JARTE
Journal of Applied Research in Technology & Engineering

4(1): 37-53, 2023
https://doi.org/10.4995/jarte.2023.18623
Received: June 29, 2022; Accepted: January 16, 2023; Published: January 31, 2023

IDENTIFYING THE CRITICAL SUCCESS PRACTICES OF SUSTAINABILITY AND THEIR IMPLEMENTATION IN THE MANUFACTURING SECTOR OF PAKISTAN: AN EXPLORATORY FACTOR ANALYSIS

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Abstract:

The concept of sustainability is increasingly discussed in organizations whether they are large firms or SMEs as a sign of environmental awareness of consumer knowledge of product quality. This study provides a better understanding of how sustainability practices are being implemented in the manufacturing sector which is one of the most promising sectors in the world. The aim of this paper is to identify the critical success factors of sustainability and their implementation in the manufacturing industries. The data was collected through a questionnaire survey from the manufacturing industries of Karachi and Hyderabad Sindh Pakistan. In-depth information about the sustainability concept in the company was collected by using the questionnaire survey technique. The data was analysed by using descriptive and exploratory factor analysis. The study also developed a conceptual framework that helps in improving the business, sustainability, and financial performance. This framework consists of three practices (economic, environmental and social) with twelve sub-practices (Cost management, research and development, limited landfilling, Environmental pollution, product lifecycle, resource consumption, public welfare, industrial health and safety, and stakeholder) of sustainability, these practices aim is to bring effective performance in the manufacturing industries of Pakistan. The proposed framework of this study will give an important vision that will enable Pakistani industries to get benefit from the sustainability implementation. Moreover, this study will also provide an understanding of how sustainability would help manufacturing industries to obtain a competitive advantage in the global marketplace. The finding of this study would serve as a guideline for business management as they developed a strategy for achieving sustainable performance. Additionally, this study will offer a preliminary step for future research on manufacturing industries in sustainable manufacturing.

Keywords: sustainability; Critical Success Factors (CFs); sustainability implementation; exploratory factor analysis.

Cite as: Wassan, A.N., Memon, M.S., Mari, S.I., Kalwar, M.A. (2023). Identifying The Critical Success Practices of Sustainability and Their Implementation in The Manufacturing Sector of Pakistan. *J Appl Res Eng Technol & Engineering, 4*(1), 37-53. https://doi.org/10.4995/jarte.2023.18623

1. Introduction

The competition in today's globalized business world, it is difficult to provide good quality products or services (Abbas, 2020). To gain a sustainable competitive advantage, companies must work harder to improve quality (Khurshid et al., 2018). Companies are seen as "important players in the societal path to sustainability" (Beske et al., 2008). In the past, the majority of businesses have kept sustainability strategies apart from their company plan and performance evaluation, making economic success indicators that have been used to evaluate businesses (Alayón, 2016). When a few manufacturing industries started implementing procedures to aid in the minimization or elimination of waste, this situation started to alter in the late 1980s. The emergence of sustainable manufacturing began with this development (Alayón, 2016). Globalization, technical advancement, and population growth all had a significant impact on the manufacturing sector globally. These factors have also influenced competitiveness for more stringent markets as well as increased demand for energy and natural resources to create more products (Muhardi et al., 2020). By creating job opportunities and developing industrial links through economic activity, the manufacturing sector has made a substantial contribution to socio-economic growth (Herman, 2016). The current line adds economy, which uses a take-make-dispose system and is driven by rising consumer demand for manufactured products is the primary cause of the environment's pressure (Sánchez Levoso et al., 2020). Significant environmental outcomes from this production process include pollution and climate change (Ahmad & Wong, 2018). The increasing consumption problems thus make the expansion of the industrial sector necessary (Amaranti et al., 2017).

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The rapid expansion of the manufacturing sector has increased the demand for natural resources, but it has also brought about several economic, environmental, and social problems such as increased pollution, climate change, global warming, resource shortage, waste generation, etc. (Mihelcic et al., 2003). Applying the application of sustainability practices as a habit in the manufacturing sector's daily activities is crucial to reducing these problems (Khan et al., 2020). Over the past few decades, countries around the world, including Pakistan have prioritized sustainable manufacturing as one of their major objectives as a result of an increase in these concerns (Choi et al., 2019). Sustainable manufacturing (SM) techniques have attracted attention as a result of growing worldwide concerns about sustainability challenges like resource scarcity, imbalanced societal equities, harsh global competitiveness, and rapid environmental degradation (Sartal et al., 2020). The idea of sustainability had a significant impact on how business is conducted (Hami et al., 2015). Given the significance, of the implementation of sustainable manufacturing, many researchers focus more on studies about this idea and its application in developed nations, but there are few studies about the application of this problem in developing nations because its application is still insufficient. In the meanwhile, achieving sustainable development goals (SDGs) may depend on sustainable manufacturing (Muhardi et al., 2020). Therefore, the purpose of this study is to evaluate the main practices of sustainability and their implementation in the manufacturing sector. The main goal of this research is to identify the key success factors (CFs) of sustainability and create the conceptual framework which helps to improve and enhance the performance in the manufacturing industries.

2. Literature Review

2.1. Sustainability

The concept of sustainability is increasingly being discussed in organizations as a sign of environmental sensitivity and product quality towards the quality of a product. Inevitably, customers are becoming more focused and interested in learning about an organization's role and involvement in achieving sustainability in their company operations as a result of the sustainable concept (Karyamsetty, 2021). Sustainability is a topic that manufacturers are more concerned with than before, manufactures must progressively pay attention to resources utilization, air emissions, employee welfare, waste treatment, water pollution, etc. in addition to dealing with intense competition, neglecting to solve these sustainability-related issues could seriously damage the company's image which has an impact on its performance (Chen, 2015). The term "sustainability" developed development" was first introduced in 1987 by the Brundtland Report, which defined it as "a development that fulfils the demands of the current without compromising the ability of the future generations to meet their own needs" (Akpan et al., 2014). The term "sustainable operations management " was created by (Kleindorfer et al., 2005), it is defined as the "integration of the traditional operations management's profit and efficiency orientation with broader considerations of the company's internal and external stakeholders and its environmental impact". Over time, the idea of sustainability has received the attention and validation it deserves which has fundamentally expanded the scope of organizational mission in three dimensions of sustainability (Zink, 2007). Organizations have been utilizing a variety of ways to achieve sustainable success (Tasleem & Nawar, 2018). In the current environment, sustainability is becoming a top concern for every firm (Sancha et al. 2016). It is founded on the idea that resources should be managed and conserved effectively for both the present and future generations (Karyamsetty, 2021).

Numerous researches have been carried out to help in the understanding of the SMP concept. But yet although, there is no clarity among academics regarding the definition of sustainable manufacturing because this idea has continued to evolve and change from year to year (Moldavska & Welo, 2017). In conclusion, sustainable manufacturing practices can be defined as the policies, techniques, and processes that companies can use to produce their, manufactured goods while minimizing adverse environmental effects and paying more attention to the safety of workers, customers, and communities (Muhardi et al., 2020). The manufacturing industry has a significant impact on world economies. This industry is made up of a wide range of subsectors, involving various sizes of businesses, producing development, and employment using basic to advance production techniques and procedures (Alayón, 2016). Industrial organizations are using up natural resources quickly to produce various goods and offer services to customers to increase their profits. Compared to the service sector, manufacturing has used more natural resources and polluted the envi-ronment, especially water and air pollution (Tao & Xiang-Yuan, 2018). The planet's temperature has been steadily rising as a result of this ongoing process while natural resources' viability has decreased (Cai & Li, 2018). The increased competition in the business marketplace encourages businesses to focus their operations on sustainability, reduction in cost, and innovation in addition to the demand from the stakeholders (Lucas, 2010). The resource-based view (RBV) of the organization in this case emphasizes the company's resources and capabilities as a facilitator to link sustainable development practices with its performance (Abbas, 2020). In the 21st century, social needs are centred on sustainability (Sartal et al., 2020). All nations must ensure that trademark assets, natural systems, and equitable collection of plant and animal species including

Figure 1: Pillars of Sustainability (Sartal et al., 2020, Sivakumar Babu et al., 2017).

the living conditions of humans are of acceptable quality over both short and long distances. The phrase sustainable development has been in use to denote the economic, environmental, and social aspects of our future existence sin 1987 (Vlek & Steg, 2007). Nowadays people are becoming more and more interested in sustainability (Govindan et al., 2014). Sustainability is often regarded as the most important variable in determining business development and improvement and it is also defined as "keeping up profitability for a long, maybe an indefinite period" (Aquilani et al., 2016, Environmental, 2011).

2.2. Comparing Frameworks of Sustainability Practices with Past Studies

This study shows the past studies related to the sustainability practices related to achieving the quality of products. This table shows that cost management, research, and development, limited landfilling, pollution, lifecycle, resource consumption, public welfare, industrial health and safety, and stakeholder trust are the important factors of sustainability in the manufacturing industries.

2.3. Evolution of Sustainability and Sustainable Development

Companies have been advised to work toward sustainability to address the concerns of limited resources and environmental damage (Lim et al., 2021). Within businesses, the idea of sustainability is recommended to achieve a balance between resource usage and resource restoration. In other words, businesses are directed toward sustainable growth when they attempt to both generate resources that are currently being utilized and produce resources for the future (Lim et al., 2021). To better understand the phenomenon, it is important to first understand the difference between sustainable development and sustainability. The units nations first used the phrase "sustainable development" in 1987, defining it as "progress that satisfies present demands without compromising the ability of future generations to meet their needs" (Zink, 2007). Since most companies were unaware of how to incorporate environmental awareness into their organizational structure, this concept initially did not advance very far. The concept of sustainable manufacturing development emerged in the 20th century (Lim et al., 2021). Sustaining absorptive and regenerative capabilities are significantly above waste generation and resource extraction rats are essential for sustainability. However, environmental problems like ozone depletion and global warming show that the world's inherent capacity for regeneration and consumption is being exceeded by the rate of waste production (Ali et al., 2019). Although there are many different definitions of sustainability that range from philosophical prospective to multi-dimensional explanations, the major concern of any definition has always been the influence of current decisions on future generations (Iranmanesh et al., 2016). Several scholars focused on aspects of the triple bottom line when defining sustainability. Sustainability was recommended as " an extension of the organizational perspective, in consideration of equalizing economic, social and environmental components of sustainability" (Elkington, 1998). Sustainability, meantime is defined by the Oxford dictionary as "the avoidance of natural resource depletion to maintain an ecological balance". Because they involve different qualitative variables, the terms "sustainable development" and "sustainability" cannot be used interchangeably (Lim et al., 2021). Sustainability and sustainable development are two separate yet important ideas that provide a forum for discussion according to most studies. Even though both ideas are linked there are some variances between them. The ethical goal of achieving equity between the present and future generations is the top priority in terms of sustainable development. This entails economic and social advancement that protects the welfare of society, the environment, and individuals. Sustainable development is the process of introducing sustainable practices that are socially just, economically sound and environmentally sound in a business. Adversely. The term "sustainability" describes the purpose of sustainable development. Consequently, a company that has gone through the process of sustainable development is a company that has achieved sustainability (Lim et al., 2021).

2.4. Stages in Implementing Sustainable Manufacturing

Scholars have highlighted a variety of steps in implementing sustainable manufacturing in the organization as stated by (Jin Gam et al., 2009) in their study. They have outlined the steps involved in putting sustainable manufacturing concepts into practice based on several studies. The process was divided into four basic stages: problem definition and research, sample creation, solution development and cooperation, and production (Muhardi et al., 2020). A company should first outline the issues it is facing and then conduct a thorough market analysis to learn as much as possible about the present state of its internal and external affairs. Research is required to gain a deeper understanding of the difficulties or challenges (Tena et al., 2001). Making a sample for materials testing, cost planning, testing procedures, and designing is the second phase. It attempts to ensure that the company can create the required items and that the product satisfies market demands. In the third step, a business must increase collaboration with other stakeholders in the product development process by exchanging data, ideas, resources, etc. The final step is production, which involves using resources like water, energy, material, and other resources during the production process until the wat management process to endure that the adverse effects of the production process on the environment can be minimized. (Jin Gam et al., 2009). Then, by focusing on innovation across three pillars or dimensions-innovative, dimensions, and technological, those stages establish a paradigm for sustainable production (Horbach & Rennings, 2013).

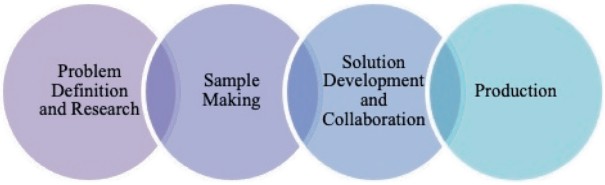

Figure 2: Stages in Implementing Sustainable Manufacturing.

2.5. The Concept of Sustainability in Manufacturing SMEs

In recent years, the idea of sustainability in the manufacturing section has received a lot of attention (Nisar, 2018). The term "manufacturing sustainability" initially originated in 1980 and developed from the phrase "sustainable development" (Rosen & Kishawy, 2012). It was described as " the development that meets the requirements of the present without compromising the capabilities of the future generations to meet their own needs" by the world commission on Environment and development in 1987 (Lee et al., 2017). Mihelcic et al. (2003) defined sustainable manufacturing as "the design of human and industrial systems to ensure that human kinds use of natural resources and cycles does not lead to diminished quality of life due to either loss in future economic opportunities or to adverse impacts on social conditions, environment, and human health. Allwood et al. (2008), incorporated the phrase in the definition of green manufacturing "creating methods that transform materials without emission of greenhouse gases, use of non-renewable or hazardous materials or generation of waste". According to the U.S. department of commerce (2010), the most widely used definition of sustainability today is "the development of manufacturing products using materials and processes that minimize negative environmental effects, conserve energy and natural resources are safe for consumers, communities, and employees and are economically sound" (Lee et al., 2017).

According to the definition, the process is set up and carried out to produce products with a better value added by maximizing inputs with more productivity, economical efficiency, and technical efficiency (Jin Gam et al., 2009). The introduction of sustainability principles has significantly changed how organizations outlook their mission and daily operations (Garvare and Johansson, 2010). Economic growth has traditionally been measured as a major factor for success, but it also cooperates with social responsibility and environmental compliance to promote the organization's sustainable development and growth (Zairi & Peters 2002). Organizations that are aware of their responsibility for upholding social and environmental standards put sustainability efforts into practice strategically and purpose for sustainable performance in terms of operations and growth measures. Organizations have been utilizing a variety of methods, techniques, and models to achieve long-term performance (Tasleem & Nawar, 2018). Another way to adopt sustainability practices is to completely implement ISO or other regional or national standards. Recognized standards include OHSAS 18001, ISO 9004, ISO 9001 quality management system (QMS), ISO 14001 environmental management system (EMS), ISO 26000 social responsibility, and others are the guidelines for managing sustained success for an organization (Hoyer et al., 2011).

3. Critical success factors of sustainability practices

The CFs in general are "the critical areas which organization must accomplish to attain its objectives by examination and identification of their impacts" (Talib et al., 2010). The study expands our understanding of the potential impact of a triple bottom line on business performance and to some extent supply chain outcomes (Chen, 2015). To achieve sustainable performance, the three dimensions of sustainability i.e. economic, environmental and social were identified from the literature (Tasleem & Nawar, 2018). Table 1 shows that this study offers a pathway for achieving sustainability in organizations and provides preliminary understanding and guidance to business establishment managers, stakeholders, and decision-makers. In this study, economic focus, Cost management, limited landfilling, research and development, pollution, environmental focus, social focus, resource consumption, life cycle, public welfare, stakeholder trust, and industrial health and safety are the most important practices of sustainability.

3.1. Cost management

Cost management is a fundamental component of business management that supports the growth of competitive advantages. Cost management has an impact on the strategic and operational elements of company management (Stępień, 2019). The best method for planning and controlling a company's co, a complete spectrum of expenditure is cost management.

3.2. Research & Development

This refers to creative efforts made by groups or organizations to create new groups or things or successful groups that already exist. The first phase of the enhancement of potential new aids is the considered development process (Sargent Jr., 2011).

3.3. Limited Landfilling

According to the ISWA (1992), a landfill is "the engineered deposit of waste on to and into land in such a way that pollution or harm to the environment is prevented and through restoration, the land is provided that may be used for another purpose". Landfills will keep playing a significant role in waste management (Sivakumar Babu et al., 2017). A landfill site is a location where waste is exchanged by burying. It is also sometimes referred to as a dump, tip, Denny dump, refuse dump, or dumping ground. Landfills have practically been the best mechanism for sorting through trash exchange and they still are in many places all over the world (Horinko & Courtin, 2016).

3.4. Environmental pollution

Environmental pollution is the introduction of substance waste that has negative impacts on the environment. Increased industrialization, mechanization, urbanization, pesticides in agriculture, improper management of the disposal of human waste, and use of fertilizers all contribute to environmental pollution as a cost of economic growth (Nazeer et al., 2016). As the human population grows, pollution has become a major issue. Human-caused pollution is an issue, but it does not have to be unavoidable. The majority of pollutants may be avoided or decreased with a pollution penetration program (Thiel et al., 2015).

3.5. Lifecycle

According to the united nations environmental program (UNEP, 2011), the term "life cycle sustainability assessment" (LCSA) refers to the evaluation of all negative environmental, social, and economic effects benefits in decision-making processes toward more sustainable products throughout their life cycle. The sequence of the structural and functional phases that biological thing passes through as it progresses through repetitive of a fundamental stage. A series of stages that something (such as a person, a civilization, or a manufactured object) experiences during its lifetime.

3.6. Resource Consumption

Resource consumption is utilizing non-exhaustible, less frequently sustainable resources. It may specifically refer to water use and energy use in electricity. Resource utilization and asset proficiency are proportions of product usage. The tendency to overconsume assets has increased as a result of industrialization and the globalization of markets. Asset utilization occurs when a nation's assets use rate does not typically correspond to the necessary asset accessibility.

3.7. Social Image

A social image is a proactive approach to controlling and understanding how business consequences affect employees, people in the value chain, local communities, and customers. Companies that emphasize social responsibility understand the value of their interactions with individuals, society, and communities (Adec Innovations, 2022). It covers a variety of topics. Including social value, safety value, system development, network

Table 1: Various practices of sustainability and comparison of this research with the past studies.

Research study	Sustainability practices	The perspective of the study	Area
Nguyen et al. (2018)	Economic performance Social performance Environmental performance	Relationship between quality management practices and sustainable performance and how quality management practices impact sustainable performance.	Vietnam based enterprises
Khoja (2016)	Creativity Innovation Recycling neutralizing Biodiversity Culture Ethics Stakeholders Harm material	Emphasized the need for understanding the synergies between TQM and sustainability models and integrating TQM with economic, Social, and the environment.	Libyan Higher Education System
Monday et al. (2015)	Innovation Poverty Health Land use Biodiversity Productivity	This study shows the impact of TQM practices on the performance and development of SMEs in Nigeria.	Oil and gas industries in Nigeria
Mishra & Napier (2015)	Environmental focus Recycling Disposal Reuse Process design Enhancement of awareness Corrective action	Develops 2 conceptual frameworks showing the relation between sustainable development (environmental) the quality management.	Environmental of organization
Jasiulewicz-Kaczmarek (2014)	Stakeholders Triple bottom line Strategic management Innovation and learning	If the impact of quality management will continue, find out the TQM-based improvement initiative will develop in the future.	Global organization's
Akpan et al. (2014)	Environmentally sustainable development Desertification	This research works attempts to establish a strategic tool for the implementation of TQM for sustainable development by using the descriptive statistical tool.	Environmental pollution in organizations in Nigeria
Elhuni & Ahmad (2014)	Social performance Economic performance Environmental performance	In this study, the aim is to construct a generic model for the successful implementation of TQM to find out the effect of this model on organization sustainability performance.	Oil sector
Issakon (2006)	Stakeholder Economic performance Lifecycle Environmental performance Social performance	It shows how a process-based change model for SD could look and how it could be used, and synergies of TQM and SD can be realized by using the 7 SQC tools studies	Manufacturing organizations
Idris & Zairi (2002)	Sustainable performance Market orientation Quality Orientation Revenue growth	Integrate a conceptual model and highlight the critical components in the model relation using empirical investigation	Market-based

versatility, bearability, social justice, social supports, job privileges, social duty, human rights, place creation, and job privileges (Costantini et al., 2004).

3.8. Social Sustainability

Social sustainability is the slightest understanding of the many strategies for achieving sustainability and economic progression. Social sustainability has received significantly less attention than financial and environmental sustainability (Epstein & Roy, 2001). Social sustainability includes strengthening, social personality, values, and sharing. Social sustainability encourages monetary development and the decrease in poverty and sustains the planet. A strong framework includes social sustainability as one of its key elements, fundamentally, social sustainability donates a configuration of social connection that reduces insecurities (Colantonio, 2009). Social sustainability essentially creates a link between environments and social conditions. Generally speaking, social sustainability covers the partners, well-being, and security.

3.9. Public Welfare

The last few years have seen viable advancement speak to one of the most important global strategy goals, and how to plan specific arrangement actions, estimate execution and results keeps offering an introduction a test (Committee, 2015). Public welfare is the state of physical and mental well-being, whereas sustainability is the balance between economic, environmental, and social aspects of a social economy system (Mendoza-Cavazos, 2019).

Industrial Health and Safety

According to the world health organization, sustainability is a methodology to meet the challenges of the current total population without having a negative impact on well-being and nature and without depleting or threatening the global asset base (Editorial Sustainability and Prevention in Occupational Health and Safety, 2016). Modern security and well-being are essential elements. Sustainability gains continue attention to safety, health, and the environment. Sustainable growth aims to provide a balance between social, economic, and ecological challenges. The long-term sustainability of workers' activities depends on providing workers with a safe and healthy work environment free from physical, biological, chemical, and radiological harms interest in a specific industry sector (Lucas, 2010).

Stakeholder Trust

Stakeholder trust is frequently analyzed with organizational reliability. This aspect is important in the fields of communication and data advancements as well as in the logical composition of exhibiting, the board, brain science, and financial matters. Although the study of various partner trusts is incomplete, researchers have separated from a more in-depth explanation of those characteristics. Although hierarchical reliability has a notable impact on customer trust, it should be noted that there is no need to separate partner trust from its many components (Matuleviciene & Stravinskiene, 2015). Any group or individual that has the potential to affect or is affected by the achievement of the association's aims is a stakeholder. Returning investors embrace their competency in the capital market. Partners in the association have the responsibility of setting goals,

Table 2: Practices and Sub practices of Sustainability in Literature.

Factor	Practice and Sub practices	Authors
Sustainability	Economic focus	Akanmu et al. (2021), Nahas (2020), Tasleem & Nawar (2018), Muhardi et al. (2020), Lim et al. (2021), Qureshi et al. (2020), Nguyen et al. (2018).
	Cost Management	Elhuni & Ahmad (2014), Martens & Carvalho (2017), Rasul & Tapa (2003), Díaz & Espino-Rodriguez (2016), Akanmu et al. (2021), Muhardi et al. (2020).
	Research & Development	Elhuni & Ahmad (2014) Thirupathi & Vinodh (2016), Fretheim et al. (2002), Sebhatu (2009), Amr et al. (2016), Tayouga & Gagné (2016), Nahas (2020).
	Limited Landfilling	Amiril et al. (2014), Elhuni & Ahmad (2014), Tayouga & Gagné (2016), Amr et al. (2016), Sebhatu (2009).
	Environment Focus	Akanmu et al. (2021), Nahas (2020), Tasleem & Nawar (2018), Muhardi et al. (2020), Lim et al. (2021), Qureshi et al. (2020), Nguyen et al. (2018).
	Pollution	Akanmu et al. (2021), Larrán et al. (2015), Sebhatu (2009), Amiril et al. (2014), Elhuni & Ahmad (2014), Thirupathi & Vinodh (2016), Lim et al. (2021).
	Life Cycle	(Qureshi et al. (2020), Amiril et al. (2014), Elhuni & Ahmad (2014), Díaz & Espino-Rodriguez (2016), Tayouga & Gagné (2016), Isaksson (2004).
	Resource Consumption	Elhuni & Ahmad (2014), Tayouga & Gagné (2016), Sebhatu (2009), Amr et al. (2016).
	Social focus	Akanmu et al. (2021), Tasleem & Nawar (2018), Muhardi et al. (2020), Lim et al. (2021), Nguyen et al. (2018).
	Public Welfare	Elhuni & Ahmad (2014), Chen (2016), Díaz & Espino-Rodriguez (2016). Zinik (2007), Muhardi et al. (2020).
	Industrial Health & Safety	Martens & Carvalho (2017), Larrán et al. (2015), Amiril et al. (2014), Elhuni & Ahmad (2014), Muhardi et al. (2020).
	Stakeholder Trust	Isaksson (2006), Elhuni & Ahmad (2014), Amiril et al. (2014), Idris (2011), Gazzola & Pellicelli (2009).

experiencing the effects, and evaluating the outcomes (Chen, 2015).

4. Contribution of this Study

Manufacturing firms understand the need of sustainable business practises for guaranteeing long-term success. For businesses to continually develop, sustainability issues and practises are incorporated into daily operations. Practices of sustainability are an integral aspect of quality management and a dedication to the improvement of both nature and people. This model will assist industrial organisations in understanding how to manage environmental risk and potential effects that may extend beyond their operational limitations. By putting this model of sustainability practices into effect in the industrial sectors, this model offers the quality assurance that consumers will receive what they anticipate as well as a method for handling dissatisfied customers and also minimises waste. This study is of a novel character, and the approach it uses enables continuous organisational improvement. It will provide a deeper comprehension of sustainability procedures and problems noted by organisational structure. The industrial sector of Pakistan will benefit from the adoption of sustainability techniques by making it easier to set goals for improving the quality performance of businesses.

5. Conceptual Framework

The conceptual model is proposed in this study bases on the above discussion and it is implemented in business to provide effective results. This conceptual model shows important practices of sustainability; economic focus, Cost management, research and development, limited landfilling, pollution, lifecycle, environmental focus, resource consumption, social focus, public welfare, industrial health and safety, and stakeholder trust are important factors of sustainability.

6. Methodology

The data was collected from the relevant experts employed in different manufacturing organizations in Sindh (Karachi and Hyderabad).

6.1. Data collection

The data was collected by using a questionnaire survey. The questionnaire was divided into two sections: the demographics and the variables data. The top management of the industries responded to the questionnaire which was distributed to the various industries in Karachi and Hyderabad, Pakistan. The purpose of the questionnaire was to identify the main sustainability practices. The questionnaire survey will employ on five-point Likert scale with options (strongly agree, agree, neutral disagree, and strongly disagree) which was set on the google forums.

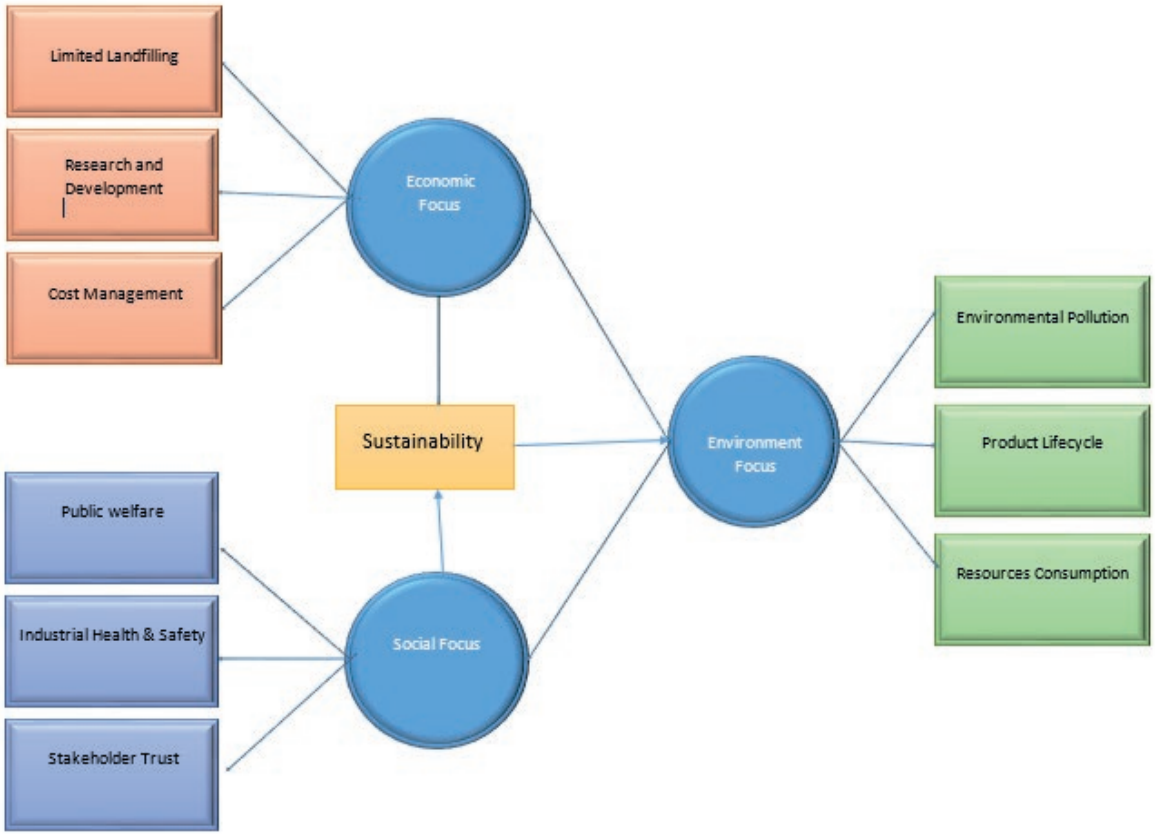

Figure 3: Conceptual Model of the Study.

The purpose of this survey questionnaire is to better understand sustainability and to validate the conclusions. The techniques to be used for data analysis depend on the type of data being studied whether it be quantitative or qualitative.

6.2. Data analysis

A survey that was distributed to managers and employees in manufacturing organizations was performed to collect the data. MS Excel and SPSS (statistical package for social science) were used to analyze the collected data. The validity was determined by using descriptive statics and exploratory factor analysis (EFA), and it shows what was intended to be measured. To distinguish the variable's structure and determine the factorial validity exploratory factor analysis was used on SPSS. The analysis demonstrated what was intended to be measured accurately.

6.3. Research tools

SPSS and Microsoft Excel 2013 was used to examine the findings of the collected data.

6.4. Research Survey

A survey of 320 samplings was carried out in different manufacturing organizations in Sindh, Pakistan. Among 320 questionnaires, 100 responses were received of which 82 were accurate and complete and 18 were incomplete or invalid. Both government and private organizations varied in terms of industry (automotive, textile, etc.), size (large, medium, small), sustainability implementation level (high, moderate, low), and ISO certification ISO.

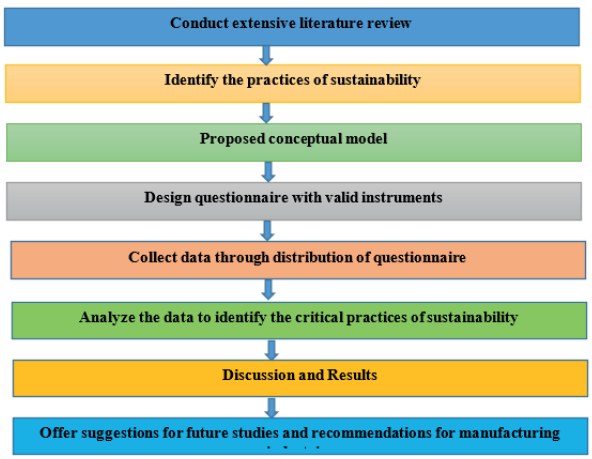

Figure 4: Proposed Research Methodology.

7. Results

Twelve practices of sustainability were created on a Likert scale. The 12 items were associated with one other and considered the factor structure of the variable.

7.1. Exploratory Factor Analysis

Exploratory factor analysis was used to test the item's uni-dimensionality. EFA allows for the investigation of "whether the measurement items covered in the appropriate factor" (Nils Urbach, 2010). EFA evaluated "if every item loads what high coefficient of one factor and this factor is same for each item that is supposed to measure it". The reliability is considered to be high if the loading coefficient is more than 0.6 and reliability is considered low if the loading coefficient is less than 0.4. After that EFA, was used to create a factor structure that reflected the sustainability practices and their sub-practices relating to the data that had been collected.

7.2. Normality of Data

The normality test of the data is shown in Table 3. Skewness and Kurtosis are used to determine whether the data is normal or not. Skewness is a measure of symmetry and Kurtosis is a measure of the normal distribution's degree. Skewness and Kurtosis have a range of values between (+1, -1, and +3, -3).

Table 3: Normality values of Data.

Variables	Skewness values	Kurtosis values
Sustainability	-0.272	-0.439

7.3. Data Screening

Data screening entails identifying errors in the data and correcting or deleting them. Data screening is required to ensure that the best information is available for the analysis of the main interest. The findings of the final analysis are likely to be prejudiced if errors like outliners and missing values are not fixed throughout the data screening.

Table 4 shows the data screening. These tables define the data as normal and clean and there is no missing value in the data and the whole data is valid for the analysis.

7.4. Reliability of Data

According to Bashir et al. (2008), reliability is defined as "the extent to which results are consistent over tie and a true reflection of the entire population under investigation. Reliability is s internal consistency; it tests whether numerous connected items or observations that are intended to measure the same broad construct will produce a finding that is comparable in terms of dimensions. The overall consistency of the measurements is shown in Table 5.

Instrument reliability is defined as its capacity to provide consistent results through pout time. The case processing summary of data is shown in Table 5.

Table 4: Data screening of the data.

	Case processing summary					
	Cases					
	valid		Missing values		Total number	
	N	Percent	N	Percent	N	Percent
Cost1	82	100.0%	0	0.0%	82	100.0%
Cost2	82	100.0%	0	0.0%	82	100.0%
RandD1	82	100.0%	0	0.0%	82	100.0%
RandD2	82	100.0%	0	0.0%	82	100.0%
RandD3	82	100.0%	0	0.0%	82	100.0%
Landfill1	82	100.0%	0	0.0%	82	100.0%
Landfill2	82	100.0%	0	0.0%	82	100.0%
Landfill3	82	100.0%	0	0.0%	82	100.0%
Pollution1	82	100.0%	0	0.0%	82	100.0%
Pollution2	82	100.0%	0	0.0%	82	100.0%
Pollution3	82	100.0%	0	0.0%	82	100.0%
Lifecycle1	82	100.0%	0	0.0%	82	100.0%
Lifecycle2	82	100.0%	0	0.0%	82	100.0%
Lifecycle3	82	100.0%	0	0.0%	82	100.0%
Consum1	82	100.0%	0	0.0%	82	100.0%
Consum2	82	100.0%	0	0.0%	82	100.0%
Consum3	82	100.0%	0	0.0%	82	100.0%
Health1	82	100.0%	0	0.0%	82	100.0%
Health2	82	100.0%	0	0.0%	82	100.0%
Health3	82	100.0%	0	0.0%	82	100.0%
Stakeholder1	82	100.0%	0	0.0%	82	100.0%
Stakeholder2	82	100.0%	0	0.0%	82	100.0%
Stakeholder3	82	100.0%	0	0.0%	82	100.0%

7.5. Cronbach's alpha

Cronbach's alpha was used to measure the internal consistency. In statistical analysis, Cronbach's Alpha is a method used frequently for the testing of internal consistency (Fowler Jr, 2009, Sarkis et al., 2011). According to (Urbach and Ahlemann, 2010), reliability represents the degree to which a variable or set of variables across various items (Cortina, 1993). An increase in the level of internal consistency (Cronbach, 1951) is consistent considering what it aims to assess alpha value, which goes from 0 to 1, indicates a higher The reliability of the data is evaluated using Cronbach's Alpha A common acceptable value is 0.7 which indicates that the items measure the same construct (Nunnally, 1988). Each value obtained a value greater than 0.7 and guaranteeing the item's consistency (Tasleem & Nawar, 2018). A group of survey items' internal consistency or reliability is measured by the Cronbach's alpha coefficient. On a uniform 0–1 scale, Cronbach's alpha assesses the degree of agreement. The values of Cronbach Alpha is given in Table 7.

Table 5: Reliability values of the Data.

Case processing summary			
		N	%
Cases	Valid	82	100.0
	Excluded[a]	0	0.0
	Total Number	82	100.0

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

Table 6: Reliability Statistics of Data.

Reliability statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
0.957	0.958	82

Table 7 shows the outcomes of sustainability practices. So, this table shows the mean values, variances, standard deviation, and Cronbach's Alpha value of variables. The alpha values of the table which are 0.7 are reliable which shows reliability and acceptance.

7.6. Principal Component Analysis

The principal component analysis is s statistical technique that enables the summarization of the data contained in big data tables that can be visualized and analyzed (AG, 2020). The value of commonalities of principal component analysis is shown in Table 8.

7.7. Total Variance Explained of sustainability

The sum of the variances of each primary component makes up the total variance. The ratio between the variance of that principal component and the total variance is the variance factor that is explained by the principal component (AG, 2020). The number of extracted factors, whose sum should be equal to the number of items subjected to factor analysis, is actually represented by eigenvalue. The list of factors that can be extracted from the analysis is shown next, along with

Table 7: Cronbach's Alpha Values of Sustainability Practices.

S.no	*Sustainability factors*	*Sub factors*	*Standard deviation*	*variance*	*Mean*	*Cronbach alpha*
01	Economical focus	Cost mgmt.	1.484	2.203		0.774
		R&D	1.652	2.728	3.52.529.727	0.612
		Landfill	2.293	5.285		0.822
02	Environmental focus	Pollution	2.437	5.937		0.768
		Lifecycle	2.233	4.981	.596.598.582	0.759
		R. Consumption	1.899	3.608		0.693
03	Social focus	Health & Safety	1.743	3.037	0.489	0.788
		Stakeholder trust	2.002	4.001	5.65	0.784

Table 8: Principle Components Analysis.

Commonalities		
	Initial	Extraction
Cost management	1.000	0.783
Research & development	1.000	0.977
Limited landfilling	1.000	0.987
Pollution	1.000	0.984
Life cycle	1.000	0.973
Resource consumption	1.000	0.990
Health & Safety	1.000	0.586
Stakeholder trust	1.000	0.981

Extraction Method: Principal Component Analysis.

The commonalities values are shown in table 9.

each factor's eigenvalues. There are three subsections in the Eigenvalue table: first-order Eigen values, Sums of Squared Loadings Extracted and Sums of Squared Loadings Rotation. Total variance of data is explained in Table 9.

Table 9 shows Eigenvalues and explains the total variance of the variables and the table shows the variance is divided among the nine possible factors.

7.8. Screen plot of sustainability

A screen plot is a line plot of the eigenvalues of factors or principal components in studying multivariate statistics. The number of factors to keep in exploratory factor analysis or the number of principal components analyses are determined using the screen pot (AG, 2020). The screen plot of Eigen values is shown in Figure 5.

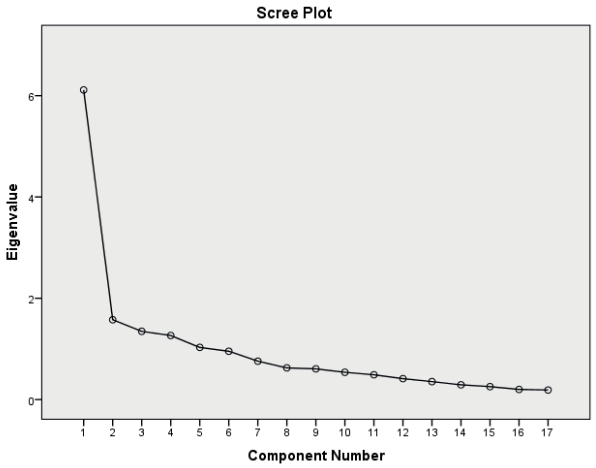

Figure 5: Screen plot of sustainability.

Table 9: Total Variance of the Data.

Compo-nents	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Vari-ance	Cumula-tive %	Total	% of Vari-ance	Cumula-tive %	Total	% of Variance	Cumulative %
1	6.112	35.955	35.955	6.112	35.955	35.955	2.737	16.100	16.100
2	1.576	9.268	45.224	1.576	9.268	45.224	2.342	13.775	29.875
3	1.347	7.922	53.146	1.347	7.922	53.146	2.316	13.625	43.499
4	1.265	7.438	60.584	1.265	7.438	60.584	2.129	12.524	56.023
5	1.029	6.056	66.640	1.029	6.056	66.640	1.805	10.616	66.640
6	0.954	5.612	72.252						
7	0.758	4.458	76.711						
8	0.625	3.676	80.387						
9	0.606	3.567	83.954						
10	0.538	3.166	87.120						
11	0.489	2.876	89.996						
12	0.413	2.428	92.424						
13	0.354	2.085	94.508						
14	0.290	1.707	96.215						
15	0.255	1.503	97.718						
16	0.199	1.173	98.891						
17	0.189	1.109	100.000						

Extraction Method: Principal Component Analysis.

7.9. Rotated Component Matrix

The Pearson correlation between items and factors is contained in the rotated components matrix. These are referred to as factor loading and they enable us to understand which characterstics our components might reflect (SPSS Statistics, 2021). The values of the rotated component matrix are shown in Table 10.

Table 10: Rotated Components Matrix.

Rotated Component Matrix[a]					
	Component				
	1	2	3	4	5
Landfilling2	0.870				
Landfilling3	0.749				
Landfilling1	0.728				
R.Consumption3	0.543				
R.Consumption2		0.874			
R.Consumption1		0.865			
Lifecycle2					
E. Pollution2			0.826		
E. Pollution1			0.802		
E. Pollution3			0.624		
Lifecycle1				0.757	
Cost Management1				0.670	
Stakeholder1				0.631	
Lifecycle3					
Health & Safety1					0.755
Stakeholder Trust3					0.671
RandD1					0.503

Extraction Method: Principal Factor Analysis.
[a] Rotation Method: Varimax with Kaiser Normalization.

[a.]Rotation congregated in 6 iterations.

Table 10 defines related features after reducing the factors. This table displays the acceptable values of the factors.

8. Final Framework of the Study

The final framework shows the critical success factors (CFs) of sustainability which are crucial for Successful businesses. The framework comprises the six critical sustainability practices.

Figure 6 shows the six CFs of sustainability in which environmental pollution (0.984), limited landfilling (0.987), product lifecycle (0.973), resource consumption (0.990), stakeholder trust (0.981), and research and development (0.977) have the high values. Organizations must include this framework into their operations in order to improve the structure of the industries, doing so increases the possibility of enhancing businesses' performance. By implementing this framework, companies increase their production and profits as much as possible.

9. Discussion

This paper presents the findings of a study that how to implement the key practices of sustainability in the manufacturing industries. The validity and reliability of the survey have been investigated and it has been found

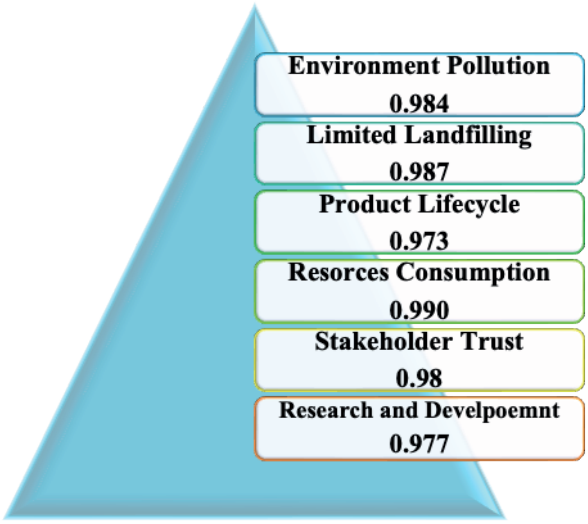

Figure 6: Final Framework of the Study.

that the data is fairly valid. The questionnaire includes the three practices with nine sub-practices of sustainability. Exploratory factor analysis was used to analyse the data to identify the critical success factors of sustainability. The reliability and validity were conducted in this study which shows the data is valid under the reliability coefficient from 0.835 to 0.966. This study indicates that the coefficient of factor is 0.957 and it is quite reliable. The major goal of this study is to find out the most common practices of sustainability. By analysing the previous research and conducting a broad literature review, it was found three main practices (economic, environmental, and social) with nine main sub-practices: cost management, environmental focus, limited landfilling, stakeholder trust, research and development, environmental pollution, economic focus, social focus, product life cycle, industrial health and safety, resource consumptions and social image. As it focuses on the main practices of sustainability and their implementation, this research also adds value to the existing literature. The results of this study also support past studies (Cantele & Zardini, 2018, Maletic & Dahlgaard, 2015, Qureshi et al., 2020, Mishra & Napier, 2015, Theng et al., 2021, Raziq & Wiesner, 2016, Hamdan & Alheet, 2021, Nguyen et al., 2018, Ali AlShehail et al., 2022, Abdul-Rashid et al., 2017, Abbas, 2020, Hristov & Chirico, 2019, Lim et al., 2021, Hami et al., 2015, Alayón, 2016, Akanmu et al., 2021, Bour et al., 2019, Maletič et al., 2015, Isaksson, 2006, Aquilani et al., 2016, Eccles et al., 2014). Implementing a sustainability philosophy will help the organizations to become more productive and competitive. Adopting a sustainability-based strategy will helot h organizations become more productive and competitive. This article presents the study's conclusion on the critical success factors of sustainability in Pakistan's manufacturing industries. Industries that have already implemented sustainability should draw useful lessons from their experience. Companies that are implementing sustainability initiative or planning to do so will have a better chance of success if they become more aware of the difficulties (Poldrugovac, 2013). These critical success factors must be comprehended and taught in order to determine the strengths and weaknesses of the industries that are currently utilizing sustainability methods. There

is strong considerable evidence that sustainability increases businesses potential to improve organisational performance (Tasie, 2016). This study's findings revealed five sustainability components. The most crucial practices include limited landfilling, resources consumption, environmental pollution, research and development and stakeholder trust are the most important practices.

10. Conclusion

To achieve sustainable performance, the three pillars of sustainability economic, environmental, and social were identified from the literature (Elkington, 1999). The sustainability concept was examined in this study to highlight its significance, its critical success factors, and the requirement for implementation in the manufacturing industries. According to the survey, sustainability had a significant impact on every dimension of company performance (Tasleem & Nawar, 2018). It can be demonstrated that this study makes a substantial contribution to the fields of product quality and sustainability. In this research, the practices of sustainability were examined in Pakistan's leading manufacturing industries. The evaluation results for the practices of sustainable manufacturing in the company explored is generally quite good, according to the empirical evidence from this research. The company has implemented the three sustainability dimensions i.e. economic, environmental, and social aspects in their business structure. The findings show that, from medium to high implementation, they must implement an integrated framework and collaborative strategy to achieve sustainability in their organizations. Companies can enhance their manufacturing processes by implementing sustainability to achieve greater performance in the economic, environmental, and social aspects. Organizations can also employ a variety of sustainability standards to solve these issues. The ISO 14001 EMS standard is the one that addresses environmental practices and measures and is the most well-known internationally. The government and other stakeholders should learn more knowledge from this study to help them make better decisions to improve the performance of Pakistan's manufacturing sector. It was suggested that manufacturing companies pay more attention to sustainability practices in light of the findings. The findings highlight the significance of sustainability measures and implemented these practices in the manufacturing industries in Hyderabad and Karachi. These quality standards must improve if industries are facing strong competition on the local level. This research also develops a framework for the industry's financial performance.

Therefore, the main practices of sustainability (economic sustainability, social sustainability, environmental focus) are included high-impact main practices (cost management, research and development, pollution, social image, and waste reduction) that have a positive effect on the performance of the company. Organizations must implement these practices with quality to achieve the success of the business. This study also supports the idea of the conceptual model. Thus, the main successful practices of sustainability are limited landfilling, environmental pollution, resource consumption, research and development, product lifecycle, and stakeholder trust that can be applied in manufacturing to improve business performance. These results will give confidence to the manufacturing sector of Hyderabad and Karachi in the implementation of the sustainability philosophy.

11. Limitations and Future Suggestions

This study is focused on the manufacturing industries in Hyderabad and Karachi Pakistan. Though a similar study is carried out in other cities in Pakistan which may give better results. In this study, the sample size was 82 which is limited, this would prompt further research by carrying out a large sample size. This study gives better results for the companies if the sample size will increase. In this study, analysis of the data was carried out by using exploratory factor analysis (EFA), future studies should focus on structural equation modeling (SEM) which gives effective results to the organization. This study was focused on the manufacturing industries i.e. textile, automobiles, steel industry, etc. if the same study will be carried out in other types i.e. service industries it may produce useful results.

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