoption are significantly related ($r = .862$, $p < .01$) and that in the plastic recycling companies of Uganda, technology adoption does indeed mediate the relationship between strategic planning and innovation. To that end, it was recommended that plastic recycling firms in Uganda need to formulate and implement strategic plans for five to ten years of operation and review the strategies once a year. There is need to increase public awareness on the dangers of improper plastic waste disposal and the avenues through which the waste can best be managed. All plastic recycling firms should review the effectiveness of the technology they use on a regular annual basis so that they are not left behind since technology is a fast changing and highly dynamic concept. Government should provide incentives to the plastic recycling firms to enable them purchase requisite plastic recycling technologies.

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter includes the background to the study, the statement of the problem, the conceptual framework, the purpose of the study, objectives of the study, research questions, scope of the study and significance of the study.

1.2 Background to the study

Globally, innovation is increasingly being appreciated as one of the most important factors in sustaining a competitive advantage in the business environment (Taylor, 2017). The greatest concern of companies is their ability to safeguard themselves and survive in the dynamic competitive business environment (Kihara, 2013). It has become more prominent due to increased competition and the changing customer needs and preferences. The desire by companies to meet the changing customer needs and survive in the market triggers innovative tendencies. Organizational survival and meeting the customer needs is premised on innovating novel products or improvements on existing products, the introduction of new processes of production and delivery of those products to the market (Wanjihia, 2011).

It is through the introduction of new products and processes in response to the changing business environment that firms shall be able to protect themselves against the competition and survive in the market. Firms are therefore transitioning from being passive towards innovation to taking it seriously. Those that are in places of comfort risk running out of business compared to those firms that have taken an aggressive path towards Innovation. The incremental consumption and use of plastics leading up to an increase in plastic waste presents an opportunity for recycling firms to develop their innovative capacity. Firms that are able to mobilize their resources and utilize the abundant plastic waste through novel

innovations will thrive in the market. Plastic recycling firms should therefore utilize the abundant plastic waste in the production of novel innovations.

Plastic waste disposal is on the increase, Africa generates 17 million tonnes of plastic waste annually (Ayeleru, et al., 2020). In Uganda, approximately 600 tonnes of plastics are disposed everyday of which the vast majority litter the city and clog vital sewage systems (Asiimire, 2015; Saad, 2020). About 51% of the plastic waste in the city is left uncollected and ends up in the drainage channels, natural water courses, man holes and on the road sides. According to Ombis, Vliet and Mol (2015), plastic waste is the third major component of municipal waste after organic waste and paper waste in East Africa. This plastic waste ends up blocking drainage channels and sewer lines hence causing excessive floods during the rainy seasons.

Plastic Recycling is seen as a solution to the plastic pandemic that is used widely in some countries however, in Uganda, the progress is slow (Atuhaire, 2009). The plastic recycling process not only contributes towards waste management but also creates job opportunities to over 600,000 Ugandans mainly youth and women (UPMRA, 2019).

In some Countries, Plastic recycling companies have utilized plastic waste as a resource to manufacture diesel through a chemical recycling process called pyrolysis, Maceiras (2016), road construction in India, United Kingdom, United States of America, Ghana, South Africa, Ethiopia Sasidharan, Torbaghan, and Burrow (2019) and in Melbourne Australia with reconophalt which is a combination of plastic waste and asphalt (Albeck-Ripka, 2019). Other products that have been innovated include; film and sheeting, kitchenware, traffic cones, carpets, door mats, leather jackets, park benches, backyard decks, lawn furniture, playground equipment for children, kids toys, skateboards, plastic garbage bins, shirts, pull overs,

sleeping bags, car batteries, garden rakes, brooms, shopping bags, cups, plates, tooth brushes, sun glasses, shoes, stock able beach chairs, picnic tables, plastic rocker chairs, garden benches, saddle bar stools, bar tables, plastic chaise lounges, benches, plastic sofa seats, plastic swings, ottoman seats, dining tables and seats, plastic lounge sets, bar side stools, bar counter stools, chat tables, coffee tables, flower pots and high back chairs (American Chemistry Council, 2020).

In Uganda, the products that are manufactured from recycled plastic waste include; pavers, eco-bricks, roof tiles, floor tiles, paving slabs, footpath tiles, septic tank covers, pit latrine slabs, ladies' bags and shopping bags (Masinde, 2020; Takoulevu, 2020). Plastic recycling firms in Uganda are limited to producing few plastic recycled products. If they were more Innovative, they would be capable of manufacturing more products in order to tap into the local and global market. The plastic recycling technologies being used by some Ugandan plastic recycling companies are manual and highly labour intensive which has affected output and productivity (Masinde, 2020). These technologies include; plastic waste hand sorting and washing, sun drying of the plastics after washing, shredding machines, heating machines, plastic mixers, sand sieving machines, paver shapers or molding equipment, hand held wood compacting equipment and trimming machines.

1.3 Statement of the Problem

Plastic products are designed to be used only once and discarded posing a threat to the environment, human and animal life. In Uganda, approximately 600 tonnes of plastics are disposed daily of which the vast majority litter the city and clog vital sewage systems (Asiimire, 2015). The ban by China and India on the importation of plastic waste flakes has affected plastic recycling firms. As Entrepreneurs grapple with the ban, mountains of plastic waste are heaped on their premises (Musoke, 2018). Given the abundant plastic waste,

recycling firms should be able to utilize the available plastic waste in developing novel innovations.

The slow progress in innovation may be attributed to failure by the recycling firms to incorporate Strategic Planning and Technological Adoption. If these firms do not embrace innovation and utilize the plastic waste, they risk running out of business, the casual laborers that are involved in the various recycling processes risk losing their source of income and there will be continuous litter of plastic waste which is a threat to both human life and the Environment. The research sought to scrutinize how innovation may be enhanced by the plastic recycling firms.

1.4 Purpose of the study

The purpose of the study is to examine the relationship between Strategic Planning, Technological Adoption and Innovation in the plastics recycling industry.

1.5 Objectives of the study

- i) To examine the relationship between strategic planning and innovation.
- ii) To examine the relationship between technological adoption and innovation.
- iii) To examine the relationship between strategic planning and technological adoption.
- iv) To examine the mediating role of technological adoption on the relationship between strategic planning and innovation.

1.6 Research Questions

- i) What is the relationship between strategic planning and innovation?
- ii) What is the relationship between technological adoption and innovation?
- iii) What is the relationship between strategic planning and technological adoption?
- iv) What is the mediating role of technological adoption on the relationship between strategic planning and innovation?

1.7 Scope of the study

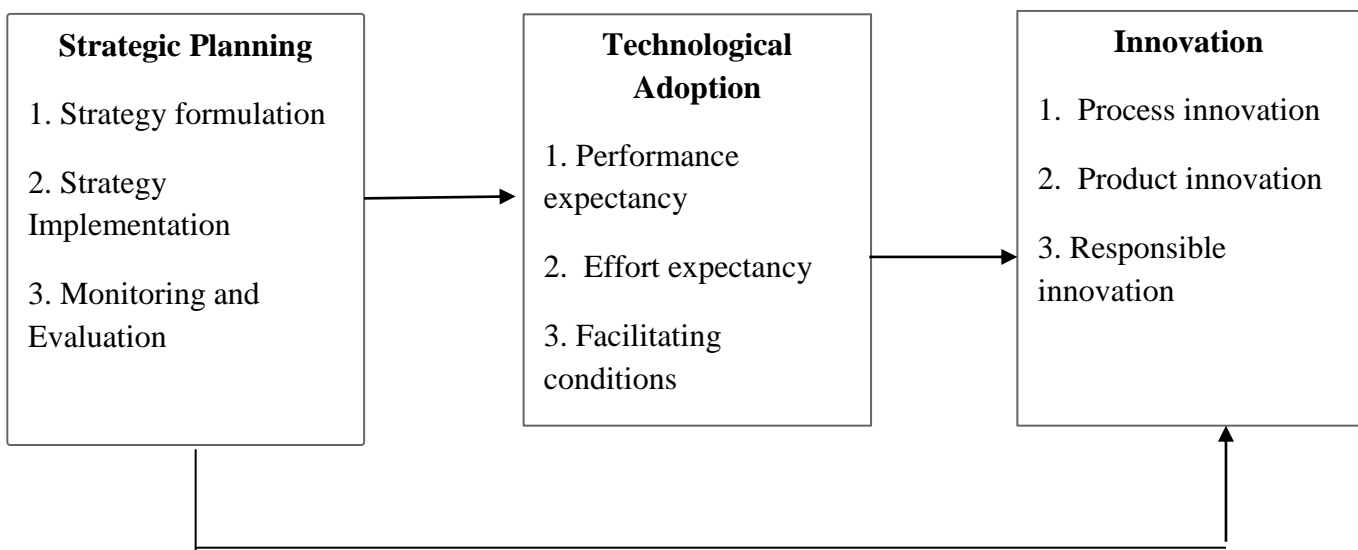
1.7.1 Subject scope

The study examines the relationship between Strategic Planning, Technological Adoption and Innovation.

1.7.2 Geographical scope

The study was carried out within Central Uganda.

1.8 Conceptual Model



Source: *Synthesized from Bagire & Namada (2013); Arasa & K'Obonyo (2012); Venkatesh, et al., (2016); Fagerberg, et al., (2005); Drucker (2014); Caetano & Amaral (2013); Simerson (2011).*

1.9 Significance of the study

The study may provide insight on the role of policy makers and Government towards providing a conducive environment for plastic recycling companies to enable them collect, recycle and manufacture various products from recycled plastic waste.

The study shall provide guidance on measures management of the plastic recycling companies ought to adopt in order to foster innovation, ensure efficiency and effectiveness through incorporating strategy taking into consideration the internal and external environment and adopting the requisite technology to increase productivity and quality.

The study will add on the existing knowledge on the significance of strategic planning and technology in fostering innovation in recycling plastic waste into plastic products.

The study shall also showcase the relevance of plastic waste recycling not only being an income generating activity but also an avenue through which the environment, human and animal life shall be preserved despite the growing rate at which plastic is being consumed and improperly disposed.

The study shall unravel the influence of strategic planning and technology on innovation which shall enable plastic recycling companies to develop better winning strategies and manufacture novel plastic recycled products.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter highlights in detail work done by researchers and scholars on the constructs of Strategic Planning, Technological Adoption and Innovation. It is organized in sections; the first section gives a theoretical framework, the description of the variables and then it describes the relationship between the variables.

2.2 Theoretical Framework

There are several commonly used theories in regard to technology adoption which is considered as a mediator in this study. This research is anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT). Technology acceptance models or theories are commonly used in studies aimed at predicting and explaining the factors that might influence decisions to accept and use the new technology. UTAUT was developed by Venkatesh et al in 2003 and has been fronted by scholars as the most promising theory in explaining behaviors towards acceptance and usage of technology. It is a combination of 8 previous theories namely; Technology Acceptance Model, Theory of Reasoned Action, Motivational Model, Theory of Planned Behavior, Model of Personal Computer Utilization, Innovation Diffusion theory, Social Cognitive Theory and a combination of Technology Acceptance Model and Theory of Planned Behavior.

The model suggests that when users are presented with a new technology, a number of factors influence their decision on how and when they will use it. Particularly, the key factors that influence the adoption of new technology are; performance expectancy, effort expectancy, social influence and facilitating conditions. These 4 core factors are moderated by 4 other variables; age, gender, voluntariness of use and experience. Performance expectancy is the

degree to which an organization believes that using a technology will enable them attain gains in job performance (Venkatesh et al., 2003). Effort expectancy is the degree of ease associated with the use of the technology (Venkatesh, et al., 2003; Wang, et al., 2009). Social influence relates to how the adopter of the technology is influenced by his or her peers, family, friends, trends affluent in the society and colleagues within the professional bodies (Jaradat & Rababaa, 2013). Facilitating conditions is the degree to which an Organization believes that technical and Organizational infrastructure exists to support the use of the technology (Hamzat & Mabawonku, 2018; Venkatesh, et al., 2014).

The UTAUT model provides a comprehensive understanding of technological adoption hence is the underpinning theory of the current study.

2.3 Conceptualization of the variables

2.3.1 Strategic Planning

Studies on various perspectives of Strategic Planning in Organizations are still in their infancy in many developing countries (Bagire & Namada, 2013). The volatile business environment has led to the evolvment and improvement in management practices however, there is a low level of adoption of various perspectives of strategic planning in most African business entities. In Uganda, the level and magnitude of strategic planning practices in the plastics recycling industry has not been studied.

Porter (2008) avers strategy is the creation of a unique and valuable position involving a different set of activities while Rao et al. (2008) define strategy as a long term plan or course of action an organization selects to move from a present state to a forecasted future. Bagire and Namada (2013) suggest strategy as a means to an end that provides a link between the firm and the business environment.

Various scholars assert it is the direction and scope of an organization over the long term (Jemala, 2010; Shri, Gupta & Agrawal, 2015). Nwachukwu, Fadeyi and Helena (2018) aver a well-articulated strategy plays a significant role in enabling a firm achieve a competitive advantage. Katsiolouides (2002) posits a good strategy ought to be effective in addressing the stated challenges within a reasonable time frame using the available resources. Therefore, Organizational strategy refers to a match between the Organization's internal capabilities and the external relationships (Dziallas & Blind, 2019).

Strategic planning is a process of analyzing the internal and external environment to plan, implement, and observe the set strategies (Jemala, 2010; Steiner, 2010). According to Arasa and K'Obonyo (2012), it is the process of deciding in advance what should be accomplished and how it shall be achieved. It entails making choices that foster strategy formulation, strategy implementation, strategy monitoring and evaluation. Maroa & Muturi (2015) agree it relates to selecting objectives and deciding the means through which they shall be realized.

Strategic planning enables management make rational decisions that have the most desirable impact on Organizational performance (Steiner, 2010). It entails various processes to enable the firm make strategic decisions hence, requires making choices that foster strategy formulation, strategy implementation, monitoring and evaluation of the strategy (Bagire & Namada, 2013; Candido & Santo, 2015; Dziallas & Blind, 2019; Shri, et al., 2015).

Strategy formulation entails developing a broad formula of how a business entity is going to operate in the competitive environment by setting the goals, objectives and how they shall be achieved (Porter, 2008). Steiner (2010) agrees it is a combination of what the Organization is striving to achieve and the processes through which it seeks to attain the goals.

Strategy formulation is one of the most important tasks that managers in every firm need to perform (Bagire & Namada, 2013). According to Rao et al. (2008), it is impossible to develop a strategy without first identifying the general direction that the firm ought to take through a vision, goal, mission and the objectives. Simerson (2011) agrees it is a process through which an organization selects from available various options the most appropriate course of action that would enable them achieve their set goal, mission, vision and objectives.

According to Rao et al. (2008), a goal is an open-ended statement of planned accomplishment which provides a focus for the Organization's mission statement while Steiner (2010) posits a vision is a statement that points the Organization towards where they need to go thus provides a direction, focus and long term alignment. A mission is a statement that shows what the Organization exists to do or conduct (Simerson, 2011). It is a statement of the purpose and the reason for the existence of the Organization. The objectives are the desired end results of the planned accomplishment that provide the specificity that is generally lacking in the statement of the goals (Shri, et al., 2015). They are established in terms of their current situation and what the Organization would like it to become (Rao, et al., 2008). As noted by Obradovic and Obradovic (2016) firms that do not have a vision, goal and objectives cannot survive in today's volatile business environment. Sreeramana (2016) avers the goal, vision, mission and objectives play an important role in setting up sustainable Organizations therefore, Nwachukwu et al. (2018) suggest Organizations should articulate the mission, vision, long term objectives and evaluate the strengths, weaknesses, opportunities and the threats in the volatile business environment.

According to Porter (2008), the fundamental essence of strategy formulation is to align the Organization with the internal and external business environment. Palladan et al. (2016) concur the essence of formulating a strategy is to relate the company to its business

environment and outperform the competition over a sustained period of time. Various scholars conclude that Organizations should carry out an in-depth analysis of the internal and external business environment to ascertain the factors that might influence attainment of the goal and objectives (Arasa & K'obonyo, 2012; Maroa & Muturi, 2015; Palladan, et al., 2016; Porter, 2008; Rintari & Moronge, 2014).

Porter (2008), suggests the internal environment captures the strengths of the organization in relation to what is being done correctly and how to leverage on the strengths while, Hieu and Nwachukwu (2014) posit the weaknesses showcase what the Organization is not doing correctly thus measures should be undertaken to address them in order to gain a competitive advantage. Maroa and Muturi (2015) assert the external environment analysis examines those elements outside the control of the Organization that might influence attainment of the set objectives. It enables the firm identify the opportunities that lie within the industry and how best to take advantage of those opportunities. Obonyo et al. (2016) aver threats are factors in the external environment that might grossly affect the company. Porter (2008), posits for a firm to gain a competitive advantage over its rivals, it should identify the strengths and weaknesses which should be matched to the opportunities and threats during strategy formulation.

There are various strategic analysis tools as posited by different scholars that a firm could adopt while crafting the strategy namely; the SWOT analysis to ascertain the Strengths, Weaknesses, Opportunities and Threats (Porter, 2008; Rintari & Moronge, 2014; Shri, et al., 2015); PESTLE Analysis which identifies the Political, Economic, Social, Technological, Legal and Ecological factors that might influence the Organizations operations (Steiner, 2010); The Boston Consulting Group (BCG matrix); The five forces model that captures the rivalry of competitors, threat of substitute products, bargaining power of customers,

bargaining power of supplies and threat of new entrants (Porter, 2008); The Value Chain Analysis which measures the internal activities and the interactions between the various functions to ascertain where and how the value could be added (Rao, et al., 2008; Rintari & Moronge, 2014; Steiner, 2010).

Strategy Implementation is widely believed to be the most critical stage in the strategic planning process (Rao, et al., 2008). On average 50-70% of Organizations fail to implement their strategic plans leading up to their inability to achieve the desired results in the time expected (Jemala, 2010). This may be attributed to lack of processes and systems that connect the strategic business plans to the objectives. According to Nwachukwu, Hieu, Chladkova and Fadeyi (2019), the changing business environment calls for firms not only to formulate the strategy and shelve it, but ensure as well that the strategy is implemented in order to achieve the set objectives.

Implementation involves putting strategies and policies into action through programs, budgets and procedures. Palladan et al. (2016) suggest it involves putting the set strategy into practice to enable the firm achieve the set objectives. It is a key aspect towards the smooth running of activities and an indispensable essential element towards Organizational success. Nwachukwu et al. (2019) agree strategic implementation has got serious implications on the employees, operations and the technologies that may be adopted by the entity. Katsiolouides (2002) suggests it is the most important stage in the strategic planning process because it is where the set strategies are operationalized and translated into action.

Strategy implementation relates to ensuring that the crafted strategies that might still be on paper are put into action therefore, effective strategy implementation will lead to effective Organizational outcomes (Bagire & Namada, 2013). This is consistent with Maroa and

Muturi (2015) who agree a strategy should be in operation if its intended purpose is to be achieved. For an organization to achieve the set objectives, it has got to operationalize and translate the strategy into actionable steps (Arasa & K'Obonyo, 2012; Rintari & Moronge, 2014).

Organizations encounter enormous challenges that may hamper the effectiveness of the strategy (Rintari & Maronge, 2014). Therefore, adoption and implementation of the strategy may be influenced by the business environmental analysis hence managers ought to conduct a detailed analysis of the business environment and guard against a wrong diagnosis (Maroa & Muturi, 2015). Mukiibi and Magunda (2019) suggest a wrong analysis may lead to adoption and implementation of a strategy that may not yield results. A correct diagnosis will lead to adoption and implementation of the right strategy that may propel the Organization towards attaining the goal and achieving the set objectives. Nwachukwu et al. (2019) concur strategy implementation is supported with heavy investments in technology and other resources to support the strategy therefore, an incorrect implementation process is highly costly to the company due to their irrecoverable nature thus, it is important to place emphasis and pay attention to strategy implementation.

Strategy Monitoring and Evaluation is a key process that enables an entity continuously assess the set strategies and their efficiency (Hieu & Nwachukwu, 2014). According to Katsiolouides (2002), monitoring and evaluation is where the outcomes of the strategy that has been implemented are assessed and where there are deviations, appropriate measures are undertaken to correct the deviations. Bagire and Namada (2013) agree it entails assessing the organizational activities and performance results so that actual performance can be compared with the desired performance.

Monitoring and evaluation needs a methodological framework that involves the assessment of the systems inputs, outputs, feedback mechanisms and the relative impacts made in terms of goal achievement (Namada, et al., 2017). Mukiibi and Magunda (2019) agree that identification of Key Performance Indicators (KPI's) and ascertaining a measurement criteria helps managers establish how much progress has been made and the extent to which the Organization is on track towards achieving the set objectives.

Monitoring and evaluation is significant in regard to ascertaining whether the company is making progress and if it is to the contrary, adjustments may be made so as to adapt to the changes (Hieu & Nwachukwu, 2014). Mukiibi and Magunda (2019) agree business entities should therefore be flexible towards adapting to the changes that may inevitably occur and corrective action should be undertaken to steer the organization towards achieving the set goal and objectives.

2.3.2 Technological Adoption

The acceptance and use of technology has been a major concern for research and practice (Dwivendi, et al., 2017). Technology is a puzzle despite its evident impact on our lives and the society at large (Narayanan & O'Connor, 2010; Jaradat & Al-Rababaa, 2013). As to why individuals and companies adopt technology has motivated a great deal of research in technological adoption.

According to Liebenberg, Benade and Ellis (2008), technological adoption is the stage or point at which the technology is mentally accepted and utilized by an individual or a company while Straub (2017) posits it is a stage in which the technology is selected by an individual or Organization for use. It relates to decisions being made on whether to accept or not to accept a given technology for integration into the entire Organization (Dwivendi, et al., 2017). Venkatesh, Thong and Xu (2016) assert it relates to the stage where or when users

make the acceptance decision based on relevant information. Therefore, it is an important step towards increasing efficiency and effectiveness in the plastics recycling industry (Jaradat & Al-Rababaa, 2013).

According to Nkwachukwu, Chima, Ikenna and Albert (2013), the plastic industry is in constant development with technology evolving in response to the ever changing customer demands. Therefore, an expansion in the recycling capacity requires an increase in equal measure of plastic collection activities, plastic separation methods and plastic recycling technology. Marques et al. (2014) agree the technologies adopted by firms in the plastic recycling process are crucial aspects that impact on the viability of the plastic recycling system.

Technology has been proposed for use in plastics recycling for various reasons not limited to improved plastic recycled products and increased output. Therefore, it is of significant importance to examine the factors which might influence the adoption or rejection of the technology (Garcia & Robertson, 2017). According to Abubakar and Ahmad (2013), the rapidly ever changing technologically driven market place calls for a paradigm shift in business management approaches. Wang, Wu, and Wang (2009) aver the acceptance and use of technology by business entities largely depends on technological sophistication, economic factors and social factors. Therefore, the firms' failure to adopt new technology to an extent may be attributed to performance uncertainty of the technology and lack of adequate infrastructure to support the utilization of the plastic recycling technology (Abubakar & Ahmad, 2013).

Based on the UTAUT model that has been extensively used by researchers, the determinants of technological adoption are performance expectancy, effort expectancy and facilitating

conditions (Hamzat & Mabawonku, 2018; Jaradat & Rababaa, 2013; Liebenberg, et al., 2018; Venkatesh, et al., 2003; Venkatesh, et al., 2016; Wang, et al., 2009).

Performance expectancy is the degree to which a firm believes that using a technology will enable them attain gains in job performance (Venkatesh, et al., 2003; Venkatesh, et al., 2016). It relates to the gains in performance that a company believes it will attain when it adopts the technology (Hamzat & Mabawonku, 2018). Liebenberg et al. (2018) suggest performance expectancy is the degree to which a company perceives that adopting technology will enable them improve in performance and therefore enhance product quality. Business entities take into consideration what the outcomes of adopting a new technology or upgrading an existing technology holds for them before accepting to use the technology (Wang, et al., 2009).

The relative performance of the plastic recycling technology towards enhancing productivity of plastic recycled products influences technological adoption (Ragaert, et al., 2017). It suffices to say that a firm will adopt plastic recycling technology due to a deep lying conviction that the technology will extend benefits to the company however, if management perceives that the technology may not enhance their productivity and performance, they may opt to decline the technology (Hamzat & Mabawonku, 2018).

According to Wang et al. (2009), incorporating performance expectancy enables companies to accomplish production processes more quickly and flexibly. Firms with high levels of performance expectancy are more likely to adopt technology than companies with lower performance expectancy. Therefore, performance expectancy is a critical factor in enhancing or hindering technological adoption in the plastic and recycling industry.

Effort Expectancy is the degree of ease associated with the use of the technology (Jaradat & Al-Rababaa, 2013, Liebenberg, et al., 2018; Venkatesh, et al., 2003; Wang, et al., 2009).

Abu-Al-Aish and Love (2013) posit it is the degree of ease that an Organization thinks they will have when using the technology. Sareen and Jain (2014), agree it is a belief that the use of a particular technology will be easy and effortless.

Dwivendi et al. (2017) postulate the ease of use of the technology and how much value is attached to it by an organization influences intention to use and adopt the plastic recycling technology. Positive attitudes towards using plastic recycling technology will develop if the employees find the technology easy to use and perceive it as being useful hence influencing the decision to adopt the technology.

Facilitating conditions take into consideration the existence of organizational and technical infrastructure that support the use of the acquired technology (Venkatesh, et al., 2003). They are the degree to which an organization believes that technical and Organizational infrastructure is available to enable the proper use of the technology (Venkatesh, et al., 2003; Venkatesh, et al., 2014). Hamzat and Mabawonku (2018) agree facilitating conditions relate to the existence of technical infrastructure to support the use of the technology. Shuhaiber (2016), suggests they are the elements with a direct influence on the intention to use the technological resources. He further avers it relates to the extent to which a managers' decisions to adopt the technology is influenced by the belief that the firm has got technical infrastructure to enhance the use of the technology.

Hamzat and Mabawonku (2018), postulate facilitating conditions such as resource availability, technical skills and technical infrastructure play a significant role in adoption of the technology. Shuhaiber (2016), suggests they are factors in the business environment that simplify a task hence having a significant direct impact on intention to use the technological resources. Jaradat and Al-Rababaa (2013), argue facilitating conditions influence adoption of

a technology if there is availability of resources and the employees uphold positive attitudes towards the utilization of the technology to enhance productivity and efficiency however, the facilitating conditions may lead to negative attitudes amongst the employees towards technological adoption if they do not fulfill their satisfaction (Shuhaiber, 2016).

Several researchers provide empirical evidence in agreement of the key assertion that performance expectancy, effort expectancy and facilitating conditions either impinge or influence the adoption of technology however, there is a lack of technological articles with a focus on the realities within the African context.

2.3.3 Innovation

Innovation is as old as mankind itself and therefore not a new phenomenon (Drucker, 2014). It is a significant approach through which global challenges may be mitigated hence gaining prominence in both the academic and Organizational context (Hartley, et al., 2019).

In recent years, studies on the impact of innovation in economic, social, and technology aspects has proliferated hence enhancing knowledge on innovation processes and their determinants. Swann (2014), posits firms innovate in order to gain a competitive advantage over their rivals within the industry hence increasing their revenue potential. Palladan, et al., (2016) agree innovation is the most essential activity or process that drives the Organization towards achieving the set objectives. According to Crasto, et al., (2020), Innovation is deeply seated in the production of new products or modifications on existing products. They further argue global concerns on plastic pollution and environmental protection have driven firms towards novel innovations that utilize the available raw materials through plastic recycling.

The definition of innovation has been an area of interest to both practitioners and researchers (Chen, 2017). Walker et al. (2011) define innovation as the development or use of new ideas,

objects or new practices. Sreeramana (2016) agrees it is the process of translating an idea or thought into a product that customers shall consume or utilize. It is the implementation of a new or significantly improved product, process or service, new marketing methods, new organizational methods in business practices and their commercialization (Nwachukwu, et al., 2018; Terziovski & Guerrero, 2014).

Product innovation is where there is a creation of a new product or improvement on an existing product (Goedhuys & Veugelers, 2012). Cheng et al. (2014) agree it is the introduction of a product that is new or has significantly improved characteristics with respect to its intended uses. Mangula, Van de Weerd and Brinkkemper (2017) concur product innovation is the production of new or significantly improved goods while Gault (2018) suggests it is where a significantly changed or new product is made available to the intended users. Hullova, Trott and Simms (2016) posit it entails significant improvements in technical aspects, components and materials. Meeus and Edquist (2009) postulate innovations are intended to benefit the customers therefore, product innovation relates to new or better products being produced and sold. The products could either be developed by the company, purchased or leased from a vendor so as to meet the external users' needs (Maier, 2018).

According to Terziovski and Guerrero (2014), the rising trends in Globalization and the technological wave have given rise to various management approaches to accelerate the product innovation process through; implementation and operationalization of cross functional teams, customer and supplier engagement, technological adoption, internal and external business environmental analysis. In hindsight, the degree of recycling plastic products is becoming an important aspect for the manufacture of new plastic products (Nwachukwu, et al., 2018).

Process innovation is the introduction of new elements into the production operations which include input resources, specifications of tasks, work and information flow mechanisms; machinery used to produce a product with the ultimate aim of achieving lower costs and high product quality (Mangula, et al., 2017). Mohnen and Hall (2013), assert it is an improvement or change in the ways products are manufactured and delivered to the market. Hervas-Oliver, Boronat-Moll and Sempere-Ripoll (2016) concur it relates to the way in which firms organize their innovation operations and also entails the introduction of new methods of production.

Gault (2018), postulates process innovation is the implementation of a new or significantly changed production or delivery method including significant changes in techniques, equipment or software. Nwachukwu et al. (2018) agree that it relates to how the product is manufactured, delivered to the market and utilized by the consumer. It entails the improvement or modification of the existing production process or the addition of new production processes and the introduction of new technology that may help an organization remain competitive and meet customer demands (Meeus & Edquist, 2009).

Goedhuys and Veugelers (2012) postulate it entails a successful introduction of a new production process that substantially changes the way the main product is manufactured and delivered to the market, whereas Obradovic and Obradovic (2016) argue process innovation depicts new ways of selling products within the supply chain and ensuring timely delivery of the products in the market. It describes new elements introduced in the various processes a business entity carries out, therefore, the process innovation should be focused on the market and market driven (Drucker, 2014; Obradovic & Obradovic, 2016). Mangula et al. (2017), posit process innovation involves small and incremental improvements that might seem insignificant but when lumped up together help increase productivity and reduction in costs being incurred.

Responsible innovation is where the Organization is cognizant of avoiding the manufacture of products that might be harmful to the customers and the environment Voegtlin and Scherer (2017), whereas Hartley et al. (2019) suggest it is a process that seeks to promote innovations that are socially desirable and undertaken in the interest of the society by taking into consideration aspects of risk, desirability and regulation.

Responsible innovation in the manufacture of innovative products is a subject of debate among scholars (Grunwald, 2011). In the past, Organizations paid little attention to the negative effects of the innovations on society, and the ecosystem. As noted by Stilgoe, Owen and Macnaghten (2013), it is a concept which is relatively new with various Organizations adopting new approaches towards innovations in which the social, cultural, environmental and ethical aspects of the innovations are explicitly considered (Block & Lemmens, 2015). Schomberg (2013) argues that innovations involve huge amounts of investment that render them highly risky therefore, societal and ethical acceptance is of significant importance towards the progress and success of the innovations.

Innovations might have a negative impact on the customers and the environment through unforeseen circumstances, therefore, a cost benefit analysis that weighs the potential benefits against the risks should be conducted (Voegtlin & Scherer, 2017). Lente et al. (2017) agree innovations significantly contribute towards alleviating societal challenges however, their utilization and consumption bear consequences that might be desirable or undesirable. It is imperative for them to recognize and eliminate the undesirable consequences that might be harmful to the customers and the environment (Pelle & Reber, 2015).

Innovations come along with expectations, fears and concerns that linger in the minds of the intended beneficiaries or clients therefore, responsible innovation addresses those fears, expectations and concerns (Grunwald, 2011).

2.4 Relationship between the Variables

2.4.1 Relationship between Strategic Planning and Innovation

Scholars in the field of innovation have showcased the relationship between strategy and innovation (Davis & Bendickson, 2021; Dziallas & Blind, 2019; Nwachukwu, et al., 2018; Palladan, et al., 2016; Sanjeevan, 2017). The business environment that firms operate in influences key decision making and strategies.

According to Nwachukwu et al. (2019), the business environment is dynamic and complex due to various factors that influence decision making therefore, Organizations should adopt strategic planning in order to deliver innovative products. The external environment that is comprised of competitors, customers, Government policy and regulations provides information that triggers impulses for innovation hence, gainful insight of your competitors operations, knowledge of your customers' expectations and the gap that exists in providing plastic products to satisfy those needs will trigger innovations in the company (Jemala, 2015; Namada, et al., 2017).

Fagerberg (2005) discovered the desire by firms as a result of the volatile business environment to be more innovative and introduce new products on the market before their competitors is supported and strongly linked to strategies that place emphasis on the company's vision, mission, goal and objectives. Nwachukwu et al. (2018) agree a well-articulated strategy enables a business entity deliver business value therefore, a strategy that enhances innovation is necessary for the success of the Organization. They further suggest

crafting effective winning strategies helps firms become more innovative in the production of novel products that meet the market demand.

Companies with a competitive strategy based on the focus strategy, differentiation strategy or low cost leadership strategy may be more innovative as a result of their response to changes in customer preferences (Porter, 2008). A company whose strategy is crafted cognizant of the plastic recycling market and the external environment could anticipate the changes in customer needs thus responding to them through the production and delivery of plastic recycled innovative products (Walker, et al., 2011). The introduction of new innovative products and modifications on existing products is a representation of an expansion strategy, Sanjeevan (2017) therefore, innovations in the plastic recycling firms through the product development strategy will enable them increase their growth potential and foster expansion drives. Lubberink et al. (2019) agree growth or expansion strategies foster innovation in novel products or improvements in existing products to meet the customers' needs.

Strategic planning enables innovation through the manufacture of plastic products that meet the customers' expectations. According to Porter (2008), a focus strategy when adopted by a company enables it produce innovative products that satisfy the needs of a target market therefore, the company ought to ascertain the needs of the target market and create an environment within the company to foster innovation towards the manufacture of plastic recycled products that meet the target market.

Sanjeevan (2017) asserts a low cost leadership strategy would enable a company manufacture innovative products at low costs in comparison with other competitors within the industry. Obradovic and Obradovic (2016) suggest a differentiation strategy puts emphasis on production of various innovative products that may easily be differentiated from the

competitors' products by the customers and also provides a variety of product options to select from. Terziovski and Guerrero (2014) postulate innovation heavily relies on strategy the company may adopt and further assert product innovation relies on the competitive strategy premised on the differentiated strategy while process innovation is based on the low cost strategy. Dziallas and Blind (2019) argue a strategy is a baseline for defining a firms innovation goals therefore; newly created innovations are an indicator of an effective and efficient strategy.

2.4.2 Relationship between Technological Adoption and Innovation

The intense global competition in today's business environment and the technological developments has rendered innovation a source of competitive advantage in the plastic recycling industry (Hogan & Coote, 2014; Terziovski & Guerrero, 2014).

According to Chen (2017), innovative plastic products are tangible and produced using plastic recycling technologies therefore, the adoption of requisite technology is central to the innovation of more plastic recycled products. Obradovic and Obradovic (2016) assert technology represents the absolute frequency of product and process innovations in the production unit. Therefore, the introduction of new technology significantly influences innovations in the manufacturing of plastic recycled products, production processes and methods of delivery to the market. Rastgoo (2017) suggests technology is adopted to enhance innovation and productivity hence, the plastic recycling companies should put in place measures to facilitate technological adoption.

There is a link between technological adoption and innovation because, the existence of technology induces innovation, Hervas-Oliver et al. (2016) whereas Rastgoo (2017) suggests Innovation is a significant factor which enables companies gain a competitive advantage in the volatile business environment. Organizational survival in the fast paced world requires

embracing investment in technology in order to enhance innovation hence leading to various advantages not limited to productivity improvement, cost reduction and access to new markets. Nwachukwu et al. (2018) agree that technological adoption is key towards the development of novel innovations that arise as a result of utilization of technologies that enable the production of a variety of good quality novel products.

According to Wong (2010), Plastic recycling firms that have embraced and accepted the new technologies like optical color recognition, air classifiers, washing film machines, shredder machines, electric heating boilers, coolers, mechanized compressors and paver shaping machines are more innovative and productive than those that have not embraced the latest recycling technology. It suffices to say that successful innovations world over have had a significant element of technology being used that was novel to the industry (Swann, 2014).

Rastgoo (2017) argues companies that realize that a new technology is on the verge of being introduced or has been introduced into the market may discard plans or innovations that involve utilizing the old available technology and promote and facilitate innovations that are compatible with the new technology. Goedhuys and Veugelers (2012) postulate innovation is enhanced through the adoption and mastery of already developed technologies often sourced from abroad therefore, plastic recycling firms should invest in technology that will enhance innovation hence the development of new products and processes.

2.4.3 Relationship between Strategic Planning and Technological Adoption

The rapidly ever changing and yet technologically driven market place calls for a paradigm shift in the approach to managing businesses with emphasis being placed on the strategy the company shall adopt (Abubakar & Ahmad, 2013). Scholars in the field of strategy have showcased the link between strategic planning and the realization of changes in technology through an analysis of the technological factors that influence the business environment

(Nwachukwu, et al., 2018). Managers are constantly being put under pressure as a result of changes in technology that call for crafting and implementation of strategic plans being supported by adoption of technologies to manufacture plastic recycled products (Abu-Al-Aish & Love, 2013).

A strategy is one of the factors that could impede or enable the adoption of technology in plastic recycling firms. According to Olupot and Mayoka (2013), a company should align the technological usage to the overall business strategy. Nwachukwu et al. (2018) agree strategic planning enables an organization commit to adoption of requisite technology and specific resources to guide it towards achieving the set objectives. An expansion strategy calls for the company to invest in technology to suit the adopted strategy in order to improve efficiency and effectiveness (Hervas-Oliver, et al., 2016). When a company adopts a market penetration strategy, investments in requisite technology and adoption have got to be made to meet the new massive production targets and delivery of the plastic recycled products to the market.

Strategic planning involves techniques and methods such as; SWOT Analysis, PESTLE Analysis, Road mapping, Delphi technique simulations and modeling that are used to make forecasts and ascertain possible risks over a certain period of time (Jamela, 2015). The success of technological adoption is to an extent dependent on the ability of the plastic recycling firms to analyze the business environment and craft strategies (Nwachukwu, et al., 2018). These strategies would enable utilization of the plastic recycling technology to improve efficiency and effectiveness towards the manufacture of plastic recycled products that meet the demands of the customers.

According to Bagire and Namada (2013), companies that adopt technology earlier than others in the market tend to be more successful than those that lag before adoption. Caetano and

Amaral (2013) concur by incorporating strategic planning, managers should essentially forecast future technological turbulences, ascertain future technological gaps and design strategic action plans for the future technological adaptations.

There is a growing shift towards reuse and recycling of plastics for economic as well as environmental reasons. Firms have henceforth developed strategies and adopted plastic recycling technology to capitalize on the economic gains through the manufacture of plastic recycled products that meet the customers' expectations (Nkwachukwu, et al., 2013). Obradovic and Obradovic (2016) agree the most important strategic decisions made by managers in the manufacturing sector involve the adoption of new technologies to replace the existing technologies.

Technological alignment with the plastic recycling company's strategy should therefore be given serious consideration by management because a change in strategy significantly influences investment in technology.

2.5 Mediation of Technological Adoption on the relationship between Strategic planning and Innovation

Technology has got a significant influence on operations in a company. A change in technology calls for a shift in strategic plans to incorporate the changes in technology thereby driving innovations. According to Caetano and Amaral (2013), Strategic plans that had been formulated and implemented that relied on certain technologies may not be effective in enabling the company achieve its objectives as a result of the old technology. Therefore, a change in strategy will lead to adoption of requisite technology to enable the smooth running of the innovation processes. Rao et al. (2008) suggest a change in technology puts pressure on managers to change their strategy in line with the new technology that has been adopted

hence plastic recycling technology will enable the companies manufacture more innovative products that meet the customer's expectations.

An internal and external analysis of the business environment avails market information to management concerning technological changes that may impact on the entity's operations (Palladan, et al., 2016). Therefore, a business environmental analysis provides insightful information towards the successful formulation, implementation and monitoring of the strategic planning process thereby driving novel innovations.

Business entities develop strategies to mitigate various issues that might relate to product quality, product development and product market delivery. Therefore, it is of significant importances for companies to utilize the available resources and adopt technology to deliver novel innovative products that will enable them achieve and sustain a competitive advantage in the volatile business environment (Shri, et al., 2015).

Strategic planning enables a company gain a competitive advantage in the market through the production of innovative products. Simerson (2011) posits companies that adopt an expansion strategy, market leadership strategy or a market penetration strategy having analyzed the external environment acquaint themselves with the technological factors that might influence their innovative capacity, will set winning strategies. Porter (2008) asserts a competitive strategy of either a focus strategy, differentiated strategy or a low cost leadership strategy may foster innovation if the right technology is adopted. The availability of technology like shredder machines, washing film machines, paver shapers, molders, optical color recognition and air classifiers will enable the companies manufacture more innovative plastic recycled products that meet the target customers' needs (Cheng, et al., 2014; Ragaert, et al., 2017).

Caetano and Amaral (2013) assert creation of new innovations may be hampered by the company's inability to embrace change and adopt new technology therefore, adoption of new technology is key towards enabling the plastic recycling companies craft their winning strategies. Jemala (2015) agrees when the strategies are well thought through and properly set, the innovation process and potential is realized because the employees shall be adequately trained and skilled, resources shall be availed to support the innovation and investments in the requisite technology shall be made to foster the innovation process. Nwachukwu et al. (2018) postulate technological adoption is key towards the success of an innovation alongside a skilled labor force and commitment from management towards supporting the formulated strategy.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter covers the way the research was carried out in line with the research design, the procedures of sampling, source of data, methods of data collection, processing and analysis and ethical considerations.

3.2 Research Design

The study adopted a cross sectional and quantitative approach to enable the researcher collect data within a short period of time. Cross sectional research is where data is collected at a particular time (Thomas, 2020). It involves studying data from a population at a specific point in time. The MBA program is time bound for 2 years therefore, the researcher selected a cross sectional research design to enable him collect data and submit the research within the 2 years duration. This was used because it is not costly to perform and does not require a lot of time, captures a specific point in time, contains multiple variables at the time of the data snapshot and the data can be used for various types of research.

On the other hand, a quantitative approach was used to quantify the problem by way of generating numerical data or data that can be transformed into usable statistics (Sekaran & Bougie, 2016). It was used to quantify attitudes, opinions, behaviors, and emotions towards the study variables and generalize results from a larger sample population.

3.2 Study Population

There are 40 plastic recycling companies in Uganda according to the Uganda Plastic Manufacturers and Recyclers Association (UPMRA, 2019) and they comprised the study population.

These firms are both formal and informal however, majority of the firms engaged in plastic recycling are informal. Informal companies are those that use simple labor-intensive technology, have low productivity, unregistered and are usually run from homes, street pavements or other informal arrangements (Dzansi & Tasssin-Njike, 2014).

3.3 Sample

The study used a sample of 36 plastic recycling firms. This number was determined from the Krejcie and Morgan (1970) Table for determination of Sample Size for a given population.

3.4 Data Sources

The research data was sourced from primary data. The primary data was obtained from the questionnaires that were administered to the respondents.

3.5 Data Collection

3.5.1 Unit of Analysis

The unit of analysis was the plastic recycling firms within the industry. An industry is group of companies that are related based on their primary business activities (Kenton, 2019). The plastic recycling industry is a group of firms that produce plastic recycled products.

3.5.2 Unit of Inquiry

The unit of inquiry in the study was three people from each firm namely; general manager, production manager and supervisor. These respondents were selected due to their direct involvement in the strategic planning process and also making the final decision on adoption of technology and the innovation policies. The researcher believes that this category of respondents is in the best position to offer valuable information regarding the area of study. The total number of these respondents was $36 \times 3 = 108$. The data was later aggregated to firm level for purposes of analysis.

3.6 Data collection Methods/techniques and instruments

The data was collected using questionnaires whereby the questionnaires containing structured questions relating to each variable were drafted and administered to the respondents to obtain data from them. 108 questionnaires were used for data collection, each questionnaire contained statements that the respondents were at liberty to reflect their opinions on. These were anchored on a five-point Likert scale including Strongly Disagree (1), Disagree (2), Not Sure (3), Agree (4), and Strongly Agree (5). An ordinal scale was used to assign numbers 1 up to 5, to these statements to reflect rank ordering on an attribute in each question.

3.7 Reliability of the Responses

Reliability determines the degree to which an assessment tool produces stable and consistent results. A measure is said to be highly reliable if it produces similar results under consistent conditions. Sekaran (2003) asserts that the reliability of a measure indicates the extent to which it is without bias and hence ensures consistency measurement across time and the various items in the instrument.

Cronbach's Alpha coefficient were used to show how reliable the data is using Software Package for Social Sciences (SPSS). The evaluation of questionnaire reliability- internal consistency is possible by Cronbach's α (Cronbach, 1951), which is considered to be the most important reliability index and is based on the number of the variables/items of the questionnaire, as well as on the correlations between the variables (Nunnally, 1978). As a general rule of thumb, a Cronbach's alpha score of 0.7 or above signifies a reliable scale (Nunnally, 1978) and this was used as a benchmark. Table 1 shows the results for reliability:

Table 1*Reliability Results*

Variable	Items	Cronbach Alpha
Strategic Planning	23	.976
Technological Adoption	20	.860
Innovation	28	.934

Source: primary data

The results in table 1 show that all values are above 0.7 which indicates that the data collected was reliable for the study.

3.7 Validity of the Instrument

To establish validity, the study used content validity (CVI) where all valid items were divided by the total number of items and only variables scoring above 0.70 were acceptable (Amin, 2005). In addition, the questionnaire was piloted among selected plastic recycling firms where 10% (9) staff were considered randomly to fill in the questionnaire and modifications were made as considered appropriate. In addition, experts in the field of innovation were consulted to rate the tools to ensure that expert judgement results indicate content validity index of over 0.70 for the tools to be acceptable. The Content Validity Index (CVI) was computed using standardized measures and appropriate adjustment was generated from the formula. According to Amin (2005) coefficient is acceptable if it is within the statistical range of 0.5 to 1.

Table 2

Content Validity Index (CVI Results)

Expert	CVI Score
Expert 1	0.714
Expert 2	0.844
Expert 3	0.705
Expert 4	0.722

Source: primary data

As seen in the table 2 above, the results for CVI were above 0.5 which indicates validity of items in the questionnaire.

3.9 Data Analysis

The data was analyzed using the Statistical Package for Social Sciences (SPSS) that summarized the data which the researcher conveniently interpreted. The quantitative data was populated from the questionnaires through coding and later on analyzed using computer packages and presented using frequency tables and descriptions. Correlation and linear regression analyses were used to obtain the relationship between the independent variable, mediator variable and the dependent variable using SPSS.

3.10 Ethical Considerations

The study was conducted after obtaining official permission from MUBS and then proceeded to the selected firms. All efforts were made to ensure that no harm is inflicted upon voluntary participants and that all participants make the decision to participate after receiving full information as to what is required and what, if any, potential negative consequences may arise from such participation.

Those who chose not to participate were given the same information with which to make their decision not to be involved and were not disadvantaged by not participating. For all

information pieces received, confidentiality and anonymity were highly upheld and after analysis and compilation of results, the results were communicated to all the respondents.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND ANALYSIS OF FINDINGS

4.1 Introduction

This chapter contains the presentation, interpretation and analysis of the findings. It includes frequency distribution statistics, correlation and regression results. The inferential results are tested and presented as per the objectives of the study which were:

This study was guided by the following objectives:

- (i) To examine the relationship between strategic planning and innovation.
- (ii) To examine the relationship between technological adoption and innovation.
- (iii) To examine the relationship between strategic planning and technological adoption.
- (iv) To examine the mediating role of technological adoption on the relationship between strategic planning and innovation.

4.2 Response Rate

The researcher intended to get data from 36 companies and all of them provided information, which gives a response rate of 100%. The response rate is the percentage of those who responded to the study.

According to Mugenda and Mugenda (2003), if the response rate is 50% or less, it shows that the data is inadequate for analysis, but if the response rate is 60%, it indicates that the data is good for analysis and if it is 70% and above, then the data is considered as very good for analysis. Basing on the above response rate, the data is very good for analysis hence the researcher proceeded to analyze it.

4.3 Company Information

The study sought background information on the 36 companies as shall be seen below.

4.3.1 Type of Company

The study also sought out information on the type of company. Results follow in table 3:

Table 3: Type of Company

	Frequency	Percent	Valid Percent	Cumulative Percent
Plastics Recycling	26	72.2	72.2	72.2
Plastic Production and Recycling	10	27.8	27.8	100.0
Total	36	100.0	100.0	

Source: primary data

Results in table 3 show that majority of companies only engage in plastics recycling as their core activity while few companies engage in both plastic manufacturing and recycling. This implies that data was obtained from both categories of companies in respect to plastic recycling.

4.3.2 When the Company started

The study sought information on when the company was established. Results are in table 4.

Table 4: When the company started

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 5 years ago	18	50.0	50.0	50.0
5-10 years ago	6	16.7	16.7	66.7
Over 10 years ago	12	33.3	33.3	100.0
Total	36	100.0	100.0	

Source: primary data

The results in table 4 show that the biggest category of these companies was formed less than 5 years ago followed by those that were formed over 10 years ago. This implies that data is not only from new plastics recycling companies but also from those which have been in operation for a long time.

4.3.3 Number of Employees

The study sought information on the number of employees. Results are in table 5.

Table 5: Number of Employees

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Less than 20	10	27.8	27.8	27.8
20-50	20	55.5	55.5	83.3
50-100	6	16.7	16.7	100.0
Total	36	100.0	100.0	

Source: primary data

The results in table 5 show that the biggest category of these companies has 20-50 staff followed by those that have less than 20 staff. This implies that the results are not only from those with large workforces but also from those which have few employees.

4.4 Respondent Information

The study sought background information on the respondents. Results are in table 6:

Table 6

Background Information on the Respondents (N=108)

		Freq	%
Position	General Manager	24	22.2
	Production Manager	36	33.3
	Supervisor	48	44.4
	Total	108	100.0
Gender	Male	75	69.4
	Female	33	30.6
	Total	108	100.0
Number of Years with current Organization	less than a year	6	5.6
	1-5 years	66	61.1
	6-10 years	27	25.0
	11-15 years	3	2.8
	16-20 years	6	5.6
	Total	108	100.0
Age	18-30 years	36	33.3
	31-40 years	42	38.9
	41-50 years	30	27.8

	Total	108	100.0
Academic Qualifications	Certificate	15	13.9
	Diploma	33	30.6
	Degree	54	50.0
	Masters	6	5.6
	Total	108	100.0

Source: primary data

Of the 36 firms, only in 24 firms were all the three interviewed namely; the General Manager, Production manager and supervisor. The production managers and supervisors in the 36 firms were all interviewed. Where the General Manager was not available, a second supervisor was selected so that three respondents from each firm were interviewed. This was to minimize the respondent bias.

Results on the position of the respondents show that majority are supervisors followed by production managers and then general managers. This shows that the data was collected from respondents in different position hence a more comprehensive view of the respondents from different management positions was taken up.

Results in table 6 show that the majority are male while the minority are female. This implies that the plastics recycling companies which are the subject of this study mostly employ male staff who were the majority of participants in this study.

Results show that the majority of the respondents have been working for 1-5 years while a quarter have been there for 6-10 years. Others have worked for varying time periods which implies that information was got from respondents who have worked for various periods of time and have got different views on the subject of innovation in their respective firms.

Results in table 6 further reveal that the biggest category of the respondents are aged 31-40 years followed by those who are aged 18-30 years. This implies that the organizations are comprised of staff in the middle age range although the other age brackets are represented.

The study also inquired on the academic qualifications in order to ascertain the education background of the respondents. Results indicate that the majority of them have a bachelor's degree followed by those who have a diploma and then those with a certificate and a master's degree. This implies that most of the staff working in/with these organizations were sufficiently educated to understand the nature of this study hence provide accurate, dependable and reliable information on innovation.

4.5 Correlation Analysis

The study set out to ascertain the relationships between the variables under study. In order to achieve this, the Pearson (r) correlation coefficient was computed given the interval nature of the data and the need to test the direction and strength of this relationship. A Pearson correlation is a number between -1 and 1 that indicates the extent to which two variables are linearly related. It can be used in a causal as well as a associative research hypothesis (Amin, 2005).

It is important to note that the results have been aggregated to the unit of analysis. Table 7 presents the correlation analysis results:

Table 7*Correlation Results (N=36)*

Variable/Indicator	1	2	3	4	5	6	7	8	9	10	11	12
1. Strategy Formulation	1											
2. Strategy Implementation	.910**	1										
3. Monitoring And Evaluation	.896**	.900**	1									
4. Strategic Planning	.966**	.969**	.965**	1								
5. Performance Expectancy	.702**	.620**	.557**	.646**	1							
6. Effort Expectancy	.735**	.682**	.652**	.712**	.441**	1						
7. Facilitating Conditions	.849**	.819**	.787**	.846**	.464**	.787**	1					
8. Technology Adoption	.894**	.828**	.781**	.862**	.722**	.912**	.887**	1				
9. Product Innovation	.615**	.535**	.574**	.594**	.488**	.560**	.631**	.659**	1			
10. Process Innovation	.695**	.628**	.637**	.675**	.440**	.570**	.693**	.668**	.876**	1		
11. Responsible Innovation	.730**	.699**	.673**	.724**	.393**	.662**	.799**	.733**	.737**	.763**	1	
12. Innovation	.724**	.658**	.669**	.706**	.478**	.636**	.751**	.734**	.950**	.951**	.881**	1

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

4.5.1 The Relationship between strategic planning and innovation

The first objective of the study was to examine the relationship between strategic planning and innovation. The results in table 7 indicate that both strategic planning and innovation are significantly and positively related ($r = .706, p < .01$).

This means that if strategic planning is well undertaken, then innovation will increase in an organization. An understanding of the business environment and the overall organizational objective will enable managers craft and implement strategies to exploit the opportunities that exist through novel innovations. When a company develops strategic plans and strives to abide by them, they are able to introduce new products in line with the strategic direction.

4.4.2 The Relationship between technological adoption and innovation

The second objective of the study was to examine the relationship between technological adoption and innovation. The results in table 7 indicate that both technological adoption and innovation are significantly related ($r = .734, p < .01$).

This means that if technology is adopted, then we can expect higher levels of innovation in the plastics recycling industry. Plastic recycling is driven by technology therefore; firms that adopt recycling technology manufacture more innovative plastic recycled products than those that have not embraced technology.

4.4.3 The relationship between strategic planning and technological adoption

The third objective of the study was to examine the relationship between strategic planning and technological adoption. The results in table 7 indicate that both strategic planning and technological adoption are significantly related ($r = .862, p < .01$).

This means that if strategic planning is embraced, then we can expect higher levels of technology adoption in the plastics recycling industry. This is because a good strategic plan

should incorporate technological changes and develop contingencies to address such changes effectively.

4.5 Regression Analysis

In order to ascertain the predictive power and combined effect of strategic planning and technological adoption on innovation, a multiple regression was run using SPSS version 21. It is important to note that the results have been aggregated to the unit of analysis. The results are shown in tables 8 and 9.

Table 8

Regression Results (N=36)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.047	.378		2.769	.007
1 Strategic Planning	.181	.080	.288	2.259	.026
Technology Adoption	.617	.162	.485	3.802	.000

a. Dependent Variable: Innovation

Source: primary data

Table 9

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.748 ^a	.560	.551	.41650

a. Predictors: (Constant), Technology Adoption, Strategic Planning

The results in table 9 show that strategic planning and technology adoption predict 55.1 percent of the variance in innovation (Adjusted R Square = 0.551). This implies that the remaining 44.9 percent is explained by factors other than the two predictor variables.

More to that, the results in table 8 pursuant to the third objective show that technology adoption ($\beta = .485$, $p < .01$) is a better predictor of innovation than strategic planning ($\beta =$

.288, $p < .05$). This implies that when it comes to innovation in these entities, more influence can be attained from technology adoption than from strategic planning.

4.6 Mediation Analysis

The Mediation analysis was conducted using techniques based on regression analysis as stated by Kumari & Yadav, (2018). Testing for mediation was also done using the Sobel (1982) Mediator Test. Barron and Kenny (1986) posit that a mediator variable is a variable that explains the relationship between a predictor variable and a criterion variable. Mediators tell us how or why something works. The mediator is considered an intervening variable which explains the relationship between a predictor variable and a criterion variable. The following conditions must be met in the results to support mediation:

- (i) The independent variable is shown to significantly influence the dependent variable in the first regression equation.
- (ii) Independent variable is shown to significantly influence the mediator in the second regression equation.
- (iii) Mediator must significantly influence the dependent variable in third equation.

Here, the independent variable and mediator are entered as predictors.

Full mediation is present when the independent variable no longer influences the dependent variable after the mediator has been controlled and all of the above conditions are met. Partial mediation occurs when the independent variable's influence on the dependent variable is reduced after the mediator is controlled.

The first model assesses if there is a significant effect of strategic planning on innovation, the second model establishes whether there is a significant effect of strategic planning (independent) on technology adoption (mediator), then the last model assesses whether there is a significant effect of technology adoption (mediator) on innovation (dependent variable).

The formula for the Sobel test equation is shown below:

$$z\text{-value} = a*b/\text{SQRT}(b^2*s_a^2 + a^2*s_b^2).$$

Where:

a= the unstandardized beta value for the regression model between strategic planning and technology adoption

b= the unstandardized beta value for the regression model between technology adoption and innovation.

S_a= the Standard error for the regression model between strategic planning and technology adoption

S_b= the standard error for the regression model between technology adoption and innovation.

Table 10
Linear Regression Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.381	.149		15.944	.000
	StrategicPlanning	.443	.043	.706	10.277	.000

a. Dependent Variable: Innovation

Source: primary data

The results in table 10 show that strategic planning is a significant predictor of innovation ($\beta = .288, p < .05$). This was carried out to confirm whether strategic planning is a significant predictor of innovation in order to proceed with the mediation test.

Table 11

Linear regression Coefficients^a

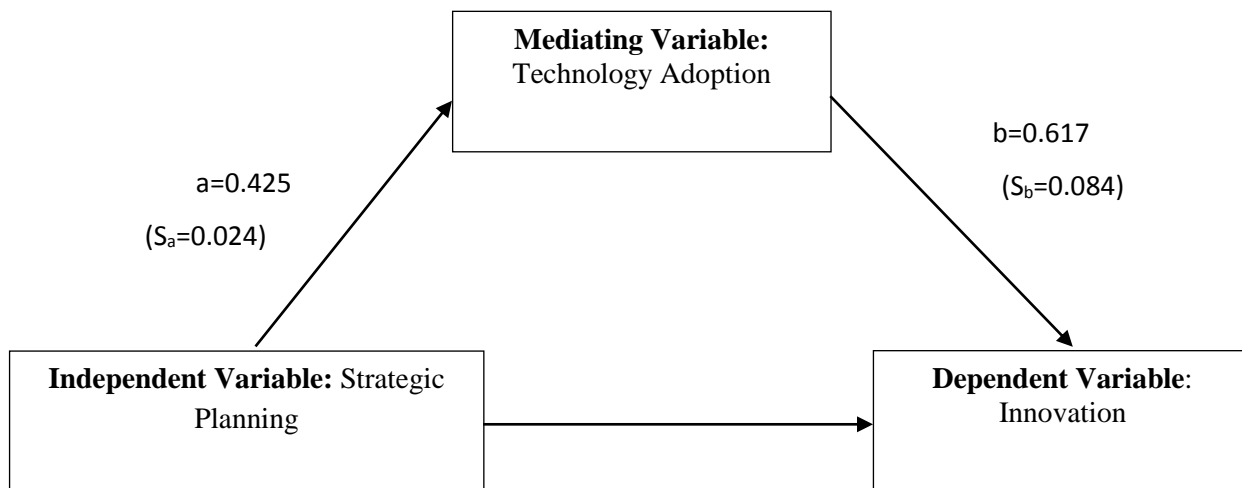
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.164	.084		25.682	.000
	StrategicPlanning	.425	.024	.862	17.487	.000

a. Dependent Variable: TechnologyAdoption

Source: primary data

The results in table 11 show that strategic planning is a significant predictor of technological adoption ($\beta = .862, p < .01$). This was carried out to confirm whether technological adoption is associated with strategic planning and if strategic planning predicts the mediator variable.

Figure 2: Medgraph for the mediating role of technological adoption on the relationship between strategic planning and innovation



The respective values are shown below:

$$a = 0.425, b = 0.617, S_a = 0.024, S_b = 0.162$$

The results of the equation are:

Table 12

Mediation Test Results

Parameter	Value
Sobel Test Statistic	3.72349518
Std Error	0.07042442
p-value	0.00019648

Source: primary data

As seen in table 12, the p-value is less than 0.01. The results therefore indicate that in the plastic recycling firms of Uganda, technology adoption does partially mediate the relationship between strategic planning and innovation.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings, followed by the discussions in relation to the research objectives and conclusions. The third section is the conclusions while the final section presents recommendations followed by limitations faced as well as areas for further research.

5.2 Discussion of Findings

This section discusses the findings according to the study objectives in the first chapter of this report. In discussing the findings, the researcher highlights any noted support or contradiction among the scholars as indicated in the literature review and, where necessary resolves in favor of one or the other.

5.2.1 Strategic Planning and Innovation in the plastics recycling industry

The first objective of the study was to examine the relationship between strategic planning and innovation. The results indicate that both variables are significantly and positively related. This means that if strategic planning is well undertaken, then innovation will increase in an organisation. The findings are further buttressed by the regression results which show that in the plastics recycling plants, strategic planning is a significant predictor of innovation.

The finding is not surprising because of the ample agreement from various scholars in the field of innovation who have showcased the relationship between strategy and innovation (Palladan, et al., 2016; Sanjeevan, 2017; Nwachukwu, et al., 2018; Dziallas & Blind, 2019). Not only does strategy implementation lead to more innovation, but so does monitoring and evaluation in the context of strategic planning in these organisations. The volatility of the business environment for example, necessitates critical strategic planning which in turn can

spur higher levels of innovation in an industry. It has been recognized in past studies that firms with a competitive strategy based on the focus strategy, differentiation strategy or low cost leadership strategy may be more innovative as a result of their response to changes in customer preferences (Lubberink, et al., 2019; Porter, 2008; Sanjeevan, 2017). A company whose strategy is crafted cognizant of the plastic recycling market and the external environment could anticipate the changes in customer needs thus responding to them through the production and delivery of plastic recycled innovative products (Namada, et al., 2017; Nwachukwu, et al., 2018; Walker, et al., 2011). The link between the two concepts is observable.

5.2.2 Technological adoption and Innovation in the plastics recycling industry of Uganda

Another theme of the study was to examine the relationship between technological adoption and innovation. The results indicate that both technological adoption and innovation are significantly related. This means that if technology is adopted, then we can expect higher levels of innovation in the plastics recycling industry. Furthermore, the regression model has shown that technology adoption is a significant predictor of innovation. In fact, of the two independent variables, it is the most significant indicator having not only a higher beta score but also a lower p-value which implies higher significance.

The findings are supported by several scholars who agree with the notion that intense global competition in today's business environment and the technological developments have rendered innovation a source of competitive advantage in the plastic recycling industry (Hervas-Oliver, et al., 2016; Hogan & Coote, 2014; Nwachukwu et al., 2018; Terziovski & Guerrero, 2014). They agree that the introduction of technology triggers innovations towards the production of novel products.

Generally, the consensus among scholars as well as the respondents in this study is that the adoption of requisite technology is central to the innovation of more plastic recycled products. Technology adoption is an enabler of innovation in not only plastic recycling but also in many other sectors thus the results are significant.

4.4.3 The relationship between strategic planning and technological adoption

The third objective of the study was to examine the relationship between strategic planning and technological adoption. The results indicate that both strategic planning and technological adoption are significantly related. This means that if strategic planning is embraced, we can expect higher levels of technology adoption in the plastic recycling industry.

The results are supported by scholars who state that there is a critical link between strategic planning and the realization of changes in technology through a PESTLE analysis of the technological factors that influence the business environment (Abubakar & Ahmad, 2013; Abu-Al-Aish & Love, 2013; Nwachukwu, et al., 2018). Results also are in line with Bagire and Namada (2013) who discovered that firms that adopt technology earlier than others in the market tend to be more successful than those that lag before adoption therefore, by incorporating strategic planning, managers should essentially forecast future technological turbulences, ascertain future technological gaps and design strategic action plans for the future technological adaptations (Caetano & Amaral, 2013).

5.2.4 The mediating role of technological adoption on the relationship between strategic planning and innovation

The mediation results indicate that in the plastics recycling industry of Uganda, technology adoption does indeed mediate the relationship between strategic planning and innovation. This implies that in order for strategic planning to lead to innovation, there must be an element of technology adoption.

The findings are not surprising and indeed they are supported by the scholarly views of several authors (Caetano & Amaral, 2013; Cheng, et al., 2014; Palladan, et al., 2016; Ragaert, et al., 2017; Rao et al., 2008; Shri, et al., 2015) who agree with the notion that an internal and external analysis of the business environment avails market information to management concerning technological changes that may impact on the entity's operations. Therefore, a business environmental analysis provides insightful information towards the successful formulation, implementation and monitoring of the strategic planning process thereby driving novel innovations. A shift in strategy may call for changes in technology thereby driving innovations. It should not be surprising therefore that adoption of new technology is key towards enabling the plastic recycling firms craft their winning strategies and foster novel innovations.

5.3 Conclusions

Strategic planning is key towards innovation in the plastics recycling industry of Uganda and the challenges being faced leading up to slow progress in innovation can be significantly attributed to failure to incorporate strategic planning. For example, there is no proper strategic plan in handling discarded plastic waste which is left uncollected and ends up in the drainage channels, natural water courses, man holes and on the road sides thus leading to a plethora of problems.

The study can conclude that technology is an enabler of innovation. Innovative companies have created advanced recycling technologies in the recycling industry worldwide and therefore the slow progress of innovation in the plastics recycling industry is attributed to lack of appropriate technology to accelerate the plastic recycling process and production of various recycled products. Novel innovations in plastics recycling would help alleviate the negative effects of plastic waste which go beyond clogging drainage systems, to aggravating

disease outbreaks and creating ecological imbalances in the environment.

Strategic planning is hard to undertake without planning for the technology that will be adopted in order to lead to innovation. If the plastics recycling companies make plans for innovation without taking into consideration technological aspects, the plans are most likely bound to fail. This is because technology adoption is a bridge between strategic planning and innovation in this industry.

5.4 Recommendations

The following recommendations are made based on the findings of this study:

1. These companies should formulate and implement strategic plans for five to ten years and reviews should be undertaken once a year to ensure that the strategic plans are being followed through however, the innovation aspect also has to be considered to balance against rigidity or bureaucracy which can have the unintended consequence of stifling innovation instead.
2. There is need to increase public awareness on the dangers of improper plastic waste disposal and the avenues through which the plastic waste can best be managed. Emphasis should be placed on the separation of plastic waste from organic waste at source.
3. All plastics recycling firms should review the effectiveness of the technology they use on an annual basis so that they are not left behind since technology is fast changing and a highly dynamic concept.
4. Government should provide incentives like subsidies, tax waivers, credit extension to plastic recycling firms to enable them purchase and operationalization the recycling equipment. Machines like extruders, optical color recognition, washing film lines and

electronic molders are expensive and out of reach of many firms. Government support would enable the firms purchase the requisite technology.

5.5 Limitations to the Study

The researcher feared that the respondents may not heed to the request to answer or fill in the questionnaires. They were likely to not return the questionnaires to the researcher or might have deliberately declined to fill in the questionnaire for various reasons hence compromising the data collection process. This limitation was addressed by informing the respondents the relevance of the research as a requirement for the award of an MBA Degree and the ethical academic research aspect of confidentiality.

The respondents targeted by the researcher could have misunderstood the questionnaire and failed to answer the questions appropriately hence impacting on the results. The researcher simplified the questionnaire and requested for appointments with the respondents at a time of their convenience so as to address any statements that may be misunderstood.

There could have been other plastic recycling companies the researcher was not aware of which might be operational but not yet registered with the umbrella body of the Uganda Plastic Manufacturers and Recycler's Association (UPMRA). The researcher tried to engage the managers at the various firms on other plastic recycling firms that were known to them.

The coronavirus pandemic that has paralyzed activities in the entire country presented a challenge in the collection of data from the study population due to fears the researcher and respondents had towards contracting the virus and its spread. The researcher tried to mitigate this limitation by wearing a mask, carrying along a pocket sanitizer and observing the standard operating procedures at the various firms like hand washing and temperature checks while conducting the study.

5.6 Areas for Further Study

Other factors such as employee motivation, Government legislation, Human Resource management practices and market conditions that contribute to innovation should be looked at in future studies since this dissertation has shown that the independent variable doesn't fully explain innovation leaving a significant part of the phenomenon unexplained.

This study used a cross sectional design approach but future studies should consider a longitudinal approach in order to cross validate the findings of this study whether in support or in contradiction.

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APPENDIX 1: QUESTIONNAIRE

MAKERERE UNIVERSITY BUSINESS SCHOOL (MUBS) MASTERS OF BUSINESS ADMINISTRATION

Dear respondent,

I am Omongot Francis, a Master's student carrying out a research study on Innovation in Plastic Recycling Companies in Uganda which is a requirement for the award of a Master's Degree of Business Administration (MBA) of Makerere University. You have been selected to participate in this survey questionnaire because of your knowledge and experience in the sector.

The data being collected is only for academic purposes and will be treated with the utmost confidentiality. Your participation is highly appreciated. **(PLEASE FILL IN APPROPRIATE PART WITH A TICK ✓ IN THE BOX)**

SECTION A:

1. Position: 1=General Manager 2=Production Manager 3=Supervisor
2. Gender: 0=Male 1=Female
3. Number of Years with current Organization:
0=Less than 1 year 1= 2-5 2= 6-10 3=11-15 4=16-20 Above 20
4. Age: 18-30 31-40 41-50 51-60 Above 61
5. Academic Qualification:
Certificate Diploma Degree Masters PhD
5. Type of company
Plastics company Recycling Company
6. When the company started
Less than 5 years ago 5-10 yrs ago More than 10 years ago

8. Number of Employees

Less than 20 20-50 50-100 Over 100

For Section B-D

Indicate the extent to which you agree or disagree with the statements on the items in each of the Sections by ticking (✓) in the appropriate number listed in the tables.

Strongly Disagree (SD)	Disagree (D)	Not Sure (NS)	Agree (A)	Strongly Agree (SA)
1	2	3	4	5

SECTION B: STRATEGIC PLANNING

	Item: Strategy Formulation	SD	D	NS	A	SA
		1	2	3	4	5
BSF1	The Organization has a Mission, Vision and Goal					
BSF2	We have effectively communicated the strategy throughout the Organization					
BSF3	We understand the Company's Strengths, Weaknesses, Opportunities and Threats					
BSF4	The Organization carries out an analysis of the Internal and External Business Environment					
BSF5	We have identified the market conditions that have the greatest influence on our strategy					
BSF6	The Company involves and engages relevant stakeholders in formulating the strategies					
BSF7	The Organization has a Vision, Mission, Objectives and values that the employees and stakeholders understand					
BSF8	The current and expected market position is known to the Company					
	Strategy Implementation	SD	D	NS	A	SA
BSI1	The Organization has got a defined Organizational structure that promotes collaboration					
BSI2	The Implementation process is carried out at departmental level					
BSI3	There are sufficient resources available to implement the strategy					

BSI4	The Organization has successfully implemented the set strategic plan					
BSI5	There is satisfaction with implementation of the strategic plan					
BSI6	We hold strategic meetings to address the priorities in the Organization					
BSI7	We continuously provide training to the Managers and staff on the strategy implementation process					
BSI8	There is relevant experience available within the Organization to operationalize the strategies					
		SD	D	NS	A	SA
	Monitoring and Evaluation					
BME1	We carry out ratings on the implementation progress					
BME2	We hold strategic meetings to evaluate the strategy					
BME3	There are appropriate monitoring and evaluation systems in the Organization					
BME4	The employees understand the monitoring and evaluation system and process					
BME5	We generate the Key Performance Indicators from the goal and objectives					
BME6	The Company is successful at identifying corrective action when strategies need improvement					
BME7	The response time is appropriate after the company acknowledges that a strategy is failing					

SECTION C: TECHNOLOGICAL ADOPTION

	Performance Expectancy	SD	D	NS	A	SA
CPE1	The plastic recycling technology helps improve productivity					
CPE2	Plastic recycling technology helps increase efficiency and effectiveness					
CPE3	The recycling capacity of the company is fully exploited					
CPE4	We adopt the latest technology available in the industry					
CPE5	Technology enables us accomplish the tasks more quickly					

CPE6	The technology available is sufficient for the daily operations					
	Effort Expectancy	SD	D	NS	A	SA
CEE1	The employees find plastic recycling technology adopted by the Organization easy to use					
CEE2	The plastic recycling technology makes the production work more interesting					
CEE3	The Organization has identified potential new technologies and determined their relation to existing technologies					
CEE4	Assessment of the values of the technology are undertaken and shared					
CEE5	The Company has got key actors who identify and engage with new technology that meets our needs					
CEE6	It is easy for the employees to become skillful at using the technology					
	Facilitating Conditions					
CFC1	The staff have received adequate training to operate and use the technology					
CFC2	The employee's familiarity with the technology significantly influences adoption of the technology					
CFC3	Adoption of technology is easier where the new technology is compatible with the existing technology					
CFC4	A technical person is readily available to provide assistance whenever challenges with the technology are encountered					
CFC5	The employees have got the necessary skills to operate the plastic recycling technology					
CFC6	The staff have developed positive attitudes towards the use of the technology					
CFC7	Technology is adopted if there is an existing budget to finance the acquisition of the plastic recycling technology					

CFC8	There is existing infrastructure to support adoption of the new plastic recycling technology					
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SECTION D: INNOVATION

	Item: Product Innovation	SD 1	D 2	NS 3	A 4	SA 5
DPI1	New Plastic recycled products have been introduced onto the market in the last 3 years					
DPI2	There is a significant level of change in the plastic recycled products compared to our previous products					
DPI3	There has been an increase in our sales and profit margins due to product innovations					
DPI4	There are open communication channels within the Company about new ideas and innovation					
DPI5	There is cooperation and teamwork in developing new ideas and new products					
DPI6	There are products in this Company that were developed by the employees					
DPI7	We recognize and reward employees who innovate new products					
DPI8	Our products are unique compared to those produced by our competition					
DPI9	Our innovative products have helped us attract new customers and retain the old clients					
	Process Innovation	SD 1	D 2	NS 3	A 4	SA 5
DPS1	There is cooperation and team work in developing new ideas and innovative new ways of dealing with new work tasks					
DPS2	There are new practices and processes that were suggested and created by the employees in the Company					
DPS3	The employees take an active role in trying out new processes of production					
DPS4	We acknowledge and reward employees who implement new production processes and new ways of doing things					
DPS5	Innovations have helped reduce the production costs that were being incurred					
DPS6	Innovations in the production systems have helped reduce the time taken in the production process					

DPS7	We encourage employees to experiment with new ideas and new ways of solving problems					
DPS8	The Company has changed or developed a new production process in the last 3 years					
DPS9	The Company plans to develop or introduce new process innovations					
DPS10	We have invested in machinery and human resources to improve the production and process innovations					
	Responsible Innovation	SD 1	D 2	NS 3	A 4	SA 5
DRI1	Our plastic recycled products are compliant with the relevant regulations and are certified by UNBS					
DRI2	The customers' requests and complaints are promptly responded to by the Organization					
DRI3	The Company produces environmentally friendly plastic recycled products					
DRI4	The Company is aware of the category of people who stand to benefit from the Innovations					
DRI5	The Company carries out Corporate Social Responsibility activities					
DRI6	The Company has got a risk management framework to assess the risks and benefits associated with the innovations					
DRI7	The Company has got standardized plastic recycling production procedures					
DRI8	We value employees taking responsibility of their work					
DRI9	There is easy access and dissemination of information in the Company					

Thank you for your participation