Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Engineering
Department of Mechanical and Industrial Engineering

Arslan Zahid

Overcoming Barriers for Sustainable Project Management

Master's thesis in Project Management
Supervisor: Nora Johanne Klungseth
June 2021

NTNU
Norwegian University of Science and Technology

Arslan Zahid

Overcoming Barriers for Sustainable Project Management

Master's thesis in Project Management
Supervisor: Nora Johanne Klungseth
June 2021

Norwegian University of Science and Technology
Faculty of Engineering
Department of Mechanical and Industrial Engineering

NTNU
Norwegian University of
Science and Technology

PREFACE

This study has been originated as a result of the rising trends such as sustainability and project management over the last few decades. Although the various advantages of sustainability are getting recognized globally but its implementation is still not fully incorporated by the businesses all over the world. There is still deficiency of sustainable development especially in the third world and developing countries.

Moreover, the sustainability principles are almost non-existent in my home country. People are unaware of the sustainability concept and they waste the natural resources quite substantially every day including the negative effects on the environment in the form of greenhouse gas emissions. This inspires me to investigate the various challenges that hinder the implementation of sustainable development and how to overcome them towards the betterment of the society and the environment in the time to come.

I would like to thank my supervisor Nora Johanne Klungseth from the bottom of my heart for giving me the highly valuable and beneficial discussions and feedbacks, providing me the guidance and assistance in conducting this research study, comprehensively. In addition, she also helped me in hunting the potential interview objects required as a part of my research.

Additionally, I would like to especially thank the people of different organizations who contributed to my research in the form of interviews, giving me the professional insight and all the essential information needed to perform the research study. All the below mentioned interviewed organizations had given me the permission to acknowledge their names when they were contacted about it including those who initially asked me first regarding the acknowledgement. In addition, there are few other organizations who preferred not to be mentioned here due to the privacy concerns. As a result, their privacy is respected but their contribution in this research study is as much important as the rest of the firms mentioned below.

"*Asplan Viak, Atkins Norge, NAV, NIRAS, Schibsted, GK Norge, Trondheim Eiendom, Veidekke Bygg, Norsk Eiendom, Circular Norway, Finans Norge, COOR and Bedriftsrådgiver: Hilde E. Bjerke*"

At the end, I would like to thank NTNU, Department of Mechanical and Industrial Engineering (MTP) and Norwegian Centre for Research Data (NSD) for giving me the opportunity to perform this master thesis in the form of a research study. Furthermore, giving the free access

to a wide variety of literature using the NTNU's library search engine 'Oria' is a notable feature that needs to be appreciated as well.

June 10, 2021

Arslan Zahid

ABSTRACT

The interest on the sustainability concept has boomed significantly and the organizations worldwide are now trying to incorporate the sustainability principles in their businesses. This has been propelled due to the climate change as a result of greenhouse gas emissions as well as not efficiently utilizing the natural resources; having a negative impact on the environment. However, the implementation of sustainability is still lacking in the organizations and the green movement is still at its infancy, especially in the developing countries.

The purpose of this study was to find the numerous sustainability barriers and how these barriers can be overcome in the form of potential drivers to move towards the sustainable development. A literature review of more than 400 different resource materials was performed and 97 of it were finally selected to be the part of this research study. In addition, a total of 18 interviews were also conducted with professionals working in different organizations to understand their perspective regarding the sustainability barriers. This in turn will help in understanding the identified barriers and subsequent drivers towards realization of the 2030 Agenda for Sustainable Development by United Nations, 2015 and to be an integral part of the European Green Deal, 2019 by European Union.

Various sustainability factors were identified associated with implementation of sustainability in an organization. These sustainability elements in the form of barriers were further simplified and categorized in form of *organizational factors, time and financial constraints, lack of knowledge and awareness, stakeholders' perspective, lack of established standards, frameworks and tools, political and governmental role, and others*. Each of these highlighted barriers have their own significance depending on the context of the organization. Likewise, the sustainability drivers were also spotlighted and grouped as *organizational aspects, financial factors, promoting awareness, stakeholders' role, standards and tools, government policies and regulations, and others.*

Furthermore, the aftermaths of incorporating the sustainable activities on the organizations' financial resources were also emphasized. The economic benefits include *profitability and higher internal rate of return, reduced costs and wastes, energy savings, and improved productivity of the built environment*. Nonetheless, implementing sustainability principles is not like a piece of cake for every organization. Sustainability has to make the *economic sense*. If the profits or positive return on investments are not generated in time, then there is a risk of going bankrupt or out of the businesses for firms as they simply cannot cope with the losses for

long time. Companies especially small and medium sized firms are unable to withstand the cost strains of sustainability incorporation in the long-term.

Finally, the role of project management was also emphasized towards accelerating the process of sustainable development. *A lifecycle perspective, a holistic approach* is needed to attain the sustainable development goals by the United Nations successfully and playing an important part towards making the Europe the first climate-neutral continent in the world; zero emissions of greenhouse gases by 2050.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
BREEAM	Building Research Establishment Environmental Assessment Method
CDSB	Climate Disclosure Standards Board
CDP	Carbon Disclosure Project
ECI	Early Contractor Involvement
ESG	Environmental, Social, and Governance
EU	European Union
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
IIRC	International Integrated Reporting Council
IFMA	International Facility Management Association
IMP	Impact Management Project
ISO	International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
NACE	European Classification of Economic Activities
NSD	Norwegian Centre for Research Data
OECD	Organization for Economic Cooperation and Development
PM	Project Management
PMI	Project Management Institute
RQ	Research Question
SASB	Sustainability Accounting Standards Board

SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
WCED	World Commission on Environment and Development
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

1 INTRODUCTION

1.1 BACKGROUND

Sustainability

Sustainability is of paramount significance (Durdyev et al., 2018). Businesses worldwide are adopting the sustainability principles in their core skills and business processes due to the increased international societal and regulatory pressure (Gomes and da Silva (2005); Labuschagne et al. (2005); Collins (2011)). Moreover, incorporating sustainability in business has heightened the attention (Stewart et al., 2016) and many industries are moving towards sustainable development as a result of negative effects on the environment (Adams and Frost (2008); Ali et al. (2016); Cai and Li (2018); Aghaegbuna et al. (2020); Hermundsdottir and Aspelund (2021)). Similarly, sustainability principles have been embraced by many organizations in their business cases due to its increasing demand in the construction industry (Mavi and Standing (2018); Pham et al. (2020)).

The interest on sustainability development concept has flourished significantly, globally (Abidin (2010); Eweje and Alakavuklar (2014); Goni et al. (2015); Ali et al. (2016); Durdyev et al. (2018); Rubino and Veltri (2020)). According to Durdyev et al. (2018), sustainable activities have increased due to its popularity over the last decade. Sustainability in project operations is among the most important matters today to address (Chawla et al., 2018). This increased focus on sustainability has impacted the process of conception, planning, execution and evaluation of projects in business; project management (PM) activities (Ali et al. (2016); Chawla et al. (2018)). In addition, firms all over the world are seeing sustainability issues as an opportunity to capture the potential business (Ali et al., 2016) and the sustainability research trend has increased in various fields (Goni et al., 2015). As mentioned by Chawla et al. (2018), sustainability has been a focal point of research in relation to the project. Additionally, sustainability innovations can lead to win-win circumstances for an organization (Hermundsdottir and Aspelund, 2021).

Project management

On the other hand, projects play a critical role in the sustainable development of businesses (Silvius and de Graaf, 2019). Sustainable project management allows organizations to interconnect sustainability principles into the project management (PM) activities, resulting in business success, eventually (Chofreh et al., 2019). According to various studies, PM has

escalated abruptly in the last decade. Additionally, there is still a rising demand and interest in this respective field (Crawford (2005); Thomas and Mengel (2008); Padalkar and Gopinath (2016); Gurjar (2016); Zwikael and Smyrk (2019)). Moreover, the strategic value of PM enables the integration of environmental and social objectives into the project's lifecycle approach (Labuschagne et al., 2005). Likewise, the strategic value can be reflected in connection with social, environmental, and economic dimensions as the characteristics of sustainability (Kivilä et al., 2017).

Construction industry

The construction industry is vital for sustainable growth (Sev (2009); Serpell et al. (2013); Gan et al. (2015)). Sustainability is becoming a substantial reflection for construction projects, worldwide (Pearce, 2008). According to Du Plessis (2007), the construction is seen as a specific phase of a project cycle. Sustainable construction is a path of contribution to achieve sustainable development for the construction industry (Shafii et al. (2006); Sev (2009); Abidin (2010)). For sustainable development in construction industry, promoting environmental protection, economic growth and social progress are pivotal (Heravi et al., 2015). Furthermore, extraordinary opportunities have been created for embracing the sustainable construction as a result of rapid urbanization in developing countries (Gan et al., 2015). In addition, green building is a propitious means of contributing the sustainable development in construction industry and its importance has increased recently (Darko and Chan, 2017). In short, to meet the sustainability goals, green building initiatives have been created (Karji et al., 2020).

The above information shows the increasing importance of the fields of sustainability, PM and the role of construction industry. In the following sub-section, the necessity to deal with sustainability issues are discussed and the objectives of the research are highlighted to further elevate their significance.

1.2 PROBLEM DESCRIPTION

There are several challenges which have played their part in necessitating the urge towards sustainable development. These significant issues are pointed out below.

Environmental aspect

Climate change is a substantial environmental hazard as a result of fossil-fuel usage, globally (Robinson (2012); Portney (2015); Yoshino et al. (2019); Ziolo and Sergi (2019)) and is viewed as a risk to the organization (Adams and Frost, 2008). Sustainability issues have seen rising

interest and attention in the last few decades (Ali et al., 2016). Climate change has additionally propelled the sustainability agenda (Collins (2011); Casey and Sieber (2016); Nielsen et al. (2016); Amankwah-Amoah and Syllias (2020); Karji et al. (2020)). The world is not near to the environmental sustainability and it is getting worse (Howes et al., 2017). The greenhouse gas emissions are rising and have a negative effect worldwide; not isolated to simply one country or continent (Howes et al. (2017); Ismael and Shealy (2018); Yoshino et al. (2019)). The greenhouse gas emissions per capita produced in Kuwait is 53% more than in United States (Ismael and Shealy, 2018). Moreover, sustainability affairs are matter of concern for businesses as a result of increased global trade and growing strain on natural resources (Casey and Sieber (2016); Ali et al. (2016); Cai and Li (2018); Hermundsdottir and Aspelund (2021)).

Negative effects of construction industry

Furthermore, the construction has an enormous impact on the environment and society all over the world (Du Plessis (2007); Sev (2009); Collins (2011); Gan et al. (2015); Karji et al. (2020)). Cement production is the largest source of greenhouse gas emissions (Shafii et al., 2006). Likewise, construction is responsible for the greenhouse gas emissions and consumes half of all global resources (Sev, 2009). The negative effects of current construction methods can no longer be rejected (Pearce, 2008). Sustainability principles have not been comprehended fully by the construction experts and hardly any have converted it into the action (Abidin (2010); Collins (2011)). In addition, construction industry promotes non-sustainable activities and have significant impact on the built environment including the environmental, social and economic aspects (Gomes and da Silva (2005); Shafii et al. (2006); Du Plessis (2007); Robichaud and Anantatmula (2011); Darko and Chan (2017); Aghaegbuna et al. (2020)). In brief, construction activities have detrimental effects on the natural environment (Sev (2009); Collins (2011); Karji et al. (2020)). The objective of reaching green goals are still lagging behind using the existing sustainability practice in construction industry (Karji et al., 2020).

Lack of sustainability in project management

Meanwhile, integrating sustainability into the sustainable PM concept has been emphasized as a need in numerous studies (Chofreh et al., 2019). In Middle East and Northern African region, it has become a necessity for increasing the adoption of sustainable construction activities for attaining sustainable development goals (Ismael and Shealy, 2018). Furthermore, the existing PM frameworks do not consider the social and environmental aspects of sustainability, effectively (Labuschagne et al. (2005); Aarseth et al. (2017)). Similarly, traditional PM is not

appropriate for managing projects; necessitating the sustainability principles to be integrated into the PM concept (Chofreh et al., 2019). Likewise, conventional construction practices focus on cost, quality and performance concerns while sustainable constructions adds minimization of resource consumption, environmental degradation and a healthy built environment (Sev, 2009).

Lack of sustainable development

Nevertheless, sustainable development is a challenge (Aarseth et al., 2017). Accomplishment of sustainable development is a common problem encountered by developing countries (Shen et al., 2018). The implementation of sustainable solutions is not simple (Støre-Valen and Buser, 2019) and is still insufficient in developing countries (Durdyev et al., 2018). According to Abidin (2010), the green movement is still at its beginning in Malaysia. Likewise, Asia is far behind in the field of green energy as the fossil energy utilization still dominates in the region (Yoshino et al., 2019). Similarly, in developing countries, the perception of sustainability concept is deficient in the construction industry (Pham et al., 2020).

There are certain factors that hamper the implementation of sustainability. For example, sustainability is not viewed as a priority (Gomes and da Silva (2005); Serpell et al. (2013); Aleixo et al. (2018)). The social characteristics of sustainability are considered seldom (Labuschagne et al., 2005). In addition, sustainable construction outcomes can appear overly risky (Ismael and Shealy, 2018). The importance of sustainability concept and its associated research directions explored studies are inadequate (Chofreh et al., 2019). Moreover, the objectives of sustainable development are not efficiently addressed by current project lifecycle methodologies in developing countries (Gomes and da Silva (2005); Labuschagne et al. (2005)). The abstractness of the objectives linked to sustainable developments goals can be challenging to constructional experts; regarding how to obtain them (Ismael and Shealy, 2018).

Moreover, from my own working experience, sustainability is still not fully embraced in all businesses; especially in hotels and restaurants facilities in which at least I have worked. For example, not implementing energy saving applications or not efficiently recycling the waste are some typical examples. This inspires me to find the barriers which have hindered the incorporation of sustainability principles from the already existed research and the industries professionals' experiences, and how they can be overcome. This will help in integration of sustainability from the start of a project till its termination; a lifecycle perspective. Using the previous studies, experts' knowledge and from my own reflections and inspiration towards

sustainability, I intend to perform the research in finding the different barriers and drivers for the implementation of sustainable development. This headed to the formation of the research questions in the upcoming sub-section.

1.3 OBJECTIVE AND RESEARCH QUESTIONS

The objective of this research study is to find the factors that hampers the implementation of sustainability concept; aiming towards the understanding of how the organizations can overcome the barriers to carry on the sustainable development. As such, **the main research question** itself. To answer this main research question, sub-questions as the following will be analyzed;

RQ1. What are the different types of barriers that exist?

This question emphasized on finding the numerous barriers which obstruct the organizations to implement the sustainability practices. In addition, these hurdles are highlighted and grouped through various perspectives.

RQ2. What are the various kinds of potential drivers that can overcome the sustainability challenges?

The purpose of this question is to accentuate the potential significant sustainability drivers that can help in overcoming the sustainability barriers; accelerating the process of sustainable development.

RQ3. How are these barriers and drivers affecting the organization's financial resources?

The spotlight of this question is the economical aspect of sustainability. It aims to seek out the key sustainability elements impacting the organization's financial assets either negatively or positively.

These sub-questions show a logical way leading to the solution of the main research question with the purpose of promoting sustainability in an organization.

1.4 SCOPE OF STUDY

The scope of study mainly lies on the organizational perspective to identify and overcome the barriers for sustainable development. Barriers in the form of organizational factors (internal) to standards, frameworks, government laws and regulations (external) are all part of this research. The study focuses on all three pillars of sustainability, that is, economic, environmental and

social aspects. Additionally, these research questions facilitate in realizing the common principles involved in PM to achieve the sustainable development goals (SDGs) by United Nations (2015) and to promote the European Green Deal, 2019 by European Union.

Moreover, this research study also serves the purpose of illuminating the areas in PM; incorporating the sustainable practices to increase the returns on investment and positive impact on an organization and the society. Furthermore, it explores the stumbling blocks faced by the organizations to keep on with sustainable progression. In brief, it justifies the need to perform this research study due to lack of clear information from existing studies regarding overcoming the barriers for sustainable development. As mentioned by Ziolo and Sergi (2019), the investments in green infrastructure projects can be facilitated by recognizing the challenges related to sustainability. Additionally, to achieve long-term profitable business, it is important to reflect on and address the sustainability issues (Chawla et al., 2018).

To ensure the quality of research, interviews are conducted with experts working in different organizations. The initial goal is to gather the experiences and input from as many professionals as possible to compare the results of the literature findings with the industrial insight, eventually. This will serve as a basis for understanding the role of sustainability and its associated challenges from an organizational perspective.

Based on the results from the literature and conducted interviews, the research questions are analyzed, answered and discussed.

1.5 LIMITATIONS AND OUT OF SCOPE

Supply chain perspective including the transportation, is not considered in this study, focusing on the internal characteristics of a firm only. The reason for this restriction is to make sure that the research is performed merely from an organization's internal point of view. This resulted in purely organizational factors only, along with government laws and regulations associated with implementation of sustainability. In similar manner, different types of green technologies and their associated pros and cons are also not part of this research.

Moreover, the interviews are conducted online, digitally as it is not safe to perform the physical interviews in current circumstances, COVID-19 (coronavirus) pandemic, globally. Businesses are busy in handling this unfortunate scenario to avoid severe economic losses and health and safety of their employees as well. For that reason, it is decided to conduct interviews digitally and avoid getting in touch with the interviewees physically; saving time and safekeeping both myself and the interview objects too in this improper circumstances. Nonetheless, this does not

affect the outcomes of this study as the quality of the work is maintained throughout the research process.

1.6 STRUCTURE OF THE REPORT

The report starts with chapter 1 about the introduction which already have been explained. It is followed by chapter 2 which contains the methodology regarding how the literature is selected and the interview process. Chapter 3 contains the vital information in the form of theory required to gather the necessary information which falls under the scope of the study. The results from the literature reviewed in theory section and the conducted interviews are then compiled in chapter 4. These results are analyzed and discussed in chapter 5 to answer the research questions asked earlier in chapter 1. A conclusion is made in chapter 6 to complete the research study. Chapter 7 gives remarks about the future work which could further aid in elevating this research study and to further explore the restrictions which limited the scope of study initially. Finally, chapter 8 shows the list of references used in producing this research report.

In the next coming section, the means of obtaining the relevant information is described including the different types of the literature used in this work and the interview process as well.

2 METHODOLOGY

2.1 INTRO

The approaches to research are normally categorized as *qualitative, quantitative and mixed methods*. The differentiation between qualitative and quantitative research methods is often outlined in form of using words (qualitative) compared to numbers (quantitative). While the mixed methods reside in between; integrating the features of both the qualitative and quantitative techniques. In addition, qualitative research methods involve gathering qualitative data through observing a setting whereas quantitate research approach use collecting data quantitatively via tools and equipment (Creswell and Creswell (2017); Olsson (2020)).

Qualitative methods	Quantitative methods	Mixed methods
Emerging methods	Pre-determined	Both pre-determined and emerging methods
Open-ended questions	Instrument based questions	Both open- and closed-ended questions
Interview data, observation data, document data, and audiovisual data	Performance data, attitude data, observational data, and census data	Multiple forms of data drawing on all possibilities
Text and image analysis	Statistical analysis	Statistical and text analysis
Themes, patterns interpretation	Statistical interpretation	Across databases interpretation

Figure 1. Difference between qualitative, quantitative, and mixed methods. [Source: re-created, Creswell and Creswell (2017)]

According to Sparkes and Smith (2014), the qualitative research methods involve collection of data, ranging from the interviews (traditional methods) to the visual and the internet (novel methods). Furthermore, interviews can be conducted in terms of *structured interviews, semi-structured interviews, unstructured interviews and group interviews* (Sparkes and Smith (2014); Olsson (2020)). Each of these interview forms have their own strengths and weaknesses and their utilization is dependent on the context of the research study and desired data collection by the researcher (Sparkes and Smith, 2014).

Figure 2 below highlights the advantages and disadvantages of both the qualitative and quantitative analysis.

Qualitative analysis	Quantitative analysis
Advantages ▪ May possesses more richness of details ▪ Present more holistic viewpoints ▪ Provide deeper insight	Advantages ▪ Provide more data in a concise format ▪ Test relationship between variables ▪ Generalize findings to larger populations
Disadvantages ▪ Maybe less credible that hard facts ▪ Dependent on evaluator's biases and logics ▪ Takes more space to present evidence	Disadvantages ▪ Require statistical expertise ▪ Much information cannot be quantified ▪ Data may distort as well as reveal facts

Figure 2. Advantages and disadvantages of using qualitative and quantitative analysis. [Source: re-created, Olsson (2020)]

Based on Figure 1, Figure 2 and the nature of the intended research study, the methodology used in this study is built on the qualitative research approach; incorporating the interview data (semi-structured) along with the literature findings. This technique helped in collecting the required information needed to answer the research questions asked in the previous chapter.

2.2 PROCEDURE

The process of conducting this research is sub-divided into the two main tasks, that is, literature review and conducted interviews. In the following sub-sections, the means of carrying out these approaches are described and explained.

2.2.1 Literature review exploration

The literature reviews are normally grouped in form of *Narrative or Traditional Literature Review, Scoping Review and Systematic Literature Review,* based on the guidelines given by Olsson (2020). Green et al. (2006) also talked about these various forms of literature reviews. In addition, these guidelines by Olsson (2020) are built on the information given by Denyer and Pilbeam (2015) and Griffith University (2020).

According to Green et al. (2006) and Griffith University (2020), the systematic literature review engages a comprehensive, meticulous and explicit process to assess the relevant literature. It comprises a criterion to include or exclude the literature, search strategies, and use of multiple databases for a thorough understanding of the researched topic. Moreover, systematic reviews

involve a technique of replicable, scientific and transparent process in relation to traditional narrative reviews (Tranfield et al., 2003). Likewise, as referred by Green et al. (2006), qualitative systematic literature review is more robust as it encompasses scrupulous process of conducting the literature review in comparison to traditional, narrative reviews. Concisely, we can replicate the resourced literature database by ourselves by following the steps involved in systematic literature review.

Process of finding the literature

As mentioned earlier, the systematic literature review was performed to search the sourced material in this study involving different processes but in a systematic way. Initially, the literature was searched to find the fundamental understandings of PM, sustainability, sustainable development, and green construction using the appropriate keywords. For example, the strings used were 'Sustainability', 'Sustainable development AND Project management', and 'Green construction'. The time period applied for this purpose lie between 2003 and 2021. Subsequently, the search was boosted to find the function of sustainability reporting as well. Finally, the pursuit of literature finding was changed to find the barriers and drivers connected with sustainability by employing the same time span and relevant keywords.

An overall representation of the type of literature used in this study is given in Figure 3. This figure is adapted from the NTNU course 'TPK4420 Project Flexibility' by Olsson (2020). This model illustrates the quality of the literature used while writing a master thesis or a scientific report. Additionally, it shows various types of literature sources ranging from internet-sites (weak quality) to journals (good quality). By applying this model, an overview of the literature used in this study can be seen, showing the various resource material and their associated quality. In addition, the model solely considered the literature reviewed in the theory section only; excluding the sources used in writing this methodology chapter.

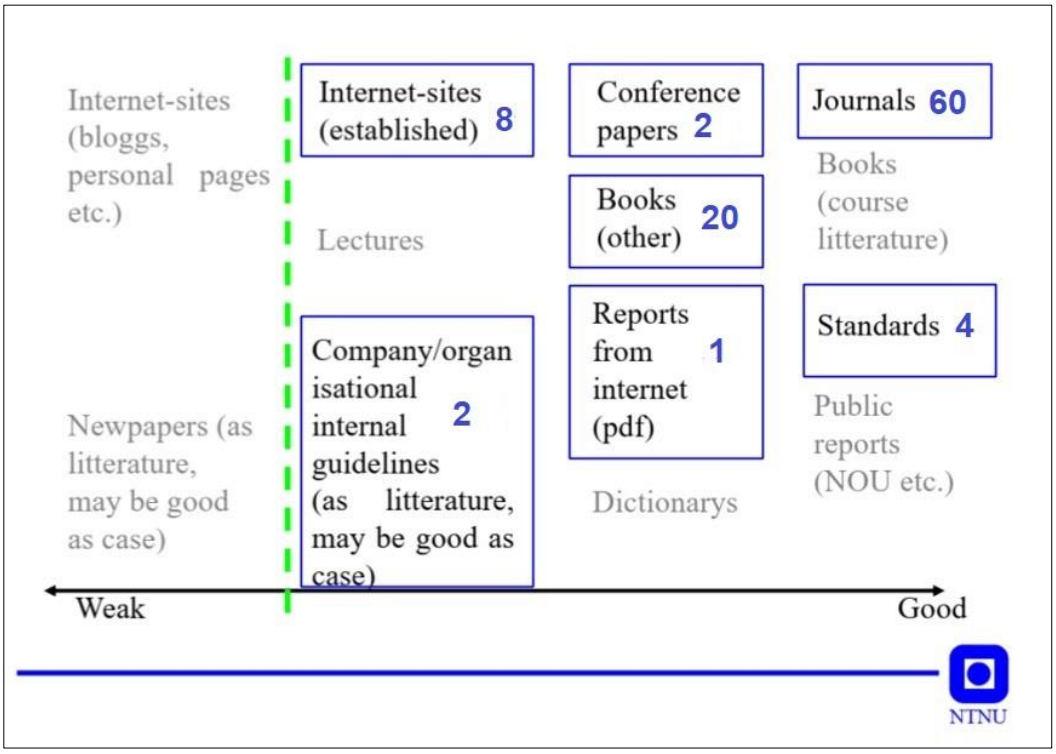


Figure 3. Profile of the type of literature used in the study. [Source: re-created, Olsson (2020)]

Moreover, the hunt of sourced material was skimmed by reading the *title, abstract* and in some cases *introduction* too. For example, type of green technologies and supply chain perspective including the transportation were irrelevant as they are out of scope of the research study. This resulted in 202 different literature from 411 various source of information retrieved, initially. In Addition, the searched literature was further evaluated and then discarded the ones which did not lie under context of this report; they did not help in answering the research questions asked earlier in this study report, that is, *irrelevant literature*. Finally, the remaining literature was thoroughly read and then carefully chosen the source material which fall under the scope of this work including the quality and information required.

Additionally, *snowballing and handsearching* techniques were also utilized simultaneously while reviewing the relevant sourced literature. Snowballing means referring to the reference list or citations of a paper to identify additional source material in a systematic literature review (Wohlin, 2014). Moreover, snowballing is inferred as a better approach for expanding the systematic literature studies compared to a database search (Wohlin, 2014). On the other hand, handsearching is a manual process of screening pre-selected literature for relevant source material that might have been missed during the indexing procedure (RUTGERS, 2020). The

aim of handsearching is to lessen the possibilities of key relevant studies getting neglected while performing the literature searching.

Figure 4 shows the overall picture of the steps involved in this process. This figure is adaptation of the guidelines made by Denyer and Pilbeam (2015). It illustrates a general flow of finding the sourced material. The process begins with the keywords searching and ends on the relevant literature which fall under the context of the research theme.

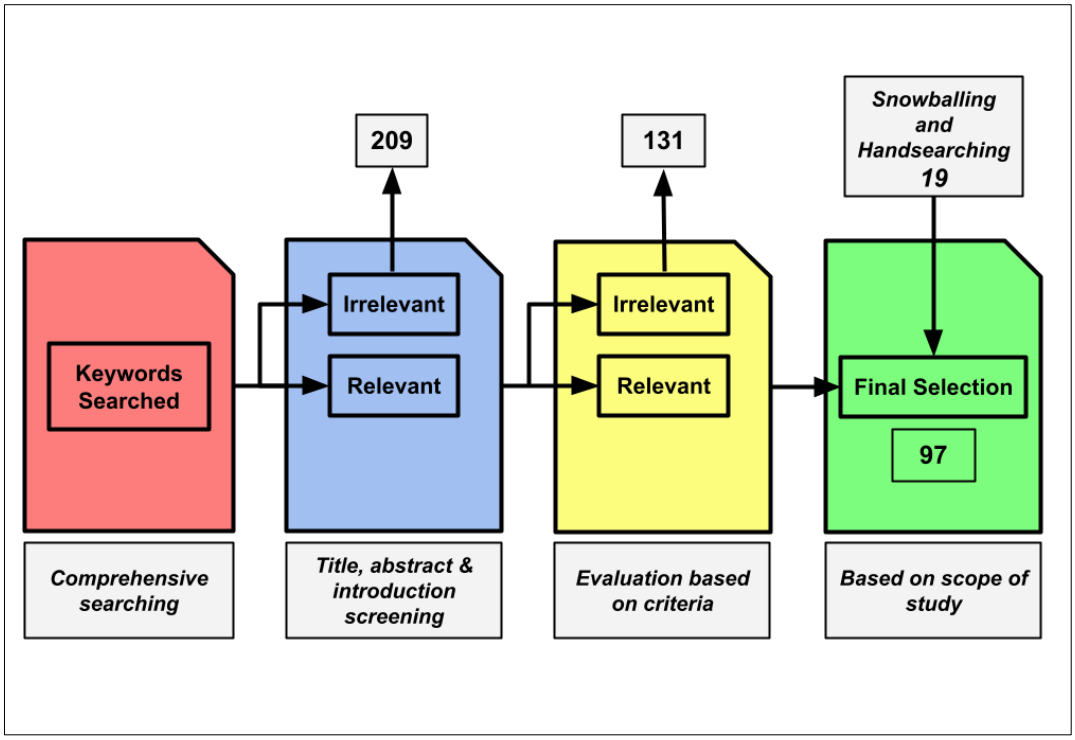


Figure 4. Overview of the phases involved in selecting the literature reviewed. [Source: own creation; adapted through Denyer and Pilbeam (2015)]

The implementation of these aforementioned approaches resulted in increased credibility of the resource database, that is, the literature used in this research. In addition, they lead to 19 more literature used in this report via snowballing and handsearching. An overview of the methodology information regarding the literature review is shown in Figure 5. This diagram in the form of a twister model portrays the literature *retrieved, reviewed, rejected, and selected* for this thesis. This twister model is built on the inspiration came from the methodology chapter work by Kristoffersen et al. (2020).

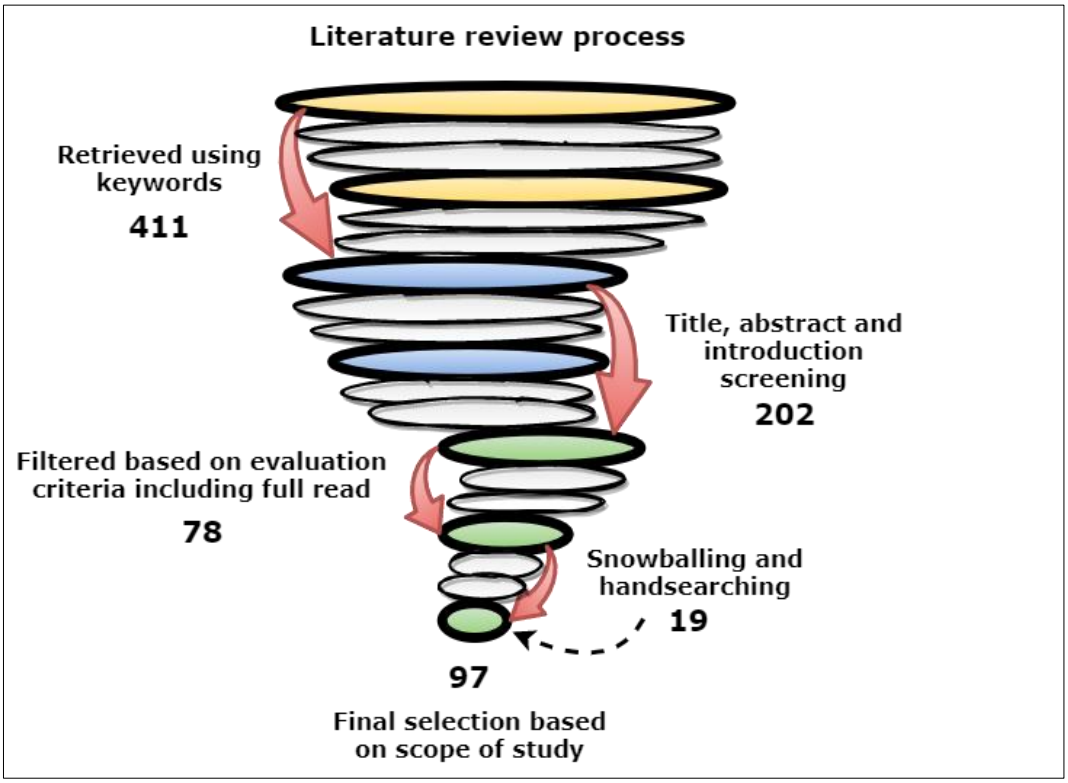


Figure 5. Twister diagram illustrating the process of finalizing the sourced literature. [Source: own creation; inspired from Kristoffersen et al. (2020)]

The information acquired through the reviewed literature is given in the following theory chapter; focusing on the salient features required to answer the stated research questions, later.

2.2.2 Interview process

The interview process involved contacting various professionals working in different organizations. However, it was not an easy task to do since it required the approval from the Norwegian Centre for Research Data (NSD) regarding collection of the personal data for research purposes. This prerequisite involved notifying the NSD about the research project and the objective of collecting the personal data. In this study, the personal data collected included the recorded digital interviews so that all the necessary information can be obtained. By doing this, the recorded information can be analyzed thoroughly and later utilized in the results section to answer the main research question asked earlier in this report. To get the approval from NSD, all the essential information about this research study was sent to the NSD including the interview guide and the information leaflet. The interview guide, shown in Appendix A, comprised of the questions asked in the interviews while the information leaflet contained the

necessary information about the research project including the privacy details and the consent form directed at the potential interview objects.

Once the approval was received from NSD in approximately two weeks, the search for finding and contacting the potential interview objects officially began. For this purpose, both my own and my supervisor's professional networks were used. In addition, relevant experts were also searched online using Google search engine and then afterwards contacted for participation in the research.

Structure of the interviews and relevant details

The type of interviews conducted in this research was in the form of semi-structured interviews. It involved a pre-planned interview guide including the open-ended questions as mentioned by Sparkes and Smith (2014). By doing this, the essential information about the area of interest, that is, the research theme, was collected as intended originally. Additionally, this approach allow the interview objects to be flexible so that they can reflect on their own thoughts, opinions and experiences (Sparkes and Smith, 2014). This aids in acquiring the additional information relevant to the research study which was not found in the reviewed literature; further justifying the research objectives.

Furthermore, the interviews were conducted digitally via Microsoft Teams ensuring that the personal data is stored securely on the NTNU's servers. The interviews on average lasted for almost 60 minutes, acquiring all the essential information crucial for the research. The shortest interview performed was around 30 minutes while the longest one reached 120 minutes. Nonetheless, the outcomes of the interviews were transcribed and sent back to the interviewees; guaranteeing that the transcribed answers were in connection with what the interviewed objects talked about. Even though the transcribing process takes on average about 5 hours per interview (90 hours in total), but it was a necessity to make sure the reliability and quality of the interview results. Eventually, these interviews outcomes are presented in the results chapter and further discussed in accordance with the research theme of this report.

Table 1 shows the information about the interview objects. The interviewee #1 was a pilot interview conducted with a firm from Pakistan. Based on the valuable feedback from the pilot testing, the rest of the interviews were conducted with the Norwegian organizations so that an overall impression about the sustainability barriers in different industries can be obtained; focusing on a Norwegian firm perspective. The size of the organization depends upon the number of employees classified by OECD (2017) as shown in Figure 6. Furthermore, the NACE

(statistical classification of economic activities in the European Community) codes were obtained using the Standard Industrial Classification 2007 (SIC 2007) by Statistics Norway (2016), and European Commission (2006). A total of 18 interviews were conducted including the pilot testing. Table 2 shows the description of the interviewed organizations based on the NACE codes. A zoomed version of Table 2 is given in the Appendix B.

COMPANY	EMPLOYEES
MICRO	1-9
SMALL	10-49
MEDIUM	50-249
BIG	250+

Figure 6. Size of an organization. [Source: OECD (2017)]

Additionally, the first columns of Table 1 and Table 2 showing the numbers, do not correspond to each other; meaning that the interview object #1 does not belong to the organization #1. This is done for the purpose of the anonymity of the interviewees so that by any means it is not possible to identify their identities.

Table 1. Description of the interviewed objects. [Source: own creation, based on interviews]

Interview object #	Role Description
1	Group leader - safety and security analysis
2	Central Chief Officer
3	Analysis Manager
4	Client Manager Health & Sustainability Manager
5	FM Expertchief
6	Responsible for sustainability
7	Consultant and senior advisor
8	Head of Sustainability
9	Communications and Sustainability Director
10	Senior Project Leader
11	Managing Director
12	Advisor for public procurement
13	Contract Manager
14	Sustainability consultant
15	Head of Sustainability
16	Construction development manager
17	Responsible for PM and BIM
18	Project leader Sustainability

Table 2. Description of the interviewed organizations. NA represents 'Not Applicable'. [Source: own creation, NACE codes obtained through European Commission (2006) and Statistics Norway (2016)]

#	Size of organization	NACE	NACE Industry Description				
			Sector	Division	Group	Class	Sub-class
1	Micro	94.110	Other service actitvities	Activities of membership organizations	Activities of business, employers and professional membership organizations	Activities of business and employers membership organizations	Activities of business and employers membership organizations
2	Micro	70.220	Professional, scientific and technical actvities	Activities of head offices; management consultancy activities	Management consultancy activities	Business and other management consultancy activities	Business and other management consultancy activities
3	Micro	NA	NA	NA	NA	NA	NA
4	Small	94.110	Other service activities	Activities of membership organizations	Activities of other membership organizations	Activities of other membership organizations	Activities of other membership organizations
5	Small	94.991	Other service activities	Activities of membership organizations	Activities of other membership organizations	Activities of other membership organizations	Activities of other membership organizations
6	Medium	71.129	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Other technical consultancy activities
7	Medium	71.129	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Other technical consultancy activities
8	Medium	70.220	Professional, scientific and technical actvities	Activities of head offices; management consultancy activities	Management consultancy activities	Business and other management consultancy activities	Business and other management consultancy activities
9	Big	NA	NA	NA	NA	NA	NA
10	Big	71.121	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Civil engineering activities
11	Big	81.101	Administrative and support service activities	Services to buildings and landscape activities	Combined facilities support activities	Combined facilities support activities	Caretaker services
12	Big	71.121	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Civil engineering activities
13	Big	41.100	Construction	Construction of buildings	Development of building projects	Development of building projects	Development of building projects
14	Big	84.110	Public administration and defence; compulsory social security	Public administration and defence; compulsory social security	Administration of the State and the economic and social policy of the community	General public administration activities	General public administration activities
15	Big	84.120	Public administration and defence; compulsory social security	Public administration and defence; compulsory social security	Administration of the State and the economic and social policy of the community	Regulation of the activities of providing health care, education, cultural services and other social activities; excluding social security	Regulation of the activities of providing health care, education, cultural services and other social activities; excluding social security
16	Big	18.110	Manufacturing	Printing and reproduction of recorded media	Printing and service activities related to printing	Printing of newspapers	Printing of newspapers
17	Big	81.109	Administrative and support service activities	Services to buildings and landscape activities	Combined facilities support activities	Combined facilities support activities	Other combined facilities support activities
18	Big	41.200	Construction	Construction of buildings	Construction of residential and non-residential buildings	Construction of residential and non-residential buildings	Construction of residential and non-residential buildings

Similarly, Figure 7 below shows the map of the industries with whom interviews were conducted. This figure is based on the last column of the Table 2, illustrating the companies in a simplified web view based on NACE codes sub-class description.

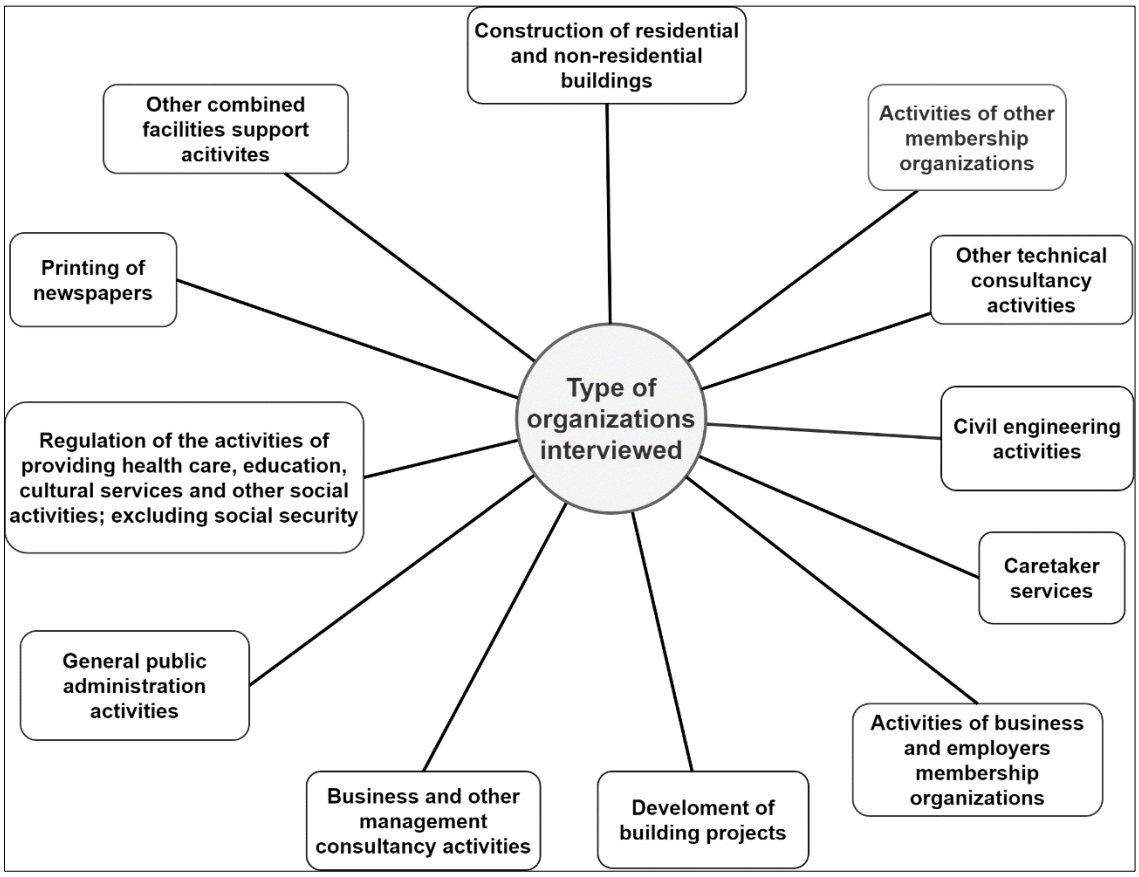


Figure 7. Web diagram showing the industries with whom interviews were conducted. [Source: own creation, based on NACE codes sub-class description]

2.3 SYNOPSIS

The methodology in this thesis is built on qualitative means in the form of systematic literature review and conducted interviews from professionals of different organizations. The goal of the literature review and interviews was to procure the knowledge about the selected research themes from existing studies and industrial insight. Moreover, NTNU's library search engine Oria including ScienceDirect and Google Scholar were primarily used to acquire the sourced literature. While the interviews were performed online using the Microsoft Teams.

In total, more than 400 literature were retrieved in the form of books, journals, articles, internet-sites and conferences. The keywords used as the main search strings for this objective were 'Sustainability', 'Green Construction', 'Sustainable Project Management', 'Sustainability

Barriers', 'Sustainability Drivers' and 'Sustainability Reporting'. Furthermore, the searched literature was then filtered to 202 based on the *title, abstract* and occasionally *introduction* screening. In addition, they were further skimmed to find the appropriate literature which falls under the context of this study, reducing to 78 in number. These resourced materials were comprehensively read including the snowballing and handsearching processes. Finally, the literature selected in this study turned out to be 97 in total, based on the scope of study. The time interval of the resourced literature lies between years 2003 and 2021; excluding the WCED (1987) report in conducting this research project.

On the other side, a total of 18 interviews were conducted in semi-structured form with experts working in different industry sectors. All the interviews were carried out digitally via Microsoft Teams. The outcomes of the interviews were transcribed, double-checked with the interview objects, and then finally used in the results chapter.

Both these methodology methods ensure the quality and reliability of the acquired information. In the following chapter, the procured information is emphasized; underlining the critical facts required to answer the main research question.

3 THEORY

A literature review has been performed to build an elementary understanding of the sustainability and its association with PM. The challenges related with implementation of sustainability have been highlighted along with the potential sustainability drivers to overcome them. In addition, the effects of sustainability on a firm's economic resources have also been explored.

3.1 SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

Sustainability is defined as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" by Brundtland Commission Report (WCED, 1987). Sustainability is comprised of three pillars: *economic, environmental and social* (Labuschagne et al. (2005); Zhang et al. (2011); Robinson (2012); Nielsen et al. (2016); Aarseth et al. (2017); Ziolo and Sergi (2019); Aghaegbuna et al. (2020)). Sustainability is a concept for thinking about the future in which environmental, societal and economic considerations are balanced in seeking an improved quality of life (UNESCO, 2019).

Moreover, the definition of sustainability is usually expressed as a *triple bottom line* as it takes into account the environmental, economic and social effects of development (Hodges (2005); Du Plessis (2007); Adams and Frost (2008); Sev (2009); Collins (2011); Cox et al. (2015); Gan et al. (2015); Casey and Sieber (2016); Kivilä et al. (2017); Martens and Carvalho (2017); Durdyev et al. (2018); Orji (2019); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Karji et al. (2020); Hermundsdottir and Aspelund (2021)). The term *triple bottom line* was first invented by John Elkington in 1994 (Henriques and Richardson, 2004). Sometimes, it is also referred to as the *three Ps*, that is, *people, planet and profits* (Henriques and Richardson (2004); Collins (2011); Silvius et al. (2012); Martens and Carvalho (2017); Hedstrom (2018); Karji et al. (2020)).

Furthermore, sustainable financing corresponds to financial services integrating environmental, social and governance criteria in business, investment decisions for the long-term benefits of customers and society. In addition, sustainable financing is a comprehensive method involving different strategies for improving the economic, environmental and social performance of the financial system (Ziolo and Sergi, 2019). An intergovernmental process was established to form a strategy for sustainable development financing at Rio+20 (United Nations, 2012).

3.1.1 Importance of sustainability

Sustainability has turned out to be an emerging goal for nations, enterprises and people (Ziolo and Sergi, 2019). Sustainability at its core is about building foundations for future success (Hedstrom, 2018). Sustainability is a path of meeting the needs while avoiding the negative impacts caused by traditional construction projects (Pearce, 2008). Sustainability in business operations have significant importance (Chawla et al., 2018). Businesses are acknowledging the significance of sustainability and are embracing it in their mission statement and corporate reporting (Ziolo and Sergi (2019); IMP (2020); Rubino and Veltri (2020)). Likewise, business sustainability is becoming a criterion for worldwide competitiveness (Labuschagne et al. (2005); Ziolo and Sergi (2019)).

Moreover, sustainability in business is gradually turning out to be the leading issue for researchers, experts and organizations all over the world (Walker et al. (2019); Manzaneque-Lizano et al. (2019); Hermundsdottir and Aspelund (2021)). There is a rising interest of developing the sustainable small and medium size enterprises (SMEs) (Manzaneque-Lizano et al., 2019). According to Eweje and Alakavuklar (2014), corporate social responsibility (CSR) and sustainability are becoming important worldwide concepts in international debates. In addition, increased competition due to globalization and new technologies are forcing the businesses towards green and sustainable value creation (IMP (2020); Hermundsdottir and Aspelund (2021)). As mentioned by Adams and Frost (2008), there are firms such as manufacturing, and energy and water companies, that are leading the way by influencing the society to be more eco-friendly. Sustainability is being pursued by the organizations because it is both *the right thing and the smart thing to do* (Stubbs and Cocklin, 2008).

On the other hand, countries all over the world are being pushed towards sustainable development due to the environmental emergency, globally (Cai and Li (2018); Ziolo and Sergi (2019)). Sustainability concept is popular and is being accepted worldwide (Walker et al. (2019). As a result, sustainability concept is increasingly recognized as a way to counter the consequences of negative externalities (Ziolo and Sergi, 2019). Organizations must make decisions in favor of the environment and society for its survival (Adams and Frost, 2008).

Implementing sustainable practices has various benefits. Sustainable development lead to a prosperous economy, a better society and a healthy environment (Howes et al., 2017). Similarly, organizations are aware of the various benefits linked with embracing sustainable practices in the form of economic, environmental and social rewards (Orji, 2019). Advantages such as *better quality and improved productivity, costs reduction, improved image and opening of new*

markets can be attained through sustainability (Mustapha et al. (2017); Orji (2019); Ziolo and Sergi (2019)). Likewise, implementing sustainability lead to *attract customers, cost savings, enhance the reputation of the company, provides ample opportunities* for firms to grow and achieve long-term *competitive advantage* as well (Casey and Sieber (2016); Amankwah-Amoah and Syllias (2020)). Nevertheless, sustainability concept need to be incorporated throughout the lifecycle of buildings to get the financial benefits and to contribute towards sustainable development (Sev (2009); Walker et al. (2019)). In addition, as mentioned by Shen et al. (2018), implementing green activities are affordable too.

However, sustainability is not only about the effects on atmosphere but also include its impact on economies and societies at macro level (Robinson, 2012). Welfare of the society is also pivotal for sustainable development (Sev, 2009). Sustainability is fulfilled only by concurrently safeguarding the environment, conserving the economic growth and advancement, and fostering equity; the *three E's* of sustainability (Heravi et al., 2015). Similarly, accomplishing sustainability goals is linked to all three pillars and the procurement in one dimension simply cannot and should not be achieved by sacrificing the others (Portney, 2015). Corporate sustainability embraces all three pillars of sustainability into the business decisions and practices of a firm along with safeguarding profitability (Hermundsdottir and Aspelund, 2021). Additionally, according to Mustapha et al. (2017), Japan and Singapore have embraced sustainable development activities without compromising any pillar of sustainability.

Furthermore, sustainable development should be viewed as *a holistic approach* (Zhou and Lowe (2003); Du Plessis (2007); Pearce (2008); Sev (2009); Collins (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Mustapha et al. (2017); Aleixo et al. (2018); Chawla et al. (2018); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Karji et al. (2020)). Likewise, in real estate, a more *holistic approach* including the need for collective understanding and common benchmark is required for sustainability (Walker et al. (2019).

Finally, *innovation* can deliver a solution to the environmental challenges (Orji, 2019). *Eco-innovation* can act as a *competitive advantage* for companies while pursuing sustainability under escalating environmental pressure (Cai and Li, 2018). Businesses can attain *competitive advantage, increase their market share and shareholders value by* incorporating sustainability (Labuschagne et al. (2005); Amankwah-Amoah and Syllias (2020)). Organizations are emphasizing sustainability as a result of *competitive advantage* and are being coerced from the

government and clients (Orji, 2019). A positive relationship exist between the sustainability innovation and the firm competitiveness (Hermundsdottir and Aspelund, 2021).

3.1.2 Sustainable development goals and green deal

Sustainability is often considered as a long-term goal while sustainable development implies to numerous processes and pathways to achieve it (UNESCO, 2019). Moreover, *"sustainable development is the overarching paradigm of the United Nations"* (UNESCO, 2019). In Rio 2012, United Nations (UN) held a conference on sustainable development, also known as Rio+20, initiating the process regarding the sustainable development goals (SDGs) (United Nations, 2012). This process lead to the formation of the *2030 Agenda for Sustainable Development*; containing the 17 SDGs at its heart, shown in Figure 8 (United Nations, 2015).

Figure 8. Sustainable Development Goals by UN. [Source: United Nations (2020)]

The 2030 agenda is an action plan to achieve sustainability worldwide (Blanco-Portela et al., 2018). Achieving the SDGs are of global importance (Ziolo and Sergi, 2019). The aim of *2030 Agenda for Sustainable Development* is to act as a plan of action for *people, planet and prosperity* (United Nations, 2015). Similarly, the SDGs are formed to reduce the poverty, protect the planet and ensure peace and prosperity for people all over the world (Blanco-Portela et al. (2018); Ziolo and Sergi (2019)). To achieve this purpose, 169 targets are set as well

besides 17 SDGs (United Nations, 2015). According to Walker et al. (2019), the 17 SDGs by UN act as a useful guide towards achieving sustainable real estate.

The importance of sustainability is additionally stimulated by the formation of *European Green Deal, 2019,* shown in Figure 9. According to the European Commission (2019b), the *European Green Deal* is a new growth strategy for European Union (EU), transforming EU into a '*modern, resource efficient and competitive economy; striving to be the first climate-neutral continent by 2050'*. Global warming in form of climate change and environmental degradation is an existing threat, challenge worldwide (Lai et al. (2012); European Commission (2019b); European Commission (2019a); Yoshino et al. (2019); Ziolo and Sergi (2019)). The *European Green Deal* is an action plan to make the EU's economy sustainable by converting the environmental and climate challenges into opportunities; aiming towards climate neutral by 2050, that is, zero greenhouse gases emissions (European Commission, 2019b).

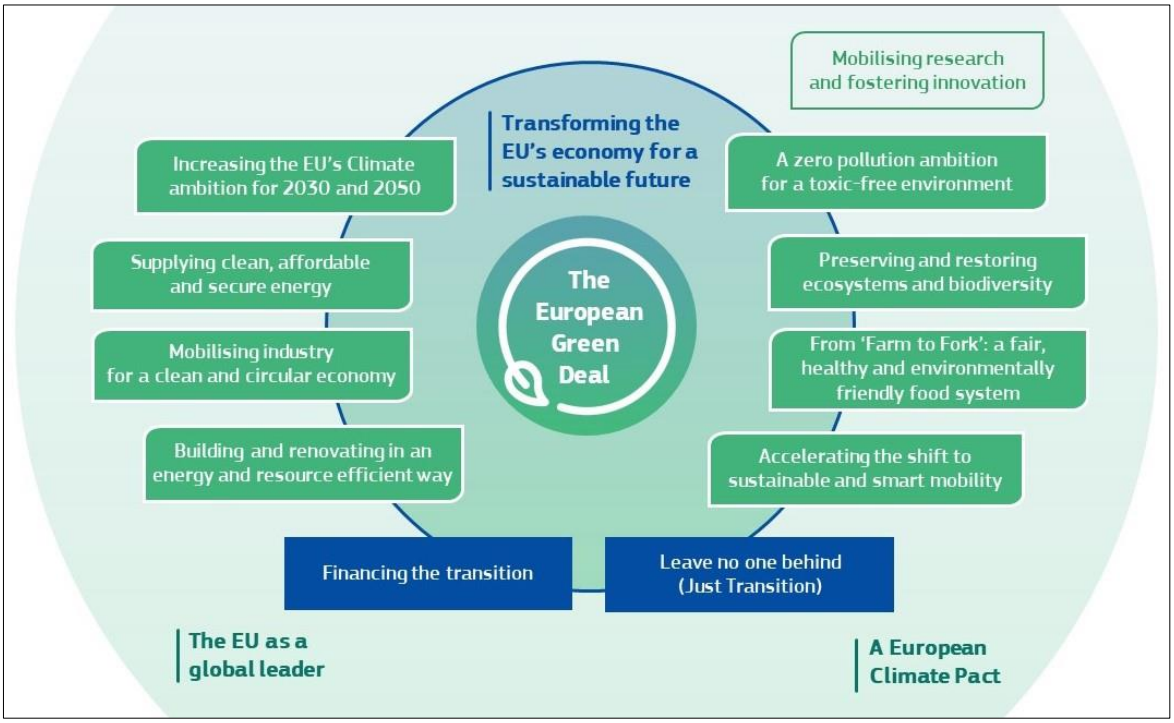


Figure 9. The European Green Deal. [Source: European Commission (2019a)]

The EU has established ambitious objectives regarding the sustainable development (Ziolo and Sergi, 2019). *Building and renovating* is one of the main policy areas of the *European Green Deal* (European Commission, 2019b). Furthermore, a *Sustainable Europe Investment Plan* will

be supplied to organize a minimum of *'One Trillion Euros'* in sustainable investments over the next decade for the achievement of the goals set by *European Green Deal* (European Commission, 2019b).

To conclude, the *European Green Deal, 2019* is a plan to make the EU sustainable by implementing the UN's 2030 Agenda for sustainable development including the SDGs; incorporating all pillars of sustainability.

3.1.3 Sustainable construction and green building

The construction industry is a critical factor for sustainable development because of its environmental and socio-economic effects (Zhou and Lowe (2003); Du Plessis (2007); Sev (2009); Serpell et al. (2013)). Construction industry is one of the main contributors to sustainable development; having significant importance in all three sustainability pillars (Sev (2009); Heravi et al., 2015; Karji et al. (2020)). Sustainable construction is a way of acting towards achieving the sustainable development and is being recognized by global construction industry (Zhou and Lowe, 2003). Construction alone is a huge segment of an economy; contributing to millions of jobs and a substantial GDP proportion in most countries (Zhou and Lowe (2003); Du Plessis (2007); Sev (2009)). Construction and real estate have the potential for achieving the sustainable development (Collins (2011); Zhang et al. (2011)). Additionally, the achievement of sustainability via real estate sector is widely recognized (Walker et al. (2019).

Furthermore, the efficient use of resources and reduction of environmental effects are fundamental elements of sustainable construction (Sev (2009); Serpell et al. (2013)). Construction firms worldwide have incorporated green concept into their construction plans to mitigate the negative effects on the environment (Hwang and Ng, 2013). According to Serpell et al. (2013), sustainability is a vital factor for the corporate image of Chilean construction firms. Likewise, the real estate is a key factor for transition to low-carbon economy (Walker et al. (2019). The built environment is the main provider to the economy and the employment (Aghaegbuna et al., 2020).

Sustainable construction was originally proposed by Charles Kilbert in 1994 in relation to a healthy built environment (Zhou and Lowe (2003); Du Plessis (2007)). Sustainable construction has surfaced as a subject of policy, research and innovation in UK during the last ten years (Zhou and Lowe, 2003). Likewise, sustainability has become an important consideration for construction projects, worldwide (Pearce, 2008). Sev (2009) proposed a framework for

sustainable construction including the principles focusing on *resource management, lifecycle design and design for human*. Similarly, sustainable construction integrates all of the principles of sustainability into the construction activities throughout the project lifecycle (Gan et al., 2015).

Moreover, the operations and management of buildings have fundamental importance on the building division, society and globally in relation to sustainability (Norman et al. (2010); Nielsen et al. (2016)). Traditional buildings have frightening impacts on the environment, economy and the society; necessitating the urge to move towards sustainable real estate (Walker et al. (2019). The construction industry consumes natural resources enormously (Karji et al., 2020). Buildings are responsible for the consumption of 40% of world's energy, 25% of water, 40% of natural resources and generating over 45% of global wastes and one-third of greenhouse gas emissions (Nielsen et al. (2016), Darko and Chan (2017)). Likewise, the real estate sector constitute a large proportion of the current global carbon footprint but it also has a huge potential for the carbon reduction as well (Walker et al. (2019).

Sustainability construction is primarily distinct in comparison to the traditional construction (Ismael 2018). Sustainability concept has begun implementing in construction projects by large developers (Abidin, 2010). Sustainable building development takes into account all three aspects of sustainability, that is, environmental, economic and social impacts (Darko and Chan, 2017). The construction must presume the crucial part for the achievement of sustainable development (Darko and Chan, 2017). Likewise, the sustainable development has shown a strong connection with the construction industry; resulting in economic growth, social progress and environmental impact, that is *the triple bottom line* (Durdyev et al., 2018). The construction sector's harmful effects on the environment, economy and socially have been tremendously decreased by the successful implementation of sustainable practices (Durdyev et al., 2018). Moreover, the sustainable construction lead to increased work productivity (Zhou and Lowe, 2003). According to Shafii et al. (2006), the goals of ASEAN Vision 2020 included the construction, focusing on natural resources and environment impacts. The fundamental transformation in the construction industry has turned out to be an ethical necessity (Du Plessis, 2007).

Green building construction phenomenon are becoming popular and continues to rise (Hwang and Ng, 2013). Sustainable real estate and green buildings have gained significant importance (Walker et al., 2019). Green buildings are getting embraced worldwide for sustainable development; reducing the operation cost, increasing the resource efficiency, improving the

built environment and reducing the stress on natural environment (Robichaud and Anantatmula (2011); Hwang and Ng (2013); Shen et al. (2018)). Green building is a feasible solution of fulfilling the need of a healthy built environment (Darko and Chan, 2017).

The advantages of sustainability and green buildings in facility management are well known (Hodges, 2005). Green buildings give value added benefits along with cost reduction benefits (Zhou and Lowe, 2003). Green materials utilization lead to energy efficiency and reduced pollution; decreased greenhouse gas emissions (Shen et al., 2018). Similarly, sustainable buildings incorporate activities that lead to decreased negative effects of its action on the environment and on human health (Walker et al., 2019). Business performance and organizational effectiveness are positively affected by green buildings (Zhou and Lowe, 2003). Green buildings can deliver a more healthier, comfortable working and living environment for inhabitants (Zhou and Lowe (2003); Darko and Chan (2017)). Likewise, besides reducing the harmful emissions, sustainable buildings also provide benefits in the form of socioeconomic and health perspective (Walker et al., 2019).

In short, green projects are the answer to accelerate the investments of non-bank financial institutions (Yoshino et al., 2019). Green financing has a global interest and positive impact on the environmental and social dimensions of sustainability (Ziolo and Sergi, 2019). The sustainable development provides the pragmatic way to the global green growth and the high employment (Yoshino et al., 2019). The promotion of sustainable buildings are shaping the practice of all businesses including the real estate towards more sustainable applications (Zhang et al., 2011). Sustainable real estate can help to form reasonable jobs by providing better working conditions and upgrading the workers' skills; improving quality of life and alleviating poverty in developing countries (Walker et al., 2019).

3.1.4 Sustainability reporting

Sustainability reporting as defined by Global Reporting Initiative (GRI) standards is "*an organization's practice of reporting publicly on its economic, environmental, and/or social impacts, and hence its contributions – positive or negative – towards the goal of sustainable development"* (GRI, 2016). Adams and Frost (2008) referred the incorporation of sustainability issues within the corporate reports as sustainability reporting. Corporate social responsibility (CSR) reporting is a concept related to the business where firms regulate their businesses to be socially accountable including the corporate governance, employees, product and environment, while improving the environmental and economic performance (Martens and Carvalho (2017);

Ziolo and Sergi (2019)). CSR is a corporate value and an essential part of the business strategy in many organizations (Collins, 2011). CSR is an important worldwide concept in international debates (Eweje and Alakavuklar, 2014).

Likewise, the environmental, social and governance (ESG) reporting includes issues such *as climate change and natural resource scarcity* (environmental), *labor practices, product safety and data security (social)* and *board diversity, executive pay and tax transparency (governance).* Furthermore, the ESG reporting has also other familiar names such as sustainability reporting, purpose-led reporting, CSR, and ESG risks and opportunities reporting (PwC, 2020).

To connect the businesses and investors on the economic effects of sustainability, the Sustainability Accounting Standards Board (SASB) provide the standards for this purpose. SASB standards fulfill the requirement for disclosing the ESG information tailor-made to investors (SASB, 2021). Sustainable financing is a broad concept integrating the ESG factors (Ziolo and Sergi, 2019). In contrast, GRI standards take into account all three dimensions of sustainability, that is, economic, environmental and social impacts of organizations (GRI, 2016). In September 2020, SASB along with other internationally leading framework and standard setting organizations (CDP, CDSB, GRI, IIRC) make a joint commitment towards working together on a comprehensive corporate reporting system (IMP (2020); SASB (2021)).

Why is it important?

The sustainability reporting is used by large array of constituencies, such as organizations, investors, policy makers, regulators, NGO and civil society, to inform a wide span of decisions and is more relevant than ever before (IMP (2020): SASB (2021)). Investors are taking a greater interest in sustainability and big companies have started to publish their own sustainability reports (Collins, 2011). Sustainability related reporting and accounting have received increased importance in the business (Rubino and Veltri, 2020). Likewise, the importance of ESG information has grown and is on the minds of the investors, corporates nowadays (Ziolo and Sergi (2019); PwC (2020)). ESG element is part of the investment strategies of 80% institutional investors (PwC, 2020).

Sustainability disclosure standards encapsulate *value creation* drivers that are not already showed in the annual financial accounts of an enterprise (IMP, 2020). The results by Adams and Frost (2008) showed that incorporating sustainability reporting lead to organization's *improved profitability, improved performance within the organization and attracting good*

staff, increase in staff pride in and loyalty to the company, reputational benefits, impact of reputation on share price, competitive advantage in the market place and improved social and environmental performance. Similarly, sustainability reporting give firms a *competitive advantage* (Collins, 2011). As mentioned by Klakegg (2015), establishing good governance and accountability are the main success factors for organizations. ESG exemplify the risks and opportunities effects on an organization's capability in relation to creating a *long-term value* (Ziolo and Sergi (2019); PwC (2020)).

Additionally, ESG reporting helps in *shining a company's name, improved reputation of a firm* (Ziolo and Sergi (2019); PwC (2020)) while suppressing the ESG information could result in damaging the company's valuation, financial acquisition, or its brand image in the market (PwC, 2020). ESG practices lead to *bigger profits* for a company (Ziolo and Sergi, 2019). The number of ESG investors including institutional investors have increased and they aim exclusively on sustainable companies (PwC, 2020). SASB standards tell about the *long-term enterprise value* driven by sustainability matters (SASB, 2021). SASB is a tool for investors to compare the sustainability performance of companies (Rubino and Veltri, 2020). In addition, the investors' decisions are based on the ESG information by firms (PwC, 2020). Likewise, ESG criteria are being incorporated increasingly in the investment decisions by members in financial markets (Ziolo and Sergi, 2019). Other stakeholders of the company such as suppliers, customers, employees and communities are also want to know about the organization's effort in relation to the ESG (PwC, 2020).

Furthermore, businesses are reporting information about their performance on sustainability topics (IMP, 2020). Sustainability performance reporting about the built environment is essential for database construction, regionally (Gomes and da Silva, 2005). Sustainability measures are incorporated into the internal performance measurement system to embed the sustainability mindset throughout the organization (Stubbs and Cocklin, 2008). Organizations are using the data collected for sustainability reporting to monitor the performance and reward the managers (Adams and Frost, 2008). Moreover, this initiative was started over the last three decades as a result of stakeholder-driven accountability action (IMP, 2020). The collected data also served the basis for more informed decision making (Adams and Frost, 2008).

According to IMP (2020), comprehensive corporate reporting system have seen acceleration over the last year due to the following three trends;

- there has been a rise in demand to understand the relationship between sustainability principles and financial risk and opportunity, besides contribution of business towards achieving the SDGs,
- there is increasing desire from regulators, policymakers, and the accounting profession to respond to this demand,
- the sustainability standard and framework setting organizations are collaborating towards providing a more comprehensive corporate reporting system.

Sustainability is about transparency and accountability (Silvius and Schipper, 2014). Transparency of activities of the members in a market is critical for a financial system to perform well (Ziolo and Sergi, 2019). GRI standards allow greater transparency and accountability of organizations (GRI, 2016). The sustainability disclosure and transparent measurement is deemed as an essential element of effective business management and serve as a trust aspect in business as well (Ziolo and Sergi (2019); IMP (2020)). Moreover, large proportion of organizations are required by law to report on sustainable activities (Walker et al., 2019). Big organizations such as Nestle, Nike and Shell have been pressured to respond to the concerns about environment and social impacts (Adams and Frost, 2008).

Moreover, governments and organizations worldwide have deepened the connection of financial systems with sustainable development including ESG criteria (Ziolo and Sergi, 2019). It is difficult for organizations to improve their sustainability performance without considering the data such as ethical, social, environmental and economic information into decision making processes (Adams and Frost, 2008).

In short, the incorporation of ESG aspects and sustainable development with corporate and investment decisions have crucial significance nowadays (Ziolo and Sergi, 2019).

3.2 PROJECT MANAGEMENT

A project is defined as a "*temporary endeavor undertaken to create a unique product, service, or result*" (PMI, 2017). Likewise, Samset (2010) stated project as ''*a means to achieve a goal by applying a certain amount of resources''*. According to Hussein (2018), there are numerous definitions of project depending on the diversity and multiplicity of the project's purposes. Projects can be regarded as *internal development projects* (internal projects of an organization) and *delivery projects* (projects organized for external customers) (Klakegg, 2015). Moreover, Hussein (2018) classify projects as *restructuring projects, construction projects, IT and*

software projects, product development and, research projects and studies. In an organization, projects are undertaken at all levels (PMI, 2017).

Furthermore, a project is a tool to achieve goals and objectives, and create more value (Klakegg (2015); Kivilä et al. (2017)). A project is viewed as an element of a bigger picture from a society viewpoint (Samset, 2010), illustrated in Figure 10.

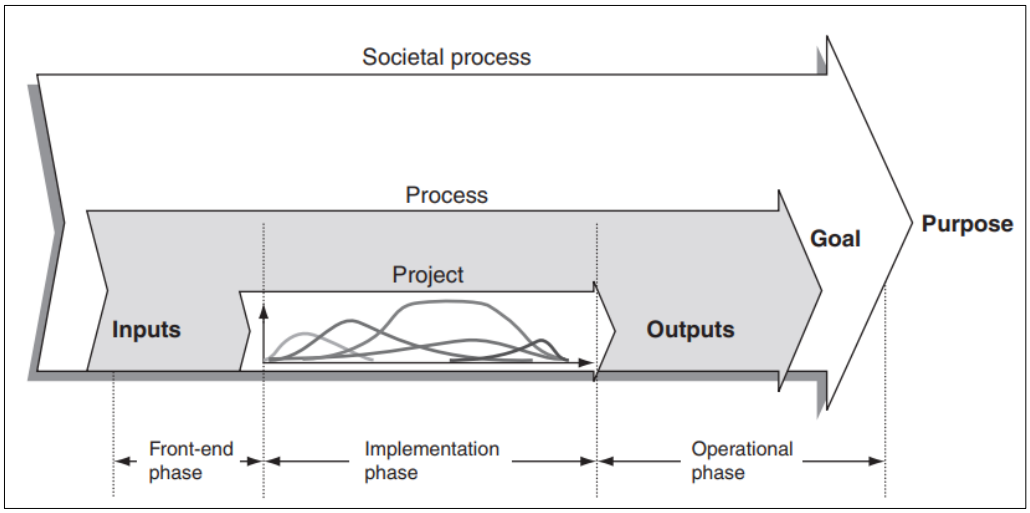


Figure 10. Project as an element of a bigger process. [Source: Samset (2010)]

But what is project management (PM)? According to PMI (2017), PM is defined as "*the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements*". PM is a core competency and an essential for the survival of business (Labuschagne et al., 2005). PM strives to accomplish the desired *time, cost and quality* specifications of the project (Hussein (2018); Aghaegbuna et al. (2020)). PM is intrinsic to construction projects (Aghaegbuna et al., 2020) as it increases organizational value through increased efficiency and effectiveness from the project's success (Badewi, 2016). Applying PM practices results in significant effects on both PM success and project investment success (Badewi, 2016).

Projects are becoming increasingly globalized as they result in substantial growth of the countries (Aarseth et al., 2017). The success of project is normally measured in the iron triangle, triple constraint, that is, *time, quality and cost* (Collins (2011); Ali et al. (2016); Badewi (2016); Chawla et al. (2018); Hussein (2018): Zwikael and Smyrk (2019)). Likewise, a project is a temporary enterprise with strict *time, cost and quality* objective (De Marco, 2018). The

achievement of these typical targets set by projects is the PM success (Badewi, 2016). But other new success measurement factors of project have also been looked over by various studies (Carvalho et al., 2015). For example, Samset (2010) pinned down the project success dynamics in terms of *efficiency, effectiveness, relevance, impact and sustainability*; a five success criteria.

A project consists of several processes throughout its lifecycle. These activities are reviewed in the following sub-section.

3.2.1 Activities involved in PM

Projects are a part of some business activity; in fact a business necessity that translates into project activity (Gurjar, 2016). The typical activities involve during the project lifecycle are *initiation, planning, execution, monitoring and control, and closeout* (Samset (2010); PMI (2017); De Marco (2018); Hussein (2018)). Additionally, the activities involved in PM are *decision making, problem solving, planning, scheduling, directing, coordinating, monitoring and control* (De Marco, 2018). Likewise, PM incorporates *planning, organizing and managing* resources to successfully fulfill the goals and objectives of a project (Collins, 2011). Furthermore, stakeholder management is a prime activity for a successful project (Eskerod and Huemann, 2013).

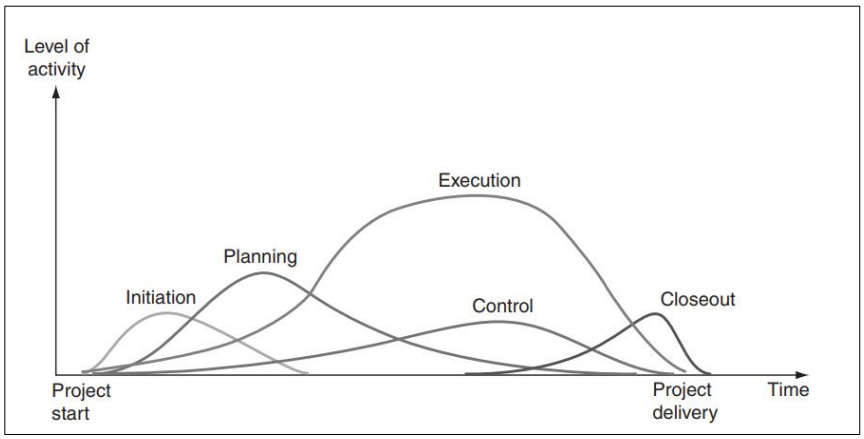


Figure 11. Processes involve during project lifecycle. [Source: Samset (2010)]

These project processes and their associated level of activity are shown in Figure 11. In addition, areas such as *risk management, stakeholder management, communications, human*

resources, procurement, quality, cost, time, scope and integration are also enlightened by PM (PMI, 2017).

Moreover, decisions made regarding sustainability at the initiation stage (front-end phase) of a project lifecycle have a far greater influence compared to decisions made at later stages; changes in project lead to significant increased cost throughout the lifecycle of the project (Samset (2010); Collins (2011); Hussein (2018)). Planning in the initial phase of construction projects such as *choosing procurement strategy, contractors and contract type selection*, are the key success factors (Hussein, 2018). Likewise, the benefits of early contractor involvement (ECI) in the early stages of project were also highlighted by Robichaud and Anantatmula (2011) and Wondimu et al. (2018).

In brief, all the above-mentioned activities have a significant position towards achieving a successful project. The importance of PM is viewed upon in the following segment.

3.2.2 Significance of PM

PM is a need and a core competency for the survival of business (Labuschagne et al., 2005). PM enables organizations to achieve their business goals and objectives while performing the projects efficiently and effectively (Crawford (2005); PMI (2017)). PM plays a crucial role for the application of sustainable practices in construction projects (Collins, 2011). Likewise, projects have a critical role in achieving more sustainable business habits (Silvius and Schipper, 2014). Challenges such as risk and uncertainty effects faced by project managers are reduced through PM; achieving the project's goals and objectives with limited resources (Geraldi et al. (2010); Kutsch et al. (2015)). Similarly, PM is a tool for reducing the risk of failed projects (Wirick, 2011). Large projects are typically more complex and strategic compared to small, simple projects (Klakegg, 2015). Interest in PM is growing swiftly (Thomas and Mengel, 2008) and PM is considered as a popular branch in the field of management (Gurjar, 2016).

The strategic value of PM enables the integration of environmental and social objectives into a lifecycle PM approach (Labuschagne et al., 2005). PM is perceived as a competitive edge in private sector (Wirick, 2011). Similarly, the strategic value of a project can be considered in terms of sustainability (Kivilä et al., 2017).

Managing projects is one of the functions of facility management (FM) and is deemed as explicitly essential (Roper and Payant (2014); IFMA (2018)). PM has relevance in several industries (Padalkar and Gopinath, 2016). In similar manner, public sector can be assisted to the varying environmental dynamics of operations through PM (Wirick, 2011). In addition, PM

has arisen as a profession to deal with the increased complexity and globalization issues, presently (Zwikael and Smyrk, 2019).

As a whole, this urges the demand to incorporate the sustainability in PM to achieve the SDGs by UN; further elevating the significance of PM.

3.2.3 Sustainable PM

Firms today are accountable for the consequences of the implemented project on the society, environment and economy (Labuschagne et al. (2005); Adams and Frost (2008)). Businesses are being forced to incorporate sustainability fundamentals and objectives into their policies and practices (Collins (2011); Aarseth et al. (2017)). Sustainable projects delivery are becoming progressively critical as stakeholders demand *ethicality, eco-friendliness, and economic efficiency* during a project's lifecycle (Kivilä et al., 2017). Sustainability in general and in project operations is an important issue to address in current times (Silvius and Schipper (2014); Chawla et al. (2018)). Because PM methodologies are also being pressurized to integrate sustainability (Aarseth et al., 2017). Moreover, all the three pillars of sustainability are equally important for achieving the goal of sustainable PM (Chawla et al., 2018).

Sustainability affects predominantly all activities involved in PM (Silvius and Schipper, 2014). Sustainability has a significant impact on PM activities (Chawla et al., 2018) and incorporating sustainability principles in PM is increasing (Aghaegbuna et al., 2020). Sustainable PM entails project managers to control and facilitate the project stages to acquire sustainable outcomes (Collins, 2011). The adaptation of sustainability in PM is associated with project lifecycle; *a holistic approach* (Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Gan et al. (2015); Aarseth et al. (2017); Kivilä et al. (2017); Chawla et al. (2018); Silvius and de Graaf (2019); Aghaegbuna et al. (2020); Karji et al. (2020)).

Firms need ways to integrate sustainability into PM activities (Kivilä et al., 2017). To integrate sustainability in PM, the companies need clear policies, procedures and liability towards them (Chawla et al., 2018). In addition, the elimination of waste in various activities such as *unnecessary change in plans and requirements, excess and unutilized resources, high waiting or lead times, over and underestimation of resources, substandard processes, redundant processes, inferior quality of products and over communications* is necessary for the sustainable PM (Chawla et al., 2018).

Business leaders today are more willing to achieve wider business profits including ethics and versatile values instead of attaining short-term project goals (Silvius and Schipper (2014); Chawla et al. (2018)). Delivering projects in sustainable way are regarded progressively indispensable as stakeholders call for *ethicality, eco-friendliness, and economic efficiency* throughout the life cycle of a project (Kivilä et al., 2017). In contrast, traditionally, PM was emphasized and strived towards accomplishing the desired time, cost and quality constraints of the project (Aghaegbuna et al., 2020). Green PM practices can deliver the sustainable construction projects within the permissible cost restraints while adding significant value to it (Robichaud and Anantatmula, 2011).

Accomplishing sustainability in PM is an important task; ensuring value and benefits realization in overall operations (Chawla et al., 2018). Sustainable PM is pivotal for infrastructure projects experiencing changes to the society and indulging associates with different interests and prospects (Kivilä et al. (2017); Chawla et al. (2018)). The research nowadays are focusing more on sustainability involving PM procedures (Silvius and Schipper (2014); Chawla et al. (2018)). In addition, Chawla et al. (2018) introduced seven critical parameters to gauge sustainability in the projects, namely;

- *profitability,*
- *safety,*
- *transparency,*
- *ethicality,*
- *nature friendly,*
- *social acceptability,*
- *fulfilling stakeholders and the customer's expectations*.

Sustainable PM should not be restricted to the planning and design stage only, it should incorporate the project execution and the project delivery stages too for a holistic evaluation (Chawla et al., 2018). Besides planning and design phases of project, the project execution stage is radically important for sustainable delivery of the projects (Kivilä et al., 2017). Incorporating sustainable construction involve integrating sustainability principles throughout the project lifecycle (Gan et al., 2015). Different industries use the stage gate, phase end framework of a project lifecycle as a baseline for sustainable PM (Labuschagne et al., 2005). Additionally, sustainability can be looked upon from two angles in projects: the sustainability in projects can be seen in form of the project delivery (the process) and the project deliverable (the product); a two angle perspective, that is, the process and the product (Kivilä et al., 2017).

As mentioned before, sustainability in PM necessitates *a holistic approach* (Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Gan et al. (2015); Aarseth et al. (2017); Kivilä et al. (2017); Chawla et al. (2018); Silvius and de Graaf (2019); Aghaegbuna et al. (2020); Karji et al. (2020)). Likewise, to integrate sustainability in PM, it requires three shifts: *a shift of scope in the management of projects, a shift of paradigm of PM and a mind shift for the project manager* (Silvius and Schipper, 2014). Moreover, sustainable development demands a paradigm shift in relation to the iron triangle approach of traditional PM (Collins, 2011).

Furthermore, Aarseth et al. (2017) identified eight sustainability strategies in PM related to *goals, supplier practices, project design, policies, project practices, sustainability-promoting actors, competencies and project portfolio management*. The highlighted strategies are

- *setting strategic and tactical sustainability goals,*
- *developing sustainable supplier practices,*
- *emphasizing sustainability in project design,*
- *setting sustainability policies,*
- *influencing sustainability of project practices,*
- *inclusion of sustainability-promoting actors in project organization,*
- *developing sustainability competencies, and*
- *sustainability-emphasis in project portfolio management.*

Similarly, Silvius and de Graaf (2019) pinpointed the dimensions of sustainability integrating into the PM such as

- *the specifications and design of the project's deliverable,*
- *materials used,*
- *benefits to be achieved,*
- *quality and success criteria,*
- *identification and engagement of stakeholders,*
- *the process of procurement in the project,*
- *development of the business case,*
- *the monitoring of the project,*
- *the identification and management of project risks,*
- *the communication in and by the project, and*
- *the selection and organization of the project team.*

Moreover, Martens and Carvalho (2017) identified four key factors of sustainability in PM as *stakeholder management, sustainable innovation business model, economic and competitive advantage, and environmental policies and resources saving*. Likewise, stakeholder management is linked with the frame of reference of sustainable development (Eskerod and Huemann, 2013).

The role of project manager is crucial for sustainable PM. For a successful project, a competent project manager is a key factor (Labuschagne et al. (2005); Klakegg (2015)). According to Collins (2011), experts of PM are pivotal to execute the sustainable practices across distinctive project phases. The responsibility of sustainability in a project is mainly distributed among the project manager and project sponsor; depending on the content and context of the project (Silvius et al., 2012). Likewise, project managers need to evolve their roles by managing the projects both efficiently and effectively with respect to sustainability, green construction projects besides fulfilling the traditional project management roles (Hwang and Ng (2013); Aghaegbuna et al. (2020)). Furthermore, policy makers need to underline the significance of sustainability by applying strict standards in design, procurement and construction contracts (Mavi and Standing, 2018).

To sum up all above, sustainability in PM demands *a holistic viewpoint, a lifecycle perspective* and the role of project manager is pivotal for the realization of sustainability in PM. Additionally, sustainability *adds value and benefits* to the projects (Abidin (2010); Robichaud and Anantatmula (2011); Hwang and Ng (2013); Silvius and Schipper (2014); Aarseth et al. (2017); Chawla et al. (2018); Silvius and de Graaf (2019); Aghaegbuna et al. (2020)).

In the following sections, the barriers and drivers related to sustainability implementation are highlighted. Inappropriate project organization structure is one of the main reason for the inability of PM to cope with sustainable measures (Gan et al., 2015). As mentioned by Serpell et al. (2013), understanding the factors that motivate the firms as well as overcoming the barriers that hinder towards sustainability are requisite to implement sustainability practices.

3.3 BARRIERS RELATED TO SUSTAINABILITY IMPLEMENTATION

The application of sustainability principles is low (Abidin, 2010). Sustainable activities are still not implemented by higher education institutes (Aleixo et al. (2018); Blanco-Portela et al. (2018)). Realization of a sustainable real estate sector on a global scale is not a minor activity (Walker et al., 2019). There are certain barriers that impede the organizational change towards sustainable development (Orji, 2019). Likewise, incorporating sustainability principles into the

construction projects and programs are difficult (Aghaegbuna et al., 2020). Sustainable construction accomplishment is complicated and difficult because of the unsolved technical issues beside social and economic conditions of developing countries. In addition, sustainable construction activities are greatly restricted to the size of the company and its core business (Serpell et al., 2013).

Numerous barriers have hindered the implementation of green building (Darko and Chan, 2017). Stewart et al. (2016) categorized the barriers that hinder sustainability implementation as *internal* (organizational related) and *external* (industrial related). The organizational barriers include *structural, political, human, and cultural dimensions* while the external barriers are *regulation, market, technology & tool, and value network*. Similarly, Pham et al. (2020) identified barriers in form of *incompetency of project managers, limited sustainable materials and technologies, maintaining the current practice and resisting the change towards sustainability, lack of government incentives, and low implementation level of sustainable practices*.

Likewise, the challenges are also related to *the lack of financial incentives, lack of integrated design, and affordability* (Serpell et al., 2013). Shafii et al. (2006) identified the *lack of awareness, training and education and ineffective procurement systems* as the major barriers for sustainable construction. According to Abidin (2010), sustainability implementation is low due to *lack of knowledge, poor enforcement of legislation, education vs experience and passive culture*. Moreover, factors such as *economic feasibility, awareness, support from project stakeholders, legislation and regulation, operability of SC, resource risk, and project management model* are critical towards incorporating sustainability practices (Gan et al., 2015).

Furthermore, *the lack of green materials and technologies* was also viewed as sustainability barrier (Gomes and da Silva (2005); Gan et al. (2015); Darko and Chan (2017); Karji et al. (2020)). Additionally, majority of the developing countries are facing the problems of *poverty and economy*, and safeguarding environment is not a *national priority* for them (Shafii et al. (2006); Du Plessis (2007); Serpell et al. (2013)). Similarly, *poverty* was also pointed out as a major barrier for sustainable development (Gomes and da Silva, 2005).

According to comprehensive review of various studies by Tokbolat et al. (2019), barriers to sustainable construction were grouped into factors such as *government, cost, knowledge and information, workforce, client and market*. Aleixo et al. (2018) identified barriers such as *lack of financial resources, lack of information and communication, lack of human resources, lack of commitment, initiatives and participation, lack of time, wrong conceptualization of*

sustainability, vertical and fragmented organizational structure, lack of instruments for sustainability and resistance to change. Likewise, Aghaegbuna et al. (2020) categorize the challenges in PM regarding sustainability principles as *planning-related challenges, project-related challenges, client-related challenges, project team-related challenges, labor-related challenges, and external challenges*.

Based on the information given above, there are several obstacles that hinder the achievement of sustainable development. These various barriers have been categorized and are further discussed in the upcoming sub-sections. Although most of the barriers are industry specific but they can be related to other industries (Orji, 2019).

3.3.1 Organizational factors

Organizational rigidity of the structure including the complex bureaucracy is an obstacle towards incorporating sustainability (Aleixo et al. (2018); Blanco-Portela et al. (2018)). Stewart et al. (2016) pinpointed internal factors that hinder the sustainability implementation in terms of

- structural dimensions (*lack of strategy, priority, lack of goal translation to functional, difficulty to define relevant sustainability performance metrics/perform reporting, lack of function integration, lack of clear responsibility distribution, difficulties related to decision making processes*),
- political dimensions (*difficulty to elaborate business case, conflict, low priority on agenda, lack of local empowerment, lack of R&D/innovative capabilities*),
- human dimensions *(lack of skills/knowledge/training, lack of involvement and empowerment, difficulties linked to learning process, fear of work overload and flexibility, lack of support from management for employees) and*
- cultural dimensions (*lack of entrepreneurial spirit, skepticism regarding potential benefits, sustainability is a distraction and not the company's responsibility, language barriers*).

In addition, there is *a lack of information* that restricts the companies towards sustainable construction (Serpell et al. (2013); Gan et al. (2015); Darko and Chan (2017); Durdyev et al. (2018)). Likewise, *the lack of complete record data* is a major hindrance to the carbon audit (Lai et al., 2012). According to the findings by Aghaegbuna et al. (2020), *the lack of information* among stakeholders was turned out to be the significant challenge. In the following sub-

divisions, various organizational factors that hamper the integration of sustainability have been highlighted to ease the understanding of the sustainability barriers in an organization internally.

Lack of priority and seriousness

Sustainability has not been a part of conventional business and sustainable construction is *not a priority* in various reported studies (Serpell et al., 2013). There is *low priority* on sustainability agenda (Stewart et al., 2016). In addition, there are *non-sustainable preferences by suppliers/institutional buyers* (Orji, 2019) as maximizing profits is the first objective corresponding to a traditional point of view of a firm (Manzaneque-Lizano et al., 2019). Due to competition, this lead the firms sometimes over consuming the natural, human and economic resources; resulting into a threat and challenge towards the overall sustainable development (Chawla et al., 2018). Similarly, sustainability is *not a first priority* among universities (Aleixo et al. (2018); Blanco-Portela et al. (2018)). Economic resources or personnel are not allocated to the sustainability projects as the management board does not perceive sustainability as *a priority* (Blanco-Portela et al., 2018). Sustainability is *a distraction and not the company's responsibility* (Stewart et al., 2016). As mentioned by Orji (2019), *resistance to organizational change and lack of appropriate response to new opportunities* lead to unsustainable conditions.

The environmental and social aspects of sustainability are not taken into consideration and not a priority for many organizations (Labuschagne et al. (2005); Abidin (2010); Collins (2011); Eweje and Alakavuklar (2014); Howes et al. (2017); Durdyev et al. (2018); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020)). Traditional core business strategies and management systems are driven towards financial performance indications compared to social and environmental aspects (Collins, 2011). In similar manner, *less attention* is paid to environmental and social performance as economic performance is the most important matter in present project feasibility practice (Gan et al., 2015). According to Orji (2019), firms put more emphasis on economic sustainability compared to environmental and social dimensions of sustainability. Measuring social aspect of sustainability is harder compared to economic and environmental dimensions (Collins, 2011). In addition, *high priority* is given to financial needs (Tokbolat et al., 2019). Likewise, the financial sector inappropriately consider the risks related to environmental and climate change (Ziolo and Sergi, 2019). However, according to Walker et al. (2019) and Hermundsdottir and Aspelund (2021), the main focus is on the environmental aspect of sustainability, neglecting the other two pillars.

Lack of capability

Lack of professional capabilities is another barrier for a sustainable built environment (Shafii et al. (2006); Lee and Kang (2013); Eweje and Alakavuklar (2014); Darko and Chan (2017); Durdyev et al. (2018)). Project stakeholders do not necessarily have the *requisite capabilities* for sustainable practice in relation to the existing green technologies (Shen et al., 2018). Employees *lack technical skills* and *have limited experience* related to green technologies and techniques (Hwang and Ng (2013); Aghaegbuna et al. (2020)). Similarly, Walker et al. (2019) and Gan et al. (2015) also mentioned about *lack of skilled, trained professionals* as a barrier. For example, *incompetent project managers* are significant barrier towards sustainable practices (Pham et al., 2020). In addition, *lack of skilled workers, green technologies and green product suppliers,* are also the highlighted barriers (Shen et al., 2018). As mentioned by Ziolo and Sergi (2019), *human capital* is significant for sustainable development.

Additionally, *lack of integrated design* is among the major barriers; not permitting the stakeholders and decision-makers to participate from the initial stage of the projects (Serpell et al., 2013). Organizations *face difficulty* in comprehending the green specifications in the contract details (Aghaegbuna et al., 2020). *Performance measurement systems and access to industry-specific information, benchmark or reference cases* are typical problematic themes (Stewart et al., 2016). The *uncertainty in performance along with limited options of green technology and materials* also discourages the sustainable construction adoption (Gan et al., 2015). In addition, *limited experience and input data* for lifecycle costing methods are also the identified challenges (Zhou and Lowe, 2003).

Big companies implement sustainable construction activities more often as they are *more aware* about the sustainability (Abidin (2010); Serpell et al. (2013)). Firms of infrastructure sector implement sustainable actives in more projects compared to building companies which are relatively smaller in size (Serpell et al., 2013). Sustainability concept is not fully accepted in the industry as small and medium enterprises (SMEs) are still not ready for the sustainability paradigm shift due to the *capital, experience and expertise* restrictions (Abidin, 2010). SMEs *lack organizational, financial and knowledge-related means* (Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019)). Likewise, SMEs *lack knowledge and expertise* connected with sustainability tools; *incapable* of fully capturing the sustainability benefits (Amankwah-Amoah and Syllias, 2020). Big companies can practice sustainability due to their strong financial resources, large variety of expertise and experience and their market compared to small firms

(Abidin, 2010). SMEs are more dependent on external resources due to *lack of critical resources* internally, in relation to the big firms (Manzaneque-Lizano et al., 2019).

Lack of scope, policies and strategies

Generating a shift in business practices and corporate culture is necessary for implementing a business model (Høgevold et al. (2015), cited by Stewart et al. (2016)). The *business case* for sustainable construction is still *fragile* (Du Plessis, 2007). Sustainability has not been incorporated by most organizations into their core management systems (Collins, 2011). There is *failure of sustainability policy* to convey corporate dedication (Stewart et al., 2016). There is *no clear strategy* about promoting sustainability in higher education institutes (Aleixo et al., 2018) and there is *lack of recognition* of sustainability (Blanco-Portela et al., 2018). Similarly, *insufficient policy implementation efforts, lengthy planning and approval process, unfamiliarity with green technologies, technical difficulty during construction process, lack of efficiency for implementing green building regulations* are also the listed barriers (Zhang et al., 2011). Likewise, the *lengthy approval process for new green technologies and recycled materials* further hampers the integration of sustainability (Hwang and Ng (2013); Aghaegbuna et al. (2020)). The corporate governance in many organizations *does not enforce* sustainable practices (Collins, 2011). Moreover, SMEs *rarely have social or environmental polices* unlike large firms (Amankwah-Amoah and Syllias, 2020).

Additionally, *lack of employee welfare package* was also identified as a barrier to organizational change for sustainability (Orji, 2019). *Heavy work commitments and lack of sponsorship* from employers lead to rare education and training in sustainable construction (Gan et al., 2015). In similar manner, *lack of worker's training and inefficient environmental competencies* were also identified as hindrances towards sustainability (Orji, 2019). Likewise, *lack of training, education and specialization in sustainability* for professionals is another major challenge (Collins (2011); Aleixo et al. (2018); Blanco-Portela et al. (2018); Shen et al. (2018); Tokbolat et al. (2019)). There is *lack of institutional framework* for sustainability (Blanco-Portela et al., 2018). Furthermore, many firms have not devoted significant attention towards ESG factors and are *lacking* ESG related communication with investors (PwC, 2020).

Moreover, *lack of long-term planning, systemization and continuity* also exist as a barrier towards sustainability (Blanco-Portela et al., 2018). In addition, firms use the application of discounting in financial assessment which supports short-term policies and discourages long-term investment (Zhou and Lowe, 2003). In short, there are *inadequate proactive plans* to ensure sustainable development (Orji, 2019).

3.3.2 Time and financial constraints

The implementation of sustainable practices faces both time and financial constraints, and they are considered as the major barriers in numerous studies. These restrictions are further highlighted individually in the following sub-sections.

Financial restrictions

Finance is seen as the top most barrier in promoting sustainability initiatives (Aleixo et al. (2018); Karji et al. (2020)) and is a major barrier towards green energy expansion in Asia (Yoshino et al., 2019). Additionally, the *financial constraints* are identified as barrier to organizational change for sustainability (Lee and Kang (2013): Orji (2019)) and economic factors are the primary cause of *policy failure* regarding the environmental sustainability (Howes et al., 2017). Sustainable construction projects *cost more* than traditional ways (Collins (2011); Shari and Soebarto (2012); Serpell et al. (2013); Gan et al. (2015); Durdyev et al. (2018); Shen et al. (2018); Støre-Valen and Buser (2019)). Similarly, owners view green projects as *more costly* (Collins (2011); Shari and Soebarto (2012); Karji et al. (2020)). Green projects *cost more* to construct due to *higher material cost, equipment and practices* (Zhang et al. (2011); Hwang and Ng (2013); Aghaegbuna et al. (2020)). *Higher costs* have hampered the implementation of green technologies in China (Zhang et al., 2011). Furthermore, the *economic benefits are low* in relation to investment and operational cost (Klakegg, 2015).

Moreover, *high initial investment, additional costs and affordability* are also regarded as significant barrier to green energy, sustainable buildings (Collins (2011); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Gan et al. (2015); Darko and Chan (2017); Støre-Valen and Buser (2019); Walker et al. (2019); Yoshino et al. (2019); Pham et al. (2020)). These *additional costs* put tremendous pressures on the organizations and owner profits (Gan et al. (2015); Amankwah-Amoah and Syllias (2020)). Similarly, businesses and governments considered eco-innovation as *an increased investment costs* factor only (Cai and Li, 2018). Developers are reluctant to take up sustainability in projects due to *constrained knowledge and cost concern; more upfront costs* (Zhou and Lowe (2003); Pearce (2008); Abidin (2010)). The *additional cost and the extra time cost* of green property projects compared to traditional projects is major a hindrance towards sustainable development (Zhang et al., 2011). Likewise, the *financial pressure* in form of *long payback period, high initial cost and high expense* of preparing documents for green building certification is a significant obstacle (Shen et al., 2018).

Besides, there is a *wrong assumption* among people that environmentally friendly options are *more expensive* compared to traditional choices (Adams and Frost (2008); Aghaegbuna et al. (2020)). *Perception of higher costs* associated with sustainable construction are the major barrier for its implementation (Zhou and Lowe (2003); Shafii et al. (2006); Pearce (2008); Abidin (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Serpell et al. (2013); Shen et al. (2018); Aghaegbuna et al. (2020)). Likewise, the *perceived high cost* of switching to green energy to replace fossil energy was also highlighted by Yoshino et al. (2019).

Furthermore, *the lack of support from financial institutions* prevents organizations in effectively managing their sustainability duties (Gan et al., 2015). Banks contemplate most of the renewable energy projects to be *risky with low rate of return* on investment (Yoshino et al., 2019). According to Aleixo et al. (2018), *lack of financial resources and funding* are among the most important barriers towards implementing sustainable practices in higher education institutes. Moreover, SMEs face problems regarding the *lack of access to financial credit* (Manzaneque-Lizano et al. (2019); Amankwah-Amoah and Syllias (2020)). As mentioned by Gurjar (2016), it is vital to have adequate money to complete the project at hand from a project manager's point of view. The access to financial support is crucial for the firm in overcoming the financial susceptibility conditions (Manzaneque-Lizano et al., 2019).

Additionally, green agenda implementation lead to *increased risks, higher capital cost and financial support* problems (Zhou and Lowe, 2003). There are *risks and uncertainties* involved with green projects application; resulting in *cost overruns* (Shari and Soebarto (2012); Hwang and Ng (2013); Aghaegbuna et al. (2020)). *Cost overruns* are frequent in most of the projects (Gurjar (2016); Chofreh et al. (2019)). The *uncertainty and risk* in projects have a significant impact on accomplishing project objectives (Geraldi et al. (2010); Chawla et al. (2018)). The *uncertainty* is real and it is difficult to look into the future (Klakegg, 2015). In addition, the predictability of *unforeseen situations* are even less in green projects compared to traditional construction projects (Hwang and Ng (2013); Aghaegbuna et al. (2020)). Moreover, the *overestimation of cost* related to sustainable construction also obstructs the implementation of green buildings (Zhou and Lowe, 2003).

In short, owners prefer to earn huge profits on traditional buildings instead of bearing the *additional costs* related with sustainable construction (Gan et al., 2015) and the associated *cost premium* for sustainability entirely filter the projects from consideration (Pearce (2008); Robichaud and Anantatmula (2011); Darko and Chan (2017)).

Time limitations

Sustainable activities are *long-lasting* (Casey and Sieber, 2016). *More time* is required to implement green construction practices compared to traditional construction projects (Hwang and Ng (2013); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)); leading to relinquish of sustainable activities due to the *time pressure* (Hwang and Ng, 2013). Similarly, sustainable practices are *long-lasting and complex; locked-in situation related to capital/technology investments, lack of time and financial resources* (Stewart et al., 2016). In addition, the *lengthy approval process and longer time during pre-construction* also hindered the sustainability implementation (Aghaegbuna et al., 2020). In short, sustainable construction is a *long-term view* (Zhou and Lowe, 2003).

Furthermore, the *long payback period* is a significant barrier towards embracing sustainable construction (Gan et al. (2015); Darko and Chan (2017); Durdyev et al. (2018)). The *payback period is excessive and unattractive* to property developers (Zhang et al., 2011). Moreover, the advantages of sustainable construction are *long-term and intangible* (Robichaud and Anantatmula (2011); Gan et al. (2015)). The *inability* to capture benefits of sustainability including the *short vision trend* of companies tends to make decisions based on initial investment, average costs and payback period (Gomes and da Silva (2005); Zhang et al. (2011)). Moreover, clients and developers aim for *short-term* economic returns rather than *long-term* (Zhou and Lowe, 2003). Clients are not interested in sustainability features unless it lead to *immediate returns on investment*, for example, energy efficiency aspects (Shafii et al., 2006). Likewise, business leaders and politician find it hard to think two or three years ahead; creating a challenge towards sustainable development (Henriques and Richardson, 2004). People are driven by *short-term* desire to make money (Robinson, 2012). Owners prefer *upfront* savings instead of *long-term* savings (Karji et al., 2020). Similarly, organizations are focused on *short-term* profits (Aleixo et al. (2018); Ziolo and Sergi (2019)). But positive financial effects are not shown up *instantaneously* (Hodges, 2005). It is difficult to achieve financial benefits in the *short-term* (Cai and Li (2018); Amankwah-Amoah and Syllias (2020)).

In brief, economic aspects including the *higher cost of sustainable building option and longer payback periods* are the top most barriers of sustainable construction (Tokbolat et al., 2019). Sustainable development is a *long-term process* (Ziolo and Sergi (2019); Aghaegbuna et al. (2020)) and *short-term* investment decision making is a major barrier for sustainability (Ziolo and Sergi, 2019).

3.3.3 Lack of knowledge and awareness

Sustainability barriers are further linked to the *insufficient knowledge and awareness* about the sustainability concept. This obstacle is further characterized as the following.

Lack of understanding and awareness

Lack of knowledge and understanding are key obstacles towards incorporating environmental and social considerations into decision making (Adams and Frost, 2008). Buyers are still *unaware* of sustainability (Abidin, 2010). There is *lack of understanding* of the need to sustainable design is the most important barrier (Shafii et al., 2006). In addition, there is *lack of technical understanding among project team members* (Shari and Soebarto, 2012). It is *difficult to understand* how to practice the sustainable activities (Lee and Kang, 2013). Likewise, the *lack of knowledge and awareness* on sustainable construction projects among stakeholders reduced the implementation of sustainable practices (Collins (2011); Serpell et al. (2013); Gan et al. (2015); Darko and Chan (2017); Durdyev et al. (2018); Aghaegbuna et al. (2020); Karji et al. (2020)). Moreover, the *lack of awareness, understanding and knowledge, and uncertainty about the sustainability topic* were also highlighted as barriers by Lee and Kang (2013) and Stewart et al. (2016). The *limited understanding* of sustainability hampers the implementation of sustainable PM in organizations (Chofreh et al., 2019).

Awareness and knowledge are vital for sustainable construction implementation (Shafii et al. (2006); Abidin (2010); Karji et al. (2020)). *Failure to take a holistic perspective* by participants is also acts as a hindrance towards implementation of sustainable practices in project (Collins, 2011). Similarly, there is *lack of awareness* amongst stakeholders as they are *not aware* of the advantages of incorporating sustainability (Shari and Soebarto (2012); Orji (2019); Støre-Valen and Buser (2019); Karji et al. (2020)). Clients are *not aware* of the meaning of sustainable building and impacts (Gomes and da Silva, 2005). Customers *lack awareness* of the long-term benefits of sustainability (Støre-Valen and Buser, 2019). Similarly, sustainability *knowledge* is still *confined* within academics with *little awareness* among construction stakeholders (Gomes and da Silva, 2005). Owners and designers are perceived *more knowledgeable and interested* about sustainability compared to contractors. As a consequence, the attainment of sustainable construction becomes enormously limited as developers are responsible for relevant projects (Serpell et al., 2013).

The *lack of knowledge and awareness of green technologies* are a challenge towards green buildings implementation (Zhang et al., 2011). Similarly, employees are *unaware* of the correct

methods and procedures (Hwang and Ng (2013); Aghaegbuna et al. (2020)). Firms are *struggling* with regarding putting sustainability principles into the practice (Collins, 2011). The low-level consciousness of sustainable construction is caused by *lack of knowledge and information* (Gan et al., 2015). Moreover, there is *lack of education, limited knowledge and poor understanding of economic benefits* of sustainable practices which hinders the sustainability incorporation (Zhou and Lowe (2003); Gan et al. (2015); Tokbolat et al. (2019)).

Contested concept

Sustainability concept is still relatively *new* among the construction industry in developing countries (Shafii et al. (2006); Gan et al. (2015)). The meaning of sustainability principles are still *not understood* by many construction experts (Abidin (2010); Collins (2011)). Likewise, sustainability is a *newly* arrived topic in the PM literature (Aarseth et al., 2017). Moreover, there is an *ambiguous understanding and definition* of sustainability; not fully understood (Aleixo et al., 2018). According to the survey by Abidin (2010), respondents *only understood the sustainability being an environmental aspect*; social and economic pillars were missing from their understanding of sustainability. As mentioned by Collins (2011), sustainable has become a *buzzword* and is *interpreted differently* by everyone.

Sustainability is a *complex concept and process* which is not simply easy to define (Zhou and Lowe (2003); Portney (2015); Aleixo et al. (2018); Chofreh et al. (2019)). The interpretation of sustainability concept is *contentious* (Du Plessis, 2007) and remains as an *ambiguous concept* (Aarseth et al., 2017). According to Sev (2009), sustainability is an *oxymoron and widely contested term* to conceptualize. According to critics, sustainability is *an arbitrary and fuzzy concept* (Collins, 2011). Similarly, the definition of sustainable construction is still *vague, diverse and contradictory* (Gan et al., 2015). According to Aleixo et al. (2018), *different perspective, beliefs and values* have an effect on the meaning of sustainability. In addition, research related to sustainability innovation are often concise to *environmental improvements only*; resulting into a *one-dimensional* concept (Hermundsdottir and Aspelund, 2021).

To be brief, the *lack of knowledge and awareness* are considered as one of the most important barriers (Tokbolat et al., 2019). The *lack of knowledge* about sustainability principles and practices lead to difficulties such as *major costs increase, project delays, quality compromises, poor working relationships, and poor implementation of sustainable activities and financial feasibility of sustainable projects* (Aghaegbuna et al., 2020).

3.3.4 Stakeholders' perspective

Stakeholders play a crucial role in moving towards sustainable development (Walker et al., 2019). Gurjar (2016) defines stakeholders as *"individuals who represent specific interest groups served by the outcomes and performance of a project or program"*. Normally, the stakeholders are *employees and other workers, shareholders, suppliers, vulnerable groups, local communities, and NGOs or other civil society organizations, among others* (GRI, 2016). According to Serpell et al. (2013), main stakeholders of the construction industry are *clients, material's manufacturers, developers, designers or consultants, constructors, research institutions, governmental offices and regulatory bodies.* Additionally, the *interests* of stakeholders can be both positive or negative in relation to the project (Gurjar, 2016).

To achieve sustainable construction, all of the stakeholders' *involvement and commitment* is essential (Gomes and da Silva (2005); Shafii et al. (2006); Collins (2011); Abidin (2010); Serpell et al. (2013)). Furthermore, the *non-integration of all stakeholders* restricts the application of sustainable activities because traditional PM is unable to cope the complexity and dynamics of decision making processes involving stakeholders (Serpell et al., 2013). In the following sub-sections, the stakeholders' element regarding acting as sustainability barriers are highlighted.

Lack of demand from clients

Clients play a critical role towards implementation of sustainable construction (Serpell et al., 2013). Building design experts are now embracing sustainable design in response to the *clients' expressed interest* (Shafii et al., 2006). However, *the demand* for sustainable construction is *low* (Zhou and Lowe, 2003). There is *lack of demand* from clients, owners regarding sustainable activities (Darko and Chan (2017); Durdyev et al. (2018); Karji et al. (2020); Pham et al. (2020)). The *lack of market demand* is a challenge towards integrating sustainability principles (Støre-Valen and Buser (2019); Walker et al. (2019)). Likewise, the *client-related challenges* related to green buildings are in the form of risk, time, budget and special requests (Hwang and Ng (2013) and Aghaegbuna et al. (2020)). In addition, clients see *little or no reward* for implementing sustainable activities (Karji et al., 2020).

Furthermore, customers want *cheap and affordable* houses (Abidin, 2010). Clients believe that sustainable construction has both *high cost and risk*, and are *unwilling* to accept them (Zhou and Lowe (2003); Shafii et al. (2006)). Additionally, *more attention* is paid to the price rather than quality and function of the building by customers (Gan et al., 2015). Likewise, customers

of larger projects demand more sustainable projects as they are more aware of environmental effects relative to smaller projects customers (Serpell et al., 2013). Furthermore, there is *little market incentive* for clients in association with green investment (Zhou and Lowe, 2003). Investors and firms are still *uncertain* about the economic and environmental outcomes of their green investments (Walker et al., 2019). The *low degree of environmental concern* among public was also seen a barrier for sustainability (Gomes and da Silva, 2005)

Lack of willingness, interest and mentality

Sustainable development entails change in *attitude and behavior* (Du Plessis, 2007) and it implies business process changes (Casey and Sieber, 2016). The *interest and involvement* of the stakeholders can change during the project's lifecycle (Gurjar, 2016). Moreover, the *unwillingness* of consultants to implement green buildings is another barrier (Zhou and Lowe, 2003). There is *lack of willingness* to invest in more expensive solutions (Støre-Valen and Buser, 2019). The *unwillingness* of stakeholders to cooperate lead to the firm's difficulties and crisis circumstances (Manzaneque-Lizano et al., 2019).

Similarly, there is *lack of commitment* among key stakeholders (Klakegg (2015); Kivilä et al. (2017)). The *lack of interest/commitment, low market demand or willingness to pay by customers* is a barrier towards adopting sustainable activities (Stewart et al., 2016). Likewise, there is a *lack of expressed interest in the client's requirements* (Shari and Soebarto (2012); Darko and Chan (2017)). Additionally, there are *interests conflicts between various stakeholders* which also play as a barrier towards green measures (Zhang et al. (2011); Klakegg (2015); Stewart et al. (2016); Kivilä et al. (2017); Manzaneque-Lizano et al. (2019); Aghaegbuna et al. (2020)). Likewise, the *interest* amongst project team members is an important factor (Hwang and Ng, 2013) and *lack of communication and interest* among project team members and other stakeholders was recognized as a challenge (Collins (2011); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Ali et al. (2016); Durdyev et al. (2018); Aghaegbuna et al. (2020)). For instance, Gurjar (2016) gave the example about a *jealous employee* who could have a *negative interest* towards the project's success.

Furthermore, *stakeholders do not want change* (Aleixo et al. (2018); Pham et al. (2020)). There is *resistance of different groups* towards change as they do not want to modify their daily routines of work activities (Blanco-Portela et al., 2018). The *social resistance to change* is a significant hindrance towards policy success (Howes et al., 2017). There is a *tendency to maintain current practice* and stakeholders show *resistance to change* due to *lack of awareness*

of the sustainability concept (Shafii et al. (2006); Durdyev et al. (2018)). The *worker's resistance to change from their traditional practices* is a challenge towards green building implementation (Hwang and Ng (2013); Portney (2015); Darko and Chan (2017; Blanco-Portela et al. (2018); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)).

The *lack of cooperation among project stakeholders* is another known challenge towards successful completion of green projects (Hwang and Ng (2013); Gan et al. (2015)). The *lack of understanding and commitment from senior management* also act as barriers towards sustainability implementation (Nielsen et al. (2016); Aleixo et al. (2018)). Likewise, the *lack of responsibilities and lack of support from leadership* also act as barriers towards sustainable development (Blanco-Portela et al., 2018). In addition, there is *inefficient commitment of top management* (Orji (2019); Karji et al. (2020)). As mentioned by Amankwah-Amoah and Syllias (2020), leadership and management factors including the *mismanagement and poor quality decisions* are the primary triggers of business failure in general.

In similar manner, incorporation of sustainable activities by owners is *inferior* (Gan et al., 2015). Sustainability is *regarded as an additional burden* with extra cost by developers and owners (Abidin (2010); Collins (2011)). The *lack of motivation from owners* was identified as the top ranked barrier for green building projects which is due to high financial pressure (Shen et al., 2018). Additionally, there is *lack of motivation* to use lifecycle costing methods (Zhou and Lowe, 2003). Project managers consider sustainability as an *added luxury* and their scope of focus lie within the budget, time and quality factors (Pham et al., 2020). *Lacking owners' demands and requirements* were found to be the main barriers for the implementation of sustainable construction (Gan et al., 2015).

To conclude, sustainable adoption is not possible without changing the *attitude and behavior* of stakeholders (Gan et al., 2015) as each of the stakeholder can have *an implicit or explicit requirements* that could affect the scope of the project (Gurjar, 2016)..

3.3.5 Lack of established standards, frameworks and tools

Standards and frameworks play a distinctive and key role in the eco-system (IMP, 2020). Guidelines are necessary for fulfilling the environmental and social needs by developers (Abidin, 2010). Nonetheless, there exists *lack of guidelines* in relation to planning, design, construction and operation of a sustainable built environment as well as technological barriers (Gomes and da Silva, 2005). Some developing countries are still establishing the *basic legal framework* for environmental protection and management, and impact assessment (Shafii et al.,

2006). There are *lack of universally accepted standards* regarding corporate approach to sustainability implementation (Collins, 2011). In addition, the *lack of quantitative standards* regarding sustainable actions are also act as barriers (Gan et al., 2015). In similar manner, various studies have emphasized about *the need for new frameworks and improved tools* for the incorporation of sustainability in the construction sector (Nielsen et al., 2016).

Similarly, there is *lack of integrated design methods, imperfect standards and tools* towards green building adoption (Darko and Chan, 2017). Likewise, the *lack of instruments for sustainability* was also identified as an obstacle by Aleixo et al. (2018). Moreover, there are *gaps in models, procedures and tools* to measure the sustainability in PM (Ali et al. (2016); Martens and Carvalho (2017); Chawla et al. (2018); Chofreh et al. (2019); Silvius and de Graaf (2019)). For instance, *adding a contingency factor* to the estimate for a traditional project is the only available method for estimating the sustainable project costs (Pearce, 2008). Besides, using international evaluation procedures to assess sustainability locally are *not feasible* (Gomes and da Silva, 2005). In addition, *the guidelines and standards* regarding PM *lacks the sustainability area* distinctively (Silvius and Schipper (2014); Aarseth et al. (2017)) and *the need* for PM *guidelines* was also highlighted by Aghaegbuna et al. (2020).

In a concise way, the *lack of guidance and tools* impedes the realization of the sustainability agenda (Lee and Kang, 2013).

3.3.6 Political and governmental role

Role of government and political factors are also viewed as challenges towards sustainable development and are expressed in form of *lack of policies and regulations* in the following segments.

Lack of policies

The role of government is a key element for promoting sustainable construction (Du Plessis (2007); Serpell et al. (2013); Gan et al. (2015); Shen et al. (2018)). However, *insufficient contribution from governments and lack of political support* lead to non-fulfillment of sustainable development (Gomes and da Silva (2005); Darko and Chan (2017)). *Environmental policy failures* are prominent in developing countries (Howes et al., 2017). According to Sev (2009), the *legislative effort* is necessary for improvement of buildings' energy efficiency. Furthermore, the *lack of government support* including the *lack of promotion, inadequate funding and incentives support by government* is another main barrier towards green buildings (Gan et al. (2015); Darko and Chan (2017); Shen et al. (2018); Walker et al. (2019); Tokbolat

et al. (2019); Pham et al. (2020)). Sustainability is *not considered seriously* by the political parties including the opposition to the sustainable proposals by the politicians (Portney, 2015). Political reasons such as *not well-developed policies, partial implementation of policies, politically unpopular, corruption and unstable political climate* are also the cause of *policy failures* regarding sustainability (Howes et al., 2017).

Policies and regulations by government are *limited* (Serpell et al., 2013). For example, national policies in the 90's of Chile focused on the *economic factor only*, social and environmental sustainability aspects along with quality were *not seen as a priority* (Serpell et al., 2013). Public policies and regulatory frameworks *restricts* the growth of construction sector in some countries (Shafii et al., 2006). In similar manner, economic and social pillars of sustainability are relatively *undervalued* in the existing legal framework (Gan et al., 2015). Moreover, government endeavors are mainly centered on environmental characteristic of sustainability (Abidin, 2010).

Furthermore, the *effectiveness* of government policies is dubious (Gan et al., 2015). Orji (2019) highlighted *inefficient legal framework* related to sustainability enforcement as a barrier to the organizational change for sustainability. In addition, *subsidy funding* is only provided after two years of projects' completion; resulting in cash flow issues for owners (Gan et al., 2015). In short, the reasons for *policy failures* are identified in form of *interrelated structural causes, implementation traps and knowledge/scope issues* (Howes et al., 2017).

Lack of regulations and strict rules

The current sustainable construction scenario would not be improved without new regulations and enforcements (Abidin, 2010). There is a *lack of political will, legislation and enforcement* (Shari and Soebarto (2012); Darko and Chan (2017); Howes et al. (2017); Karji et al. (2020)). The *lack of legal regulations and outdated regulatory obligations* can be a problem to green investments, sustainable construction (Gan et al. (2015); Ziolo and Sergi (2019)). The legislations and/or regulations *do not contain* all aspects of sustainability; leading to *ineffective local government's enforcement* and *unsuccessful persuasion* of organizations' comply with sustainability requirements (Gan et al., 2015). The legislations are either *absent or inadequate* and are *not enforced* (Darko and Chan (2017); Howes et al. (2017)). Likewise, the *lack of an efficient monitoring system* and *an inappropriate governance* lowers the execution of associated policies and regulations (Gan et al. (2015); Howes et al. (2017)) .

Large percentage of companies are *required by law* to integrate and report on sustainability activities (Walker et al., 2019), However, *strict regulations* are another hindrance towards sustainable development (Tokbolat et al., 2019). According to Stewart et al. (2016), regulations may *hamper* the innovation for value proposition approaches. Similarly, small and medium sized companies only apply the *minimum standard* required by the government related to sustainability implementation; making sure that the product is available to all kinds of buyers (Abidin, 2010). Moreover, *government funding* often impedes project schedules as a result of *excessive regulations and bureaucracy* (Gan et al., 2015). Similarly, there are *some laws that act as obstructions* towards achieving the environmental targets (Howes et al., 2017).

To conclude, these aforementioned barriers result in the project delays and complete abandonment of the sustainability principles (Aghaegbuna et al., 2020).

3.4 DRIVERS RELATED TO SUSTAINABILITY IMPLEMENTATION

The motivational factors to integrate sustainability principles may be both value and business perspective (Aarseth et al., 2017). Gomes and da Silva (2005) identified drivers such as *law, regulations and policies, science and research, education and sustainability building and construction (SBC) demonstration projects, design guidelines and strategies* by both the building industry and academic bodies to raise awareness, and financial penalties and incentives. Likewise, *the government support, economic conditions, professional training, public education, and corporate social responsibility* are also the drivers for green building (Shen et al., 2018). In addition, the sustainable construction has many advantages (Pham et al., 2020). The benefits of sustainable activities can be pictured by organizations via taking into account the lifecycle cost and total cost of ownership (Hodges, 2005).

In the following sub-sections, various drivers have been highlighted to signify their importance in overcoming the barriers towards sustainable development.

3.4.1 Organizational aspects

Organizations play a key role in achieving sustainable development as they contribute positively and negatively towards it (GRI, 2016). Organizations can accomplish sustainability via *internal capabilities* (Stubbs and Cocklin, 2008). Size of a firm and its core business also influences upon promoting sustainable practices (Serpell et al., 2013). Small and medium size organizations can make a significant impact to sustainable development by improving their *knowledge and acceptance* of sustainable practice (Abidin (2010); Aghaegbuna et al. (2020)). Moreover, *regulations, corporate image and client demand* have significant influence on big

companies to implement sustainable construction practices compared to small size companies (Serpell et al., 2013).

For successful implementation of sustainability, *a set of objectives* has to be established and pursued (Collins, 2011). Sustainability can be executed highly efficiently through developing *human resource policies including the training of employees*; *increasing the internal capabilities* (Stubbs and Cocklin (2008); Robichaud and Anantatmula (2011); Casey and Sieber (2016); Kivilä et al. (2017); Mustapha et al. (2017); Shen et al. (2018); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Karji et al. (2020); Pham et al. (2020)). Policies must be consistent throughout the organization as it provides a framework for establishing objectives for management systems (Mustapha et al., 2017).

Additionally, the sustainable practices are considered as *value creation opportunity* (Zhou and Lowe (2003); Labuschagne et al. (2005); Collins (2011); Robichaud and Anantatmula (2011); Hwang and Ng (2013); Serpell et al. (2013); Silvius and Schipper (2014); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Chawla et al. (2018); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); IMP (2020); Hermundsdottir and Aspelund (2021); SASB (2021)), *competitive advantage* (Labuschagne et al. (2005); Adams and Frost (2008); Abidin (2010); Collins (2011); Casey and Sieber (2016); Martens and Carvalho (2017); Darko and Chan (2017); Cai and Li (2018); Orji (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); PwC (2020); Hermundsdottir and Aspelund (2021)) and *enhanced brand image and reputation of the company* (Zhou and Lowe (2003); Adams and Frost (2008); Abidin (2010); Zhang et al. (2011); Lee and Kang (2013); Serpell et al. (2013); Casey and Sieber (2016); Orji (2019); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); PwC (2020); Hermundsdottir and Aspelund (2021)).

Proactive communication with all stakeholders is required by PM organizations to achieve sustainability (Chawla et al., 2018). Organizations need *contributions* from at least some of its stakeholders (Eskerod and Huemann, 2013). *An increased engagement and enhanced collaboration* between stakeholders is required to understand their *needs and interests* along with *support* from industry groups, professional organizations, and related authorities and local governments to remove the barriers towards achieving sustainable development (Gan et al. (2015); Ali et al. (2016); GRI (2016); Darko and Chan (2017); Kivilä et al. (2017); Durdyev et al. (2018); Shen et al. (2018); Silvius and de Graaf (2019)). SMEs need to *work together* with

local authorities and other stakeholders to share the risk and cost of investments (Amankwah-Amoah and Syllias, 2020).

Likewise, *stakeholders' involvement* is necessary in decision making process for sustainable PM (Ali et al. (2016); GRI (2016); Chawla et al. (2018)). Decisions made regarding sustainability at the initial stage of a project lifecycle have a far greater impact compared to decisions made at later stages (Collins, 2011). In addition, *responsibilities* must be assigned, and *employees must be qualified* to understand the vision of the organization in relation to sustainability (Casey and Sieber, 2016).

Furthermore, *sustainability criteria* need to be included in the measures of PM and avoid considering only the cost, time and quality factors, that is, the iron-triangle (Silvius and Schipper (2014); Chawla et al. (2018)). It is important for the project managers to *develop strategies* for containing the costs in the early stages of a project (Robichaud and Anantatmula, 2011). Similarly, Zhang et al. (2011) talked about *active and passive design strategies* to be incorporated in green building projects to reduce energy consumption, low carbon emissions and reduced lifecycle costs; resulting in *improved built environment* including the occupants. Moreover, Du Plessis (2007) talked about *enablers* in form of *value system, technological and institutional* considering human needs and environmental limits for enabling sustainable construction. To reduce the risk of failure, sustainability needs to be integrated in the *processes, routines and procedures* of the organizations (Amankwah-Amoah and Syllias, 2020). As cited by Collins (2011), sustainability goals are achieved by the organizations through having *clear sustainable objectives*. The *appropriate leadership, favorable work conditions, and training and rewards* increase the perception of organizational support towards achieving sustainable development (Casey and Sieber, 2016).

The critical success factors for green building are stated as *the competence of the project participants, integration of project team, technical and management innovation, external environment, and project characteristics* (Shen et al., 2018). Similarly, *good benchmarking* offers real value outcomes and adjust the *priorities* and correlated research requirements (Gomes and da Silva, 2005). At each level of PM organization, the *feedback* module should be included to realize sustainability in projects (Chawla et al., 2018). Organizations encompassing the shareholders should review and assess this *feedback* to take remedial action in order to achieve sustainability in projects (Chawla et al., 2018). Performance assessment system including *sustainability indicators* are essential to change the *mindset* and achieve purposeful political commitments (Gomes and da Silva, 2005). According to a recent research, there is a

correlation between sustainability performance and drivers of enterprise value creation (IMP, 2020).

Moreover, sustainability requires eco-friendly *innovation* (Ziolo and Sergi, 2019). The environmental challenges can be solved through *innovation* (Orji, 2019). *Innovation* is a critical economic concept for businesses to overcome the sustainability challenges through societal changes (Hermundsdottir and Aspelund, 2021). Likewise, Martens and Carvalho (2017) talked about the *sustainable innovation business model* for the incorporation of sustainability in a PM context. Moreover, *innovations* during the frond-end and execution phases of projects aids in achieving the sustainability (Kivilä et al., 2017). *Partnership* among higher education institutes and the industry can act as big contribution towards sustainable PM as it promotes *innovation* and development (Collins, 2011). Similarly, emphasis should be put on exploration activities in favor of fostering *eco-innovation* improvements rather than traditional production development system (Cai and Li, 2018). Firms are desiring green *innovations* and financial institutions are ready to finance green projects (Ziolo and Sergi, 2019).

Additionally, *project participants' abilities* can be enhanced through *innovation* (Shen et al., 2018). Lee and Kang (2013) talked about the *diffusion of innovation theory* regarding the *innovation* characteristics for the adoption of sustainability in facility management. Furthermore, the factors that drive *innovation* success are *financial access, infrastructure, skilled labor and good managerial and organizational practices* (Ziolo and Sergi, 2019). Likewise, *technological capabilities, environmental organization capabilities, a market-based instrument, customer green demand, and competitive pressure* act as the drivers for *eco-innovation* (Cai and Li, 2018). The *advancement in technology* is labeled as another important enabler of green building development (Shen et al. (2018); Karji et al. (2020)).

In similar manner, the *internal motivation to increase competitiveness* is another driver for adopting the sustainability *innovation*. For example, both the market and finance related drivers, such as *customer requirements, the brand and reputation of companies, and cost savings in terms of materials and energy,* are vital for embracing the sustainability *innovations* (Hermundsdottir and Aspelund, 2021).

In short, *innovation* is key to sustainability and results in *competitive advantage* for an organization (Cai and Li (2018); Orji (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); Hermundsdottir and Aspelund (2021)).

3.4.2 Financial factors

The economic advantages of sustainability are progressively acknowledged by organizations (Orji, 2019). Sustainability lead to *improved financial performances, economic advantages and profitability* (Zhou and Lowe (2003); Shafii et al. (2006); Kiron et al. (2012); Shari and Soebarto (2012); Ismael and Shealy (2018); Walker et al. (2019); Ziolo and Sergi, 2019). Sustainable activities result in total *operational cost savings* (Shafii et al. (2006); Pearce (2008); Robichaud and Anantatmula (2011); Amankwah-Amoah and Syllias (2020)). More efficient resources utilization including energy helps in *energy savings and improved financial returns* (Zhou and Lowe (2003); Hodges (2005); Pearce (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Robinson (2012); Shari and Soebarto (2012); Lee and Kang (2013); Walker et al. (2019); Amankwah-Amoah and Syllias (2020)). Furthermore, incorporating sustainable practices lead to *waste minimization; saves money* (Robinson, 2012). Additionally, sustainable buildings are expensive because of the material used. If the materials are procured locally, this would lead to significant *reduction of cost* (Abidin, 2010). In similar manner, the *competitive price* of sustainable practices will further propel the sustainability agenda (Karji et al., 2020).

Furthermore, embedding sustainability in work also increases the *productivity improvement* which also have a tremendous *positive effect* on the financial resources of an organization as a result of the *increased performance of the employees* (Zhou and Lowe (2003); Hodges (2005); Hoffman and Henn (2008); Shari and Soebarto (2012); Lee and Kang (2013)). Moreover, sustainability reporting and practices are also associated *positively* with the firms' financial performances and the economic outcomes, as well as *attracting the investors* (Casey and Sieber (2016); Shen et al. (2018); PwC (2020); Ziolo and Sergi (2019)).

Moreover, the EU is leading the role in endeavors to develop a financial system advocating sustainable economic growth (Ziolo and Sergi, 2019). The *increase in sustainable investments* including both ethical and green aspects is the major driver for sustainability (Ziolo and Sergi, 2019). Furthermore, *the return on investment* is related to the project investment success (Badewi, 2016). Insurance sector has a pretty appropriate business model to support sustainability as *insurance of products* allow investors to focus on long-term; providing financial security against the short-term risks (Ziolo and Sergi, 2019).

Additionally, green projects financing systems such as *green banks and green bonds*, have the capability to facilitate clean green energy, sustainable financing (Yoshino et al. (2019); Ziolo and Sergi (2019)). In addition, *green bonds* are well recognized means of sustainable

development (Ziolo and Sergi, 2019). Similarly, *capital loans* should be provided to green industries (Cai and Li, 2018).

In short, organizations are realizing that the *profits* are linked with sustainable practices; adding positively to the financial resources.

3.4.3 Promoting awareness

Promoting public *awareness* about sustainable products is vital for the implementation of sustainability (Orji (2019); Karji et al. (2020)). It becomes much easier to change our ways of living when we are *aware* of them (Robinson, 2012). Higher education institutes play a significant role in *promoting sustainability* as they are the foremost partners in sustainability efforts all over the world (Shari and Soebarto (2012); Gan et al. (2015); Aleixo et al. (2018)). Likewise, *increasing awareness* of the public and the industry about *long-term benefits* of sustainability through public education and professional training (Shen et al., 2018).

Moreover, the *diffusion of knowledge* among project managers is vital for advancing the sustainability agenda (Collins, 2011). *More value* can be created successfully by increasing the *awareness* and strategic approaches to projects (Klakegg, 2015). Likewise, the *awareness* of a firm is a major driver for implementation of sustainability practices (Serpell et al., 2013). In addition, sustainable development demands *a holistic view* (Zhou and Lowe (2003); Du Plessis (2007); Pearce (2008); Sev (2009); Collins (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Mustapha et al. (2017); Aleixo et al. (2018); Chawla et al. (2018); Silvius and de Graaf (2019); Walker et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Karji et al. (2020)).

Furthermore, for real environmental progress, the economic and social aspects of sustainability agenda need to be addressed (Henriques and Richardson, 2004). According to Tokbolat et al. (2019), social aspects along with environmental ones are also turned out to be the driving factors for adaptation of sustainability. Additionally, the triple bottom line agenda allow corporations to concentrate on all three dimensions of sustainability, not just on the financial gains (Henriques and Richardson, 2004).

However, as mentioned by Serpell et al. (2013), the *awareness and commitment* are simply not adequate to drive further substantial changes. *Understanding the bigger picture* is a vital requirement for tackling the barriers and incorporating the sustainability drivers in construction projects (Tokbolat et al., 2019).

3.4.4 Stakeholders' role

Leaders play a decisive role in introducing sustainability (Aleixo et al., 2018). Any organization can start the transformation process with the *right leadership* (Henriques and Richardson, 2004). Stakeholders' role is critical in securing the resources that are vital for the survival of the firm including the financial distress (Eskerod and Huemann (2013); Shen et al. (2018); Manzaneque-Lizano et al. (2019)). *Stakeholders' involvement* in a project is vital for effectively delivering the desired goals (Ali et al., 2016) and for establishing new practices (Nielsen et al., 2016). *Top management support* is crucial for sustainable initiatives and boosting employees' engagement to achieve sustainable development (Casey and Sieber, 2016). *Actions by the private sector* are also identified as a significant factor to reduce the sustainability barriers (Shari and Soebarto, 2012).

Stakeholders' involvement and contribution is vital for the implementation of sustainability in projects (Darko and Chan (2017); Kivilä et al. (2017); Chawla et al. (2018); Durdyev et al. (2018)). Firms are already being *challenged by the customers and financial markets* regarding their commitments and performance about the triple bottom line (Henriques and Richardson, 2004). *Clients* are demanding the construction segment to take proactive position in fostering the sustainability agenda (Collins, 2011). *Action by the clients* in form of *demanding sustainable products and services* is important to remove the barriers and move forward (Shari and Soebarto, 2012). Likewise, *pressure from stakeholders and competitors* is a significant factor for the adoption of *eco-innovation, sustainability* by a firm (Lee and Kang (2013); Eweje and Alakavuklar (2014); Cai and Li (2018); Amankwah-Amoah and Syllias (2020)).

Support from senior decision makers in form of human and financial resources is crucial for the implementation of green building projects successfully (Shen et al., 2018). In addition. *decision makers* have the most critical and significant action to counteract the various challenges and threats associated with sustainable development and to achieve the success of green, sustainable projects (Hwang and Ng (2013); Chawla et al. (2018)). Moreover, stakeholders need to *incorporate appropriate strategies* in advancing green buildings in the evolving markets of developing countries (Shen et al., 2018). Sustainability needs to be realized as a driving force for decision making (Eweje and Alakavuklar (2014); Manzaneque-Lizano et al. (2019)). Likewise, stakeholders should positively *influence* the strategic decisions regarding sustainability innovations (Hermundsdottir and Aspelund, 2021). In addition, *policy makers* need to apply the *strict sustainability standards* in design, procurement and construction contracts (Mavi and Standing, 2018).

Furthermore, *owners* have an *influential position* over other stakeholders in undertaking sustainable construction practices (Gan et al., 2015). In addition, *the role of project managers* is also pivotal for *assessing, addressing and enforcing* sustainable project activities throughout the project phases (Collins (2011); Robichaud and Anantatmula (2011)). Furthermore, *investors and tenants* play a critical role towards development of sustainable buildings (Walker et al., 2019). *Customers are ready to pay extra* for green goods (Cai and Li, 2018). Similarly, *tenants are willing* to share the responsibility for sustainable operations of buildings and to *pay premiums* for green features, and are *increasingly demanding* the green characteristics (Walker et al., 2019).

Additionally, the *public interest and willingness* to pay higher cost can drive sustainability projects; *change of mindset* is required (Abidin, 2010). *Green demand from clients* is an important pressure that triggers the *eco-innovation* for firms (Cai and Li, 2018). According to Shen et al. (2018), *market demand* is the principal factor for developing the green building industry which can be driven through *improved competency* of the project stakeholders.

Managing stakeholders is crucial for the project to succeed (Ali et al. (2016); Badewi (2016)). The sustainable PM is highly dependent on *decision makers, policy makers and implementation of decisions and policies* regarding the sustainability in projects (Chawla et al., 2018). It is important to *understand the stakeholders' information needs* (GRI, 2016) since sustainability in infrastructure projects is vital for shareholders prospects (Chawla et al., 2018). Stakeholders are vital for the sustainability of the firm (Manzaneque-Lizano et al., 2019). In a concise way, *strong commitment* by all stakeholders is crucial regarding implementing the global goals for the realization of the 2030 Agenda for Sustainable Development (United Nations (2015); Walker et al. (2019)).

3.4.5 Standards and tools

Correct tools are necessary for the proper implementation of sustainability (Collins, 2011). The *National Carbon Offset Standard (NCOS)* guides the organization towards becoming the carbon neutral (Lai et al., 2012). Similarly, Sev (2009) proposed a *conceptual framework* including the sustainable design principles, strategies and methods towards sustainable development.

According to Zhou and Lowe (2003), *lifecycle costing* is an ideal economic tool and an effective way of depicting *long-term value* of sustainability. The *lifecycle cost analysis* helps the organizations in realizing the sustainability benefits (Hodges, 2005). Carbon audit is *a lifecycle assessment tool* regarding the greenhouse gas emissions. In addition, there are also some online

web-based data tools to calculate the greenhouse gas emissions of an organization (Lai et al., 2012). Similarly, the *lifecycle analysis* is crucial to assess both the environmental and economic impacts of a sustainable building (Walker et al., 2019). Incorporating sustainability concept throughout the *lifecycle* of buildings lead to *financial benefits* (Sev (2009); Walker et al. (2019)). *Full-cost accounting* is an appropriate tool to cope with sustainability as the external costs like environmental and sustainability, are central to it (Rubino and Veltri, 2020). *Control checklists* also help in correct application of the sustainability standards placed by project managers (Collins, 2011). In addition, *foreign developed tools* and attainment of *benchmarking information* are seen as an opportunity by contractors to perform sustainability performance assessment, calibrated to regional conditions (Gomes and da Silva, 2005).

Furthermore, *the accessibility* of such a tool results in knowledge dissemination, becoming an essential driver for market creation for sustainable buildings and products (Gomes and da Silva, 2005). *New standards and mandates* including the international ones are both encouraging and requiring the firms to develop better environmental assessment and management systems (Sev, 2009). Frameworks such as *LEED and BREEAM certifications* have also assisted in implementation of sustainable development and to assess the sustainability performance of the buildings (Norman et al. (2010); Collins (2011); Robichaud and Anantatmula (2011); Durdyev et al. (2018); Karji et al. (2020)). In addition, *LEED and BREEAM* emphasize on energy efficiency, promote energy conservations (Norman et al. (2010); Robichaud and Anantatmula (2011); Lee and Kang (2013); Mustapha et al. (2017)). Similarly, *method and tool development* is important for introducing and implementing design for sustainability (Ali et al., 2016).

SASB standards are recognized as a core component of a firm's ESG disclosures by investors, globally (SASB, 2021). These standards in the form of sustainability reporting also facilitate in making the information available to stakeholders to make informed decisions about an organization's input into sustainable development (GRI, 2016). Similarly, SASB act as a tool for the investors to compare the companies regarding their sustainability performance (Rubino and Veltri, 2020).

To conclude, these *methods, tools, standards and frameworks* provide guidelines to alleviate the environmental, social and economic problems related to construction and operation processes (Karji et al., 2020).

3.4.6 Government policies and regulations

An uninterrupted and dynamic role of government is crucial for the development of a sustainable built environment (Gomes and da Silva (2005); Robinson (2012); Shari and Soebarto (2012)). The role of government is pivotal for removing the barriers associated with adoption of sustainable construction by building owners (Gan et al. (2015); Darko and Chan (2017); Pham et al. (2020)). Governments all over the world have developed *policies* regarding sustainable development (Howes et al., 2017). *Increase in legislation* regarding sustainable performance has driven the integration of sustainable PM practices into the project delivery process (Collins, 2011). In addition, this helps in transition to a low carbon development (Gan et al., 2015).

Moreover, the role of government is vital for identifying the *new types of impact and pioneering assessment methods* (Henriques and Richardson, 2004). Similarly, government play a key responsibility for sustainable development as it sets *rules, laws, standards and guidelines*; creating a *framework* (Shari and Soebarto (2012); Ziolo and Sergi (2019)). Furthermore, *policies and regulations* are the main drivers for sustainable construction (Gomes and da Silva (2005); Du Plessis (2007); Abidin (2010); Serpell et al. (2013); Darko and Chan (2017); Shen et al. (2018)). As mentioned by Gan et al. (2015), sustainable development is a *major strategy* in China and a *key national priority* in Singapore (Hwang and Ng, 2013).

It is vital to understand the government *policies* related to green construction projects (Hwang and Ng, 2013). Governments are *aware* of their *responsibility* regarding implementation of sustainability and are *demanding* the companies to integrate sustainability into project strategies and action plans (Aarseth et al., 2017). *Systematic measures* by governments such as *strategies and regulations, standards and codes, and economic and financial incentives* can promote sustainable construction (Shari and Soebarto (2012); Gan et al. (2015)). According to Cai and Li (2018), many *environmental policies* are established to meet the soaring demands of the economy while moving towards a low emission, sustainable development.

Moreover, there is a need to create *economic incentives* by governments (Amankwah-Amoah and Syllias, 2020). The role of *fiscal policies* such as *tax relief or tax credit* can help countries to promote renewable energy implementation and adoption of sustainable construction (Gan et al. (2015); Yoshino et al. (2019)). According to the survey performed by Serpell et al. (2013), *tax reduction* was the most voted *financial incentive* by construction firms. Likewise, *incentives* such as *tax reduction* is a proposed as a solution towards sustainable development (Karji et al., 2020).

Financial system play a significant role in the certainty of a sustainable future (Ziolo and Sergi, 2019). Government should provide *financial incentives* to cope up with the increased upfront costs (Shari and Soebarto, 2012). *Capital loans* should be provided by government to green industries on the basis of guaranteed returns (Cai and Li, 2018). *Policy framework* along with *financial incentives* need to be developed by government to enhance sustainable construction implementation to decrease owners' aversion to risk-taking and enhance their investment intention (Serpell et al. (2013); Shen et al. (2018); Walker et al. (2019)). For example, government *policy* in form of *tax reduction incentives* associated with the level of investment is a key to promote sustainability (Serpell et al., 2013). In addition, the government *taxations* are the dominant source of financing investments towards sustainable development (Ziolo and Sergi, 2019). Similarly, government should increase the *financial support* of organizations having good performance on sustainability issues (Aleixo et al., 2018). As mentioned by Ziolo and Sergi (2019), *adequate financing* is an essential factor for successful implementation of sustainable development.

Likewise, governments should gradually raise the *carbon taxes* to support low carbon energy systems (Yoshino et al., 2019). Governments are *encouraging* the real estate developers to integrate *carbon reducing technologies* in their products (Zhang et al., 2011). Governments should *encourage* educational institutes to offer majors in *eco-innovation* at the undergraduate, postgraduate and doctorate levels (Cai and Li, 2018). The government can propel green building by promoting *sustainable building criteria, providing favorable investment conditions, setting research grants and subsidies for green technical innovation, directly investing in green building projects, and supporting professional training and public education* (Shen et al., 2018).

Government *regulations* along with *technological advancement and financial benefits* have pushed the Chinese manufacturing industry in adopting organizational change management for sustainability (Orji, 2019). Similarly, *strict sustainability regulations* have positive effect on a firm's competitiveness and performance by steering *innovation* activities in firms (Hermundsdottir and Aspelund, 2021). In addition, *strict policies and regulations* are developed to protect the built environment (Hwang and Ng, 2013). *Regulations* as a result of external pressure from governments and stakeholders are driving the companies towards sustainability *innovation* compared to the firms which are not being forced (Hermundsdottir and Aspelund, 2021).

Furthermore, the role of government needs to be different in relation to the four different types of corporation, namely, *locusts, caterpillars, butterflies and honeybees*, shown in Figure 12 (Henriques and Richardson, 2004). In addition, *corporate butterflies and honeybees* must be treated in a different way in comparison to *corporate caterpillars and locusts* (Henriques and Richardson, 2004).

	Low impact	**High impact**
Regenerative (increasing returns)	Butterflies	Honeybees
Degenerative (decreasing returns)	Caterpillars	Locusts

Figure 12. Corporate characteristics. [source: re-created, Henriques and Richardson (2004)]

In brief, regulations related to sustainability should be established, revised and strictly enforced by governments as clients are more likely to incorporate sustainability practices in the presence of legislations and regulations (Gan et al. (2015); Ziolo and Sergi (2019)).

All the aforementioned drivers play a significant role in achieving the 17 SDGs by UN and for a better built environment. But how integrating sustainable activities affect the financial resources of an organization? Both the positive and negative effects of sustainability are highlighted in the following sub-section.

3.5 ECONOMIC EFFECTS OF SUSTAINABLE ACTIVITIES

Companies operate their business to generate profits which is the mission of all organizations (Serpell et al. (2013); Ziolo and Sergi (2019)). Economic factors such as *initial investment, benefit and payback time* are normally the highest priority for owners (Gan et al., 2015). In private businesses, sustainability is about economic maturity and development (Portney, 2015). Likewise, from a business point of view, the expected return on investment from the project's outcome is a key in declaring the project's success (Badewi, 2016). Sustainability has effected the whole lifecycle process in several industries, for instance, from Ford, Nike, Apple, to Coca Cola and Pepsi (Hedstrom, 2018).

Additionally, the interrelations between financial benefits, social and environmental impacts regarding change on sustainability in both short and long-terms are increasingly recognized by organizations (Orji, 2019). Seeking economic principles of sustainable construction are important for creating a profitable market for it (Zhou and Lowe, 2003). Sustainable strategies must make *economic sense* for green projects to be feasible (Robichaud and Anantatmula, 2011). Moreover, developers are impelled by profit and according to different studies, the sustainability concept can be *economically feasible* (Abidin, 2010). Sustainable real estate is a key starting point for creating *improved economic effects* (Walker et al., 2019).

In the following sub-segments, both the positive and negative effects of sustainable activities have been spotlighted to show the two sides of the sustainability coin.

3.5.1 Positive effects

Sustainable business has several *tangible and non-tangible advantages* that are being recognized globally by construction experts (Abidin, 2010). The incorporation of sustainability principles has *economic, environmental and social benefits*; resulting into a *win-win* situation for both the stakeholders and shareholders (Collins, 2011). The *performance* of building projects is *improved both economically and environmentally* as a result of sustainable construction (Zhou and Lowe (2003); Shafii et al. (2006); Shari and Soebarto (2012)). Addressing sustainability concerns lead to *better economic performances* at all levels (Ziolo and Sergi, 2019). The *financial benefits* of sustainable construction are *crucial, diverse and stimulus* (Zhou and Lowe, 2003). Sustainability lead to *profitability* in harvesters' firms (Kiron et al., 2012). *Cost savings, higher property values and increase in sustainability funding* lead to an *increase in the organization value* (Nielsen et al., 2016). *Higher internal rates of return* are resulted through embracing sustainable practices compared to traditional activities (Walker et al., 2019). Moreover, the *economic advantages* of green building are way ahead of its capital cost (Ismael and Shealy, 2018). Moreover, sustainable buildings *create job opportunities*; serving as a means for economic and social inclusion (Walker et al., 2019).

Furthermore, the benefits include *total cost savings, tax savings, added value, more efficient resource use, productivity improvement, increased organization effectiveness, the generation of positive image and support for the local economy* (Zhou and Lowe, 2003). Moreover, even small steps in *energy savings* can lead to billions of dollars being driven back to the bottom line (Hodges, 2005). Similarly, sustainable building construction helps in *saving in operational cost* (Shafii et al. (2006); Pearce (2008); Amankwah-Amoah and Syllias (2020)).

Likewise, green buildings are *more energy efficient* in relation to the conventional buildings; leading to *energy savings as electricity, gas and water costs are minimized and waste reduction* as well (Pearce (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Robinson (2012); Shari and Soebarto (2012); Lee and Kang (2013); Amankwah-Amoah and Syllias (2020)). Minimizing waste through sustainability *saves money* (Robinson, 2012). Moreover, *energy cost reduction and financial benefits* are produced by labor *cost savings* and *productivity gains* for better indoor air quality, natural ventilation, local thermal control, daylighting and rent premium (Norman et al. (2010); Lee and Kang (2013); Mustapha et al. (2017); Walker et al. (2019)).

Profits are a way to attain sustainable results (Stubbs and Cocklin, 2008). *Bigger financial returns* are obtained through *energy savings and waste reductions* by implementing sustainable and green building practices (Hodges, 2005). Companies are acknowledging the environmental friendly practices such as *proper materials and waste management, efficient process and product design, resource efficiency and recycling* to be profitable (Sev, 2009). Big organizations believe that *profits* can be generated by addressing social needs and protecting the environment; *creating value* to the projects and *a good image* of the organization (Abidin, 2010). Likewise, *eco-innovation* results in *an increased firm's environmental performance*; contributing *positively* on the financial resources (Cai and Li, 2018). The *profitability* of an organization is *improved* as a result of *cost and efficiency savings* (Amankwah-Amoah and Syllias, 2020). In addition, *investor's net income is increased* through lower expenses and higher valuations (Walker et al., 2019).

Moreover, sustainable practices lead to *increased work productivity* (Zhou and Lowe (2003); Hodges (2005); Hoffman and Henn (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Lee and Kang (2013); Mustapha et al. (2017)). The performance of occupants is claimed to increase from 6% to 26% by using green building strategies. As a result, an economic case for green building is created through this *improved productivity* since 90% of an organization's annual expenses are comprised of employee costs (Hoffman and Henn, 2008).

Additionally, green projects help the organizations to gain their *branding name and reduce admin costs* as well through establishing efficient experience sharing scheme (Zhang et al., 2011). Sustainability acts as a critical aspect for *corporate image* of firms which could turn in *higher sales* compared to other companies who have embraced little sustainability practices (Serpell et al., 2013). Sustainable practices steer to *improve collaboration*; further contributing

to *profits* (Kiron et al., 2012). Implementation of green building rating systems tends to raise the international profile of investors besides *improving the value* of the green buildings (Shen et al., 2018).

Lastly, sustainability, CSR and ESG reporting by firms *attract investors*; leading to *financial access* as investors today are focusing and investing in these type of organizations (Casey and Sieber (2016); PwC (2020); Ziolo and Sergi (2019)). Sustainability and CSR are *positively linked* to economic outcomes and firm financial performance (Casey and Sieber, 2016). *Positive effect* of ESG can also be seen in purchasing decisions as sustainability-marked products bloomed 5.6 times quicker than non-sustainable products between 2013 and 2018 (PwC, 2020). There is a *direct correlation* between ESG practices of an enterprise and *large, steady profits* (Ziolo and Sergi, 2019).

As mentioned by Portney (2015), economic growth is vital for improving the standard of living which is related to the human condition, that is, social aspect of sustainability.

3.5.2 Negative effects

Many organizations are dedicated towards sustainable development; nevertheless, they encounter difficulty in performing it because of the means in which funding is allotted to the projects (Pearce, 2008). Sustainability measures *cost too much* (Shari and Soebarto (2012); Amankwah-Amoah and Syllias (2020)) and transition towards low-carbon and green economy involve *gigantic investment* (Yoshino et al. (2019); Ziolo and Sergi (2019)). Construction firms are concerned about the *additional costs* connected to embracing sustainability practices (Serpell et al., 2013). And knowledge of the firm's approach of managing capital is critical in forwarding towards sustainable development (Hodges, 2005).

Incorporating sustainability is not like a piece of cake for every organization. Organizations must make a profit regarding sustainable activities to exist (Stubbs and Cocklin, 2008). Availability of financial resources is the key for the survival of the firm (Manzaneque-Lizano et al., 2019). Furthermore, there are negative effects of *uncertainties and risks* in the form of *cost overruns* regarding the implementation of sustainable practices (Zhou and Lowe (2003); Geraldi et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Klakegg (2015); Stewart et al. (2016); Chawla et al. (2018); Walker et al. (2019); Aghaegbuna et al. (2020)).

Delayed projects and full desertion of the sustainability fundamentals are the recognized consequences (Aghaegbuna et al., 2020). SMEs typically *lack the vital skill* in connecting

sustainability to financial benefits. As a consequence, firms are unable to hold on long enough and *collapse* in the short period because of *resource constraints and withstanding cost strain*s regarding sustainability initiatives (Amankwah-Amoah and Syllias, 2020). Similarly, SMEs are struggling to carry out the different pillars of sustainability (Støre-Valen and Buser, 2019). In comparison to the big firms, SMEs have *lower probability of survival* and have faced *high rates of business failures* (Manzaneque-Lizano et al., 2019). The failure of SMEs is related to the *internal economic and financial factors, a lack of quality human capital, the influence of environmental conditions, competition, production costs, poor management decisions, regulations concerning customers, less negotiating powers and political influence* (Manzaneque-Lizano et al., 2019).

In a nutshell, sustainability agenda most probably fails if it does not contribute to profitability over time regardless of having an obligation or business case for the long term (Kiron et al., 2012).

4 RESULTS

Based on the literature reviewed and the conducted interviews, the following results have been compiled in the form of tables, highlighting the barriers and drivers regarding the sustainability implementation.

4.1 FINDINGS FROM THE LITERATURE

Different sustainability barriers have been identified through various reviewed literature which impedes the implementation of sustainable activities in an organization. Table 3 highlights these barriers and their associated sub-factors. Moreover, these sustainability obstacles are interconnected to each other in terms of their context and are grouped as the following

- *organizational factors,*
- *time and financial constraints,*
- *lack of knowledge and awareness,*
- *stakeholders' perspective,*
- *lack of established standards, frameworks and tools,*
- *political and government role,*
- *others.*

A total of 54 different literature sources talked about these identified sustainability hindrances as shown in Table 3. *Time and financial constraints* come out to be the most highlighted barrier as mentioned by different 40 resourced literature. This is followed up by *organizational factors (34), lack of knowledge and awareness (29), stakeholders' perspective (29), others (21) and political and government role (19).* The least stressed barrier is the *lack of established standards, frameworks and tools* with a score of 17.

The 'others' barriers are the external factors like *political and government role, and lack of established standards, frameworks and tools*, which are not under the control of the organizations such as *lack of sustainable materials and technologies, non-sustainable market conditions, poverty and economic problems of countries, and uncertainty and risk.*

Table 3. Sustainability barriers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific barrier.

Barriers (54)	Sub-factors	Source of literature
Organizational factors 34 different literature talked about it	a) Lack of institutional framework including insufficient policies and its implementation, lack of scope and strategies including the lack of business case, sustainability reporting and complex bureaucracy (17)	a) Shafii et al. (2006); Du Plessis (2007); Collins (2011); Zhang et al. (2011); Hwang and Ng (2013); Lee and Kang (2013); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016); Aleixo et al. (2018); Blanco-Portela et al. (2018); Shen et al. (2018); Orji (2019); Tokbolat et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020); PwC (2020)
	b) Lack of priority and seriousness, preferring non-sustainable preferences (current practices), and focusing only on the financial aspect of sustainability, overconsumption of resources including human, economic and natural (19)	b) Labuschagne et al. (2005); Abidin (2010); Collins (2011); Serpell et al. (2013); Eweje and Alakavuklar (2014); Gan et al. (2015); Stewart et al. (2016); Howes et al. (2017); Aleixo et al. (2018); Blanco-Portela et al. (2018); Chawla et al. (2018); Durdyev et al. (2018); Manzaneque-Lizano et al. (2019); Orji (2019); Tokbolat et al. (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020); Pham et al. (2020)
	c) Lack of capability including the skills, innovation activities, lack of human resources and incompetent employees, size of the company, ineffective procurement systems (21)	c) Zhou and Lowe (2003); Gomes and da Silva (2005); Shafii et al. (2006); Abidin (2010); Zhang et al. (2011); Hwang and Ng (2013); Serpell et al. (2013); Eweje and Alakavuklar (2014); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Durdyev et al. (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Tokbolat et al. (2019); Walker et al. (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); Karji et al. (2020); Pham et al. (2020)
	d) Lack of support from management and leadership including poor decisions (9)	d) Eweje and Alakavuklar (2014); Gan et al. (2015); Nielsen et al. (2016); Stewart et al. (2016); Aleixo et al. (2018); Blanco-Portela et al. (2018); Orji (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020)
	e) Lack of information and input data (10)	e) Zhou and Lowe (2003); Lai et al. (2012); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016): Darko and Chan (2017); Aleixo et al. (2018); Durdyev et al. (2018); Tokbolat et al. (2019); Aghaegbuna et al. (2020)
Time and financial constraints 40 different literature talked about it	a) Lack of financial resources and funding including lack of support from financial institutions (14)	a) Zhou and Lowe (2003): Abidin (2010); Lee and Kang (2013); Eweje and Alakavuklar (2014); Gan et al. (2015); Gurjar (2016); Darko and Chan (2017); Howes et al. (2017); Aleixo et al. (2018); Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Yoshino et al. (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020);
	b) More costs and high initial investment including the cost overruns and wrong perception of higher costs associated with sustainability (24)	b) Zhou and Lowe (2003); Shafii et al. (2006); Adams and Frost (2008); Pearce (2008); Abidin (2010); Collins (2011); Zhang et al. (2011); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Serpell et al. (2013); Gan et al. (2015); Gurjar (2016); Darko and Chan (2017);Shen et al. (2018); Durdyev et al. (2018); Chofreh et al. (2019); Støre-Valen and Buser (2019); Tokbolat et al. (2019); Walker et al. (2019); Yoshino et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)

Table 3 (continued). Sustainability barriers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific barrier.

	c) Low economic benefits and profits (5)	c) Gan et al. (2015); Klakegg (2015); Kivilä et al. (2017); Amankwah-Amoah and Syllias (2020); Pham et al. (2020)
	d) Long payback period, more time, long-term and costly investments are discouraged, short vision trend is preferred (23)	d) Zhou and Lowe (2003); Henriques and Richardson (2004); Gomes and da Silva (2005); Hodges (2005); Shafii et al. (2006); Pearce (2008); Robichaud and Anantatmula (2011); Zhang et al. (2011); Robinson (2012); Hwang and Ng (2013); Gan et al. (2015); Casey and Sieber (2016); Stewart et al. (2016); Darko and Chan (2017); Aleixo et al. (2018); Cai and Li (2018); Durdyev et al. (2018); Shen et al. (2018); Tokbolat et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); Karji et al. (2020)
Lack of knowledge and awareness 29 different literature talked about it	a) Lack of knowledge and understanding (22)	a) Zhou and Lowe (2003); Shafii et al. (2006); Adams and Frost (2008); Abidin (2010); Collins (2011); Zhang et al. (2011); Shari and Soebarto (2012); Lee and Kang (2013); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Aleixo et al. (2018); Durdyev et al. (2018); Chofreh et al. (2019); Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Tokbolat et al. (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); Karji et al. (2020); Pham et al. (2020)
	b) Lack of awareness (18)	b) Gomes and da Silva (2005); Shafii et al. (2006); Abidin (2010); Collins (2011); Zhang et al. (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Lee and Kang (2013); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Durdyev et al. (2018); Orji (2019); Støre-Valen and Buser (2019); Tokbolat et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020)
	c) Sustainability being a contested concept; newly arrived and complex (10)	c) Zhou and Lowe (2003); Shafii et al. (2006); Du Plessis (2007); Sev (2009); Collins (2011); Gan et al. (2015); Portney (2015); Aarseth et al. (2017); Aleixo et al. (2018); Chofreh et al. (2019)
Stakeholders' perspective 29 different literature talked about it	a) Lack of willingness, commitment, cooperation, interest and mentality (20)	a) Zhou and Lowe (2003); Collins (2011); Zhang et al. (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Klakegg (2015); Gurjar (2016); Nielsen et al. (2016); Stewart et al. (2016); Darko and Chan (2017); Kivilä et al. (2017); Aleixo et al. (2018); Blanco-Portela et al. (2018); Durdyev et al. (2018); Manzaneque-Lizano et al. (2019); Orji (2019); Støre-Valen and Buser (2019); Aghaegbuna et al. (2020); Karji et al. (2020)
	b) Resistance to organizational change, traditional practice (12)	b) Shafii et al. (2006); Hwang and Ng (2013); Portney (2015); Darko and Chan (2017); Howes et al. (2017); Aleixo et al. (2018); Blanco-Portela et al. (2018); Durdyev et al. (2018); Orji (2019); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)
	c) Conflicts among stakeholders (6)	c) Zhang et al. (2011); Klakegg (2015); Stewart et al. (2016); Kivilä et al. (2017); Manzaneque-Lizano et al. (2019); Aghaegbuna et al. (2020)

Table 3 (continued). Sustainability barriers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific barrier.

	d) Clients related challenges including the lack of demand, customers want cheap solutions (13)	d) Zhou and Lowe (2003); Gomes and da Silva (2005); Shafii et al. (2006); Abidin (2010); Hwang and Ng (2013); Gan et al. (2015); Darko and Chan (2017); Durdyev et al. (2018); Shen et al. (2018); Tokbolat et al. (2019); Walker et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020);
Lack of established standards, framework and tools 17 different literature talked about it	a) Lack of established standards, frameworks, guidelines and benchmark (8) b) Lack of methods and tools (6) c) Gaps in models, procedures and tools including the project management model (9)	a) Gomes and da Silva (2005); Shafii et al. (2006); Collins (2011); Lee and Kang (2013); Gan et al. (2015); Nielsen et al. (2016); Stewart et al. (2016); Darko and Chan (2017); b) Pearce (2008); Lee and Kang (2013); Nielsen et al. (2016); Stewart et al. (2016); Darko and Chan (2017); Aleixo et al. (2018) c) Silvius and Schipper (2014); Gan et al. (2015); Ali et al. (2016); Aarseth et al. (2017); Darko and Chan (2017); Chawla et al. (2018); Chofreh et al. (2019); Silvius and de Graaf (2019); Aghaegbuna et al. (2020)
Political and government role 19 different literature talked about it	a) Lack of policies, lack of national priority and policy failures/ineffectiveness, not all three pillars of sustainability are taken into the consideration (15) b) Lack of regulations and strict rules including poor enforcement of legislation (10) c) Too much strict policies and regulations, excessive regulations and bureaucracy (5) d) Outdated regulations, conflicting laws, need for new regulations and enforcements (4)	a) Gomes and da Silva (2005); Shafii et al. (2006); Du Plessis (2007); Abidin (2010); Shari and Soebarto (2012); Serpell et al. (2013); Gan et al. (2015); Portney (2015); Howes et al. (2017); Shen et al. (2018); Orji (2019); Tokbolat et al. (2019); Walker et al. (2019); Karji et al. (2020); Pham et al. (2020) b) Sev (2009); Abidin (2010); Shari and Soebarto (2012); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Howes et al. (2017); Orji (2019); Ziolo and Sergi (2019) c) Shafii et al. (2006); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Tokbolat et al. (2019) d) Abidin (2010); Gan et al. (2015); Howes et al. (2017); Ziolo and Sergi (2019)
Others 21 different literature talked about it	a) Lack of sustainable materials and technologies (7) b) Non-sustainable market conditions (6) c) Poverty and economic problems of countries (4) d) Uncertainty and risk (12)	a) Gomes and da Silva (2005); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Shen et al. (2018); Karji et al. (2020); Pham et al. (2020) b) Serpell et al. (2013); Stewart et al. (2016); Støre-Valen and Buser (2019); Tokbolat et al. (2019): Walker et al. (2019); Pham et al. (2020) c) Gomes and da Silva (2005); Shafii et al. (2006); Du Plessis (2007); Serpell et al. (2013) d) Zhou and Lowe (2003); Geraldi et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Klakegg (2015); Stewart et al. (2016); Darko and Chan (2017); Chawla et al. (2018); Walker et al. (2019); Yoshino et al. (2019); Aghaegbuna et al. (2020)

Likewise, the sustainability drivers are also grouped in the form of

- *organizational aspects,*
- *financial factors,*
- *promoting awareness,*
- *stakeholders' role,*
- *standards and tools,*
- *government policies and regulations,*
- *others.*

In similar manner, 63 various resourced literature talked about the sustainability drivers as shown in Table 4. The *organizational aspects* turned out to be the most prominent driver for sustainability implementation as highlighted by 47 different resourced literature. This is trailed by *financial factors (42), promoting awareness (33), government policies and regulations (28), stakeholders' role (26) and standards and tools (22).* The *others* emerged as the least emphasized driver as talked by 8 literature sources, respectively.

Table 4. Sustainability drivers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific driver.

Drivers (63)	Sub-factors	Source of literature
Organizational aspects 47 different literature talked about it	a) Establishing set of clear objectives, policies and strategies (11)	a) Abidin (2010); Collins (2011); Robichaud and Anantatmula (2011); Zhang et al. (2011); Klakegg (2015); Casey and Sieber (2016); Kivilä et al. (2017); Mustapha et al. (2017); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020)
	b) Proactive communication with all stakeholders and understanding their needs and prospects (12)	b) Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Gan et al. (2015); Ali et al. (2016); GRI (2016); Darko and Chan (2017); Kivilä et al. (2017); Chawla et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Silvius and de Graaf (2019); Amankwah-Amoah and Syllias (2020)
	c) Integration of the sustainability in the processes, routines and procedures of the organization and PM measures, performance assessment system and benchmarking (14)	c) Gomes and da Silva (2005); Zhang et al. (2011); Robichaud and Anantatmula (2011); Eweje and Alakavuklar (2014); Silvius and Schipper (2014); Ali et al. (2016); Kivilä et al. (2017); Mustapha et al. (2017); Chawla et al. (2018); Durdyev et al. (2018); Chofreh et al. (2019); Silvius and de Graaf (2019); Amankwah-Amoah and Syllias (2020); IMP (2020)
	d) Recognition of sustainable practices as value creation opportunity, competitive advantage, enhanced brand and reputation of the company (33)	d) Zhou and Lowe (2003); Labuschagne et al. (2005); Du Plessis (2007); Adams and Frost (2008); Abidin (2010); Collins (2011); Robichaud and Anantatmula (2011);Zhang et al. (2011); Eskerod and Huemann (2013); Hwang and Ng (2013); Lee and Kang (2013); Serpell et al. (2013); Silvius and Schipper (2014); Casey and Sieber (2016); GRI (2016); Nielsen et al. (2016); Aarseth et al. (2017); Darko and Chan (2017); Kivilä et al. (2017); Martens and Carvalho (2017); Cai and Li (2018); Chawla et al. (2018); Hedstrom (2018); Shen et al. (2018); Orji (2019); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); IMP (2020); PwC (2020); Hermundsdottir and Aspelund (2021); SASB (2021)
	e) Increasing the internal capabilities including the competence of the project participants and skilled labor (11)	e) Stubbs and Cocklin (2008); Robichaud and Anantatmula (2011); Casey and Sieber (2016); Kivilä et al. (2017); Mustapha et al. (2017); Shen et al. (2018); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020); Pham et al. (2020)
	f) Innovation including both technical and management innovation (10)	f) Collins (2011); Lee and Kang (2013); Kivilä et al. (2017); Martens and Carvalho (2017); Cai and Li (2018); Shen et al. (2018); Orji (2019); Ziolo and Sergi (2019); Pham et al. (2020); Hermundsdottir and Aspelund (2021)
	g) Right leadership and top management support (8)	g) Henriques and Richardson (2004); Hwang and Ng (2013); Casey and Sieber (2016); Aleixo et al. (2018); Chawla et al. (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019); Pham et al. (2020)
	h) Sustainability reporting including CSR, GRI, ESG, SASB	h) Gomes and da Silva (2005); Adams and Frost (2008); Stubbs and Cocklin (2008); Collins (2011); Eweje and Alakavuklar (2014); GRI (2016); Martens and Carvalho (2017); IMP (2020); PwC (2020); Ziolo and Sergi (2019); Rubino and Veltri (2020); SASB (2021)

Table 4 (continued). Sustainability drivers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific driver.

Financial factors 42 different literature talked about it	a) Economic benefits including value creation, higher internal rates of returns and profits, cost savings, efficiency and effectiveness (41)	a) Zhou and Lowe (2003); Hodges (2005); Labuschagne et al. (2005); Shafii et al. (2006); Adams and Frost (2008); Hoffman and Henn (2008); Pearce (2008); Stubbs and Cocklin (2008); Sev (2009); Abidin (2010); Norman et al. (2010); Collins (2011); Robichaud and Anantatmula (2011); Zhang et al. (2011); Kiron et al. (2012); Robinson (2012); Shari and Soebarto (2012); Lee and Kang (2013); Serpell et al. (2013); Silvius and Schipper (2014); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Darko and Chan (2017); Kivilä et al. (2017); Mustapha et al. (2017); Cai and Li (2018); Chawla et al. (2018); Durdyev et al. (2018); Ismael and Shealy (2018); Shen et al. (2018); Silvius and de Graaf (2019); Walker et al. (2019); Yoshino et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020);IMP (2020); PwC (2020); Hermundsdottir and Aspelund (2021); SASB (2021)
	b) Financial support including green banks, green bonds, capital loans and products insurance (4)	b) Aleixo et al. (2018); Cai and Li (2018); Yoshino et al. (2019); Ziolo and Sergi (2019)
Promoting awareness 33 different literature talked about it	a) Promoting awareness and diffusion of knowledge (14)	a) Collins (2011); Lai et al. (2012); Robinson (2012); Shari and Soebarto (2012); Serpell et al. (2013); Gan et al. (2015); Klakegg (2015); Darko and Chan (2017); Aleixo et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Orji (2019); Karji et al. (2020); Pham et al. (2020)
	b) Addressing all sustainability aspects, not just focusing on the financial gains, understanding the bigger picture; a holistic view (23)	b) Zhou and Lowe (2003); Henriques and Richardson (2004); Du Plessis (2007); Pearce (2008); Sev (2009); Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Gan et al. (2015); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Mustapha et al. (2017); Aleixo et al. (2018); Chawla et al. (2018); Silvius and de Graaf (2019); Tokbolat et al. (2019); Walker et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Karji et al. (2020)
Stakeholders' role 26 different literature talked about it	a) Stakeholders' involvement, contribution, and the pressure towards sustainability integration (16)	a) Robinson (2012); Eskerod and Huemann (2013); Lee and Kang (2013); Eweje and Alakavuklar (2014); United Nations (2015); Ali et al. (2016); Nielsen et al. (2016); Darko and Chan (2017); Kivilä et al. (2017); Cai and Li (2018); Chawla et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019); Walker et al. (2019); Amankwah-Amoah and Syllias (2020); Hermundsdottir and Aspelund (2021)
	b) Actions by the decision makers, policy makers and private sector (8)	b) Shari and Soebarto (2012); Hwang and Ng (2013); Eweje and Alakavuklar (2014); Darko and Chan (2017); Chawla et al. (2018); Mavi and Standing (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019)
	c) Customer requirements and demands (8)	c) Henriques and Richardson (2004); Abidin (2010); Collins (2011); Shari and Soebarto (2012); Darko and Chan (2017); Cai and Li (2018); Walker et al. (2019); Hermundsdottir and Aspelund (2021)
	d) Role of owners and project managers (9)	d) Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Hwang and Ng (2013); Gan et al. (2015); Nielsen et al. (2016); Kivilä et al. (2017); Manzaneque-Lizano et al. (2019); Silvius and de Graaf (2019)

Table 4 (continued). Sustainability drivers identified from different literature reviewed. Numbers in brackets show the total number of the sourced literature regarding a specific driver.

Standards and tools 22 different literature talked about it	a) Correct tools, market-based instruments, lifecycle cost analysis/perspective (13)	a) Zhou and Lowe (2003); Gomes and da Silva (2005); Hodges (2005); Sev (2009); Collins (2011); Lai et al. (2012); Ali et al. (2016); Nielsen et al. (2016); Darko and Chan (2017); Mustapha et al. (2017); Cai and Li (2018); Walker et al. (2019); Rubino and Veltri (2020)
	b) Standards and frameworks such as SASB, GRI, LEED and BREEAM (12)	b) Sev (2009); Norman et al. (2010); Collins (2011); Robichaud and Anantatmula (2011); Lee and Kang (2013); GRI (2016); Mustapha et al. (2017); Durdyev et al. (2018); Karji et al. (2020); PwC (2020); Rubino and Veltri (2020); SASB (2021)
Government policies and regulations 28 different literature talked about it	a) Policies, regulations and legislations (16)	a) Gomes and da Silva (2005); Du Plessis (2007); Abidin (2010); Collins (2011); Robinson (2012); Serpell et al. (2013); Eweje and Alakavuklar (2014); Gan et al. (2015); Portney (2015); Darko and Chan (2017); Howes et al. (2017); Durdyev et al. (2018); Shen et al. (2018); Orji (2019); Ziolo and Sergi (2019); Karji et al. (2020)
	b) Capital loans, financial support, economic incentives (16)	b) Henriques and Richardson (2004); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Serpell et al. (2013); Gan et al. (2015); Darko and Chan (2017); Aleixo et al. (2018); Cai and Li (2018); Durdyev et al. (2018); Shen et al. (2018); Orji (2019); Walker et al. (2019); Yoshino et al. (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020)
	c) Sets rules, laws, standards, guidelines and strict regulations (8)	c) Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Darko and Chan (2017); Kivilä et al. (2017); Ziolo and Sergi (2019); Karji et al. (2020); Hermundsdottir and Aspelund (2021)
	d) Encouraging educational institutes, research and innovation (6)	d) Henriques and Richardson (2004); Zhang et al. (2011); Darko and Chan (2017); Cai and Li (2018); Durdyev et al. (2018); Shen et al. (2018)
Others 8 different literature talked about it	a) Advancement in technology and market demand regarding sustainability (7)	a) Robichaud and Anantatmula (2011); Zhang et al. (2011); Robinson (2012); Nielsen et al. (2016); Darko and Chan (2017); Shen et al. (2018); Orji (2019); Karji et al. (2020)

4.2 FINDINGS FROM THE INTERVIEWS

The results from the conducted interviews are compiled in similar manner, in form of barriers and drivers, shown in Table 5 and Table 6, respectively. As mentioned earlier, a total of 18 interviews were conducted with professionals working in different industries.

Based on Table 5, both the *organizational factors, and time and financial constraints* turned out to be the most stated barriers as all the interview objects (18) talked about it. The barriers lagging behind them are *lack of knowledge and awareness (15), political and government role (10), stakeholders' perspective (9), others (7) and lack of established standards, frameworks, and tools (5).* In similar manner, using Table 6, the *organizational aspects* is the most accentuated sustainability driver (18), followed by *financial factors (17), government policies and regulations (15), promoting awareness (13), stakeholders' role (9), standards and tools (8) and others (4).*

However, these numbers do not necessarily show the importance of each barrier and driver in terms of their rankings because these individual barriers and drivers were not specifically asked from the interview objects. The barriers and drivers mentioned by the interviewees were those they had in their minds during the interview. Moreover, it was noted that due to the time limitation of the interview, the interview objects could not manage to think or talk about all the barriers and drivers in due time.

Furthermore, half of the interviewed organizations are doing the sustainability reporting officially when asked about it and they are medium and big size enterprises. The other half belong to micro and small organizations which are not doing any sustainability reporting at the moment. However, all the 18 organizations have sustainability included in their mission statement or as a part of their core business strategy.

Additionally, all the interviewed objects believe that the three sustainability pillars are equally important but 13 of them considered the environmental aspect as the most important in their organizations in comparison to economic (10) and social (8) dimensions of sustainability. Moreover, majority of the interview objects considered the PM success based on the cost, time and quality factors first, and then in addition, the sustainability, impact and relevance parts too except the few public organizations who measured the success of the projects more on the non-traditional factors, that is, sustainability, impact and relevance aspects.

Table 5. Sustainability barriers identified from the interviews. Numbers in brackets show the total number of the interviewees regarding a specific barrier.

Barriers	Sub factors	Source (interview object)
Organizational factors 18 interviewees talked about it	a) Lack of capability (16) b) Too much additional work for employees (3) c) Sustainability issues looked upon as compliance issues (2) d) Problem of green washing (4) e) Lack of priority, commitment (5) f) Difficult to measure social aspects of sustainability (10) g) Lack of data and information regarding sustainable solutions (3) h) Inconvenient organization's policies including the responsibility (5) i) Lack of leadership and top management support (4) j) Hard to build a proper strategy due to changing trends in the society (1) k) Lack of internal communication (1) l) Stuck up with the old technology and methods, do not want change (8) m) Lack of culture regarding sustainability importance (2)	a) 1, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 b) 12, 14, 18 c) 3, 4 d) 7, 11, 14, 15 e) 5, 6, 13, 14, 17 f) 2, 3, 4, 6, 7, 8, 11, 12, 16, 17 g) 5, 6, 11 h) 5, 6, 10, 13, 15 i) 6, 10, 13, 15 j) 6 k) 14 l) 5, 6, 9, 10, 11, 12, 13, 14 m) 1, 13
Time and financial constraints 18 interviewees talked about it	a) Inadequate finances, budget especially for small firms (3) b) Budgeting year by year act as a hindrance (1) c) Hike in import prices due to foreign exchange differences (1) d) Lengthy approval processes (2) e) Long term process, adds more time (13) f) More cost, high additional investment (15) g) Organizations and clients want quick results (3) h) Misconception about environmentally friendly options being expensive (1)	a) 2, 13, 14 b) 13 c) 1 d) 1, 11 e) 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 17 f) 1, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18 g) 6, 7, 15 h) 12
Lack of knowledge and awareness 15 interviewees talked about it	a) Lack of knowledge regarding how to incorporate sustainable activities in business (13) b) Sustainability being a new, complex concept (5) c) People think that sustainability is only related to the environment (2) d) People do not understand the big picture, lack of holistic view (4)	a) 3, 4, 5, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18 b) 1, 11, 14, 15, 17 c) 7, 15 d) 7, 8, 9, 13
Stakeholders' perspective 9 interviewees talked about it	a) Lack of sustainable demand from the clients (6) b) Mentality of the people that sustainability will fade away/not important (9) c) Lack of building owner's role to implement sustainable actions as most of the organizations' buildings are rented offices (2) d) Conflicting issues among stakeholders "selvråderett" (4) e) Resistance from the employees (1) f) Lack of responsibility, someone else should do sustainable work (1) g) Media and public focusing on specific sustainable issues, neglecting others (1)	a) 5, 9, 10, 12, 14, 17 b) 1, 3, 4, 5, 8, 9, 10, 13, 15 c) 5, 13 d) 5, 6, 9, 13 e) 13 f) 18 g) 6
Lack of established standards, frameworks, and tools 5 interviewees talked about it	a) Lack of quantitative measures to choose the best environmentally friendly options (2) b) Lack of tools and framework (5)	a) 3, 4 b) 3, 4, 10, 11, 16

Table 5 (continued). Sustainability barriers identified from the interviews. Numbers in brackets show the total number of the interviewees regarding a specific barrier.

Political and government role 10 interviewees talked about it	• Mixed views about government policies and regulations (3) • Government is lagging behind industries regarding sustainability (4) • Lack of regulations, no law regarding sustainability; companies doing it (5) • voluntarily • Lack of clear government approach and knowledge (4) • Conflicting laws (2) • Insufficient framework for sustainability, lack of policies, incentives (5) • Focusing on cheapest solutions during procurement (3)	a) 1, 6, 8 b) 7, 10, 11, 15 c) 1, 5, 10, 11, 15 d) 2, 6, 11, 15 e) 12, 15 f) 1, 2, 10, 11, 15 g) 1, 6, 11
Others 7 interviewees talked about it	• Market conditions in favor of non-sustainable solutions (3) • Dropped in revenues due to covid-19 (2) • Uncertainty and risk (4)	a) 6, 10, 11 b) 6, 14 c) 11, 12, 16, 18

Table 6. Sustainability drivers identified from the interviews. Numbers in brackets show the total number of the interviewees regarding a specific driver.

Drivers	Sub factors	Source (interview object)
Organizational aspects 18 interviewees talked about it	a) Implementing organizational activities having minimal negative environmental effects (15) b) Trainings of the employees, competence development (5) c) Good working conditions, gender equality, sickness absence (11) d) Performance measurement system regarding sustainability (2) e) More satisfied customers (sustainability conscious) (4) f) Gathering/sharing information with members and other organizations (5) g) Enhanced reputation, branding, image and pride (15) h) An attractive place to work (11) i) Increased number of customers and projects (10) j) Business opportunity (5) k) Competitive advantage (9) l) Drives innovation and change (5) m) Setting up targets for eco-label (3) n) Embedding sustainability in PM (10) o) Encouraging customers to implement sustainability (15) p) Clear strategy, priority and responsibility (6) q) Support from top management and leadership (5) r) Clear communication (3) s) Understanding the stakeholders' demand (3) t) Working/cooperating with suppliers (6) u) Organization becomes more interconnected internally (1) v) Create a culture that supports sustainability importance (2)	a) 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17 b) 1, 3, 4, 11, 15 c) 2, 3, 4, 5, 6, 8, 10, 13, 14, 15, 17 d) 1, 2 e) 1, 2, 10, 17 f) 8, 13, 16, 17, 18 g) 1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17, 18 h) 3, 4, 5, 6, 7, 9, 11, 12, 15, 17, 18 i) 1, 5, 6, 7, 8, 9, 10, 15, 17, 18 j) 2, 9, 10, 11, 15 k) 3, 4, 5, 7, 9, 11, 15, 17, 18 l) 3, 4, 6, 9, 17 m) 5, 13, 14 n) 1, 2, 3, 4, 5, 7, 9, 15, 16, 17 o) 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 17, 18 p) 7, 9, 13, 14, 15, 18 q) 13, 14, 15, 16, 18 r) 2, 11, 14 s) 6, 14, 17 t) 6, 9, 13, 14, 15, 17 u) 18 v) 1, 7
Financial factors 17 interviewees talked about it	a) Adds value in the long-term; more profit (13) b) Attracts diversified investors (4) c) More revenue from the customers side (2) d) Cost savings, cost and energy efficient (13) e) Not all sustainable solutions are costly (3) f) Improved productivity, lead to positive effects (2) g) Taking smaller steps is important towards long term process (5) h) Green bonds and loans (2)	a) 1, 2, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, 18 b) 2, 6, 15, 18 c) 2, 9 d) 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17, 18 e) 5, 12, 18 f) 6, 10 g) 7, 8, 9, 13, 15 h) 16, 18
Promoting awareness 13 interviewees talked about it	a) Realization of sustainability being an important phenomenon; creating awareness (6) b) Knowledge development; excites the employees and development learning (3) c) Educating stakeholders about sustainability (6) d) Understanding that sustainability is a bigger picture (4)	a) 1, 5, 9. 11, 14, 15 b) 3, 4, 17 c) 6, 9, 11, 14, 15, 17 d) 7, 8, 9, 16

Table 6 (continued). Sustainability drivers identified from the interviews. Numbers in brackets show the total number of the interviewees regarding a specific driver.

Stakeholders' role 9 interviewees talked about it	a) Clients' demanding sustainability (9)	a) 1, 2, 3, 4, 6, 7, 10, 16, 17
Standards and tools 8 interviewees talked about it	a) Developing sustainability tools, digital tools, guiding the PM (4) b) Using lifecycle cost analysis instead of initial stage cheapest solutions (7) c) BREEAM specification (2)	a) 5, 7, 9, 15 b) 5, 7, 9, 12, 13, 16, 17 c) 16, 17
Government policies and regulations 15 interviewees talked about it	a) Policies and legislations in favor of sustainable development (10) b) Incentives including research allowances in relation to sustainability (12) c) Strict regulations including the more tougher greenhouse gas emissions taxation and the EU taxonomy (7) d) Clear indication and stability regarding the sustainable development (3)	a) 1, 3, 4, 6, 8, 9, 12, 16, 17, 18 b) 1, 5, 6, 7, 8, 9, 10, 12, 14, 16, 17, 18 c) 6, 7, 8, 9, 10, 11, 18 d) 5, 7, 18
Others 4 interviewees talked about it	a) Changing market conditions in favor of sustainability (3) b) EU green deal (2) c) Technology, digitalization (1)	a) 3, 4, 9 b) 9, 15 c) 9

4.2.1 Why economic part is important for businesses in general

The interviewed persons emphasized about the significance of the economic aspect in general as well as the positive and the negative effects of the sustainability. They are highlighted as the following with the numbers in brackets representing the interviewed objects.

- Being in business, economy is very important, it cannot go away from a business, it is the fundamental of doing business (1, 3, 4, 11, 12, 14).
- *"Economic aspect is very important because it is the starting steppingstone and the backbone of sustainability"* (1).
- *"No green future without profits; sustainability has to be economically feasible to succeed"* (2), *"sustainability has to make the economic sense otherwise we have to shut the door and turn off the lights"* (7), *"you cannot cope with loss for many years"* (8), if you are losing money every year, it would not help and the whole project will stop, and we would be out of the business within a year (1, 11), "*without earning money and profits, we would be out of the business"* (15), *"if the business is not economical sustainable, it will not last"* (18).
- *"Sustainability responsibility shifted from the development team to the financial team, which is quite positive, taking all three dimensions of sustainability. On the financial side, we are stock listed, and the investors are talking about the other factors (sustainability related), but not purely the financial ones"* (6).
- *"Of course, we have to make money, that is kind of why a company exists"* (9).
- *"Like everyone else in the industry, we need to make money"* (17).
- *"We focus on the transformation and making sure that it makes money as well"* (11).
- *"Everybody is in the sustainability just for the money"* (10).
- *"Making money from sustainable practices is the key to actually ensuring the financial benefits and not having them as a separate project on the side but integrating them in the core business"* (9).
- *"Businesses have to make sure that they can continue every year"* (11).
- *"There should be separate enough finances for the sustainable projects and activities"* (14).

Figure 13 shows the importance of the economic for businesses based on the interview outcomes.

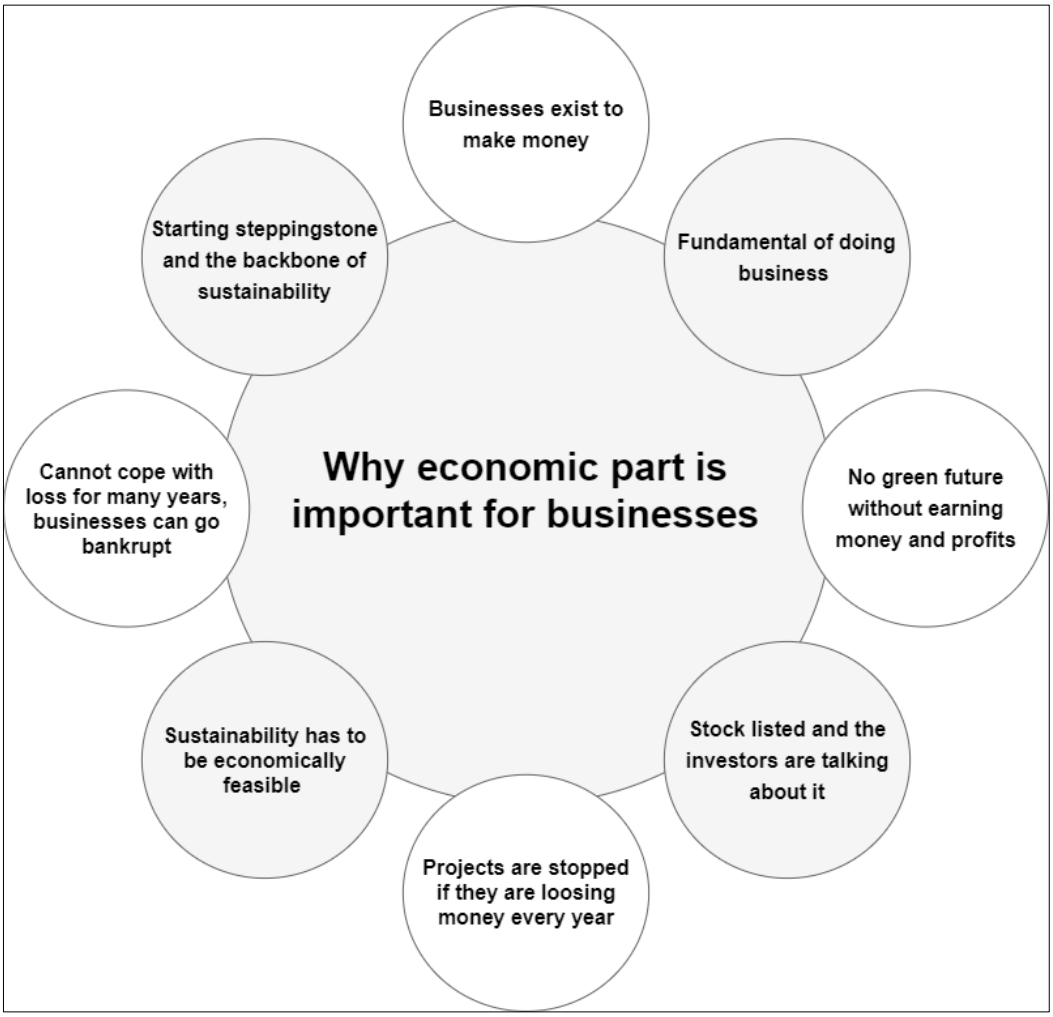


Figure 13. Importance of the economic aspect in businesses. [Source: own creation, based on interviews]

4.2.2 Positive things about sustainability

- *"Sustainability is the biggest shift happening right now and it is the biggest business opportunity of our time"* (2).
- *"Research shows that sustainable companies perform better financially"* (9).
- *"Energy efficient buildings lower the electricity bills and lot of savings as a result"* (8).
- *"There might be some projects which might not return positively but still you will gain the valuable experience from those projects which definitely help in future projects to be more economical feasible"* (7).
- *"5% of the total cost of our organization is through offices, 70% cost is related to the salaries of the employees, improving the work environment lead to better productivity and positive impact on financial resources"* (5).

- *"With time, sustainability will give us more projects as a result of good reputation by doing sustainable activities in projects, therefore, having a positive impact on the financial resources. When companies get profit in return from sustainability activities, they then invest more in sustainable projects"* (10).
- *"There is good economy in sustainability including the whole supply chain"* (13).
- *"Incorporating sustainability results in positive financial returns. And most of this excess return is linked to the environmental aspect"* (18).

4.2.3 Negative things about sustainability

- *"There are inadequate finances/budget for small firms regarding sustainable practices"* (2).
- *"If you are in a new market like sustainability, the success rate is 5% of your new product compared to if you launch your product in an existing market which is 50%. Some companies are not getting the higher prices in the market even though their carbon emission is less than their competitors"* (11).
- *"Companies have struggled and faced problems in making profits from sustainability. Small and medium companies do not have time luxury to run extra processes related to sustainability even though they will see that over time the same work will be easier done. Bad finance companies can go bankrupt"* (14).
- *"I do not think that we nor our competitors can pay for sustainable development in the long term; too much cost"* (17).

4.2.4 Key highlights regarding PM

- *"Time, cost and quality are the most important primary success factors of PM for us since we are still amateur regarding sustainability"* (1).
- Public clients/organizations are focused less on time and cost, and more on the positive long-term effects including the sustainability (3, 4, 12).
- *"Project management purpose is sort of acting as a bridge to those visions and strategies and to turn them into deliveries and results and the long-term benefits"* (3).
- *"Project managers can play a vital role in promoting sustainability in an organization"* (4).
- A lot of value creation in an organization is happen through projects, so it is sort of very important engine (3, 4).

- *"The impact of quantitative assessments is much heavier than those of qualitative ones. For example, Oslo municipality have now said that when they do contract in large building projects, there should be 20% weight on criteria to have environmentally friendly options on the ground. So, that is the way of forcing the contractors to be environmentally friendly"* (3).
- *"We encourage everybody to have sustainability in the projects. PM is an agile way of making projects out of changes you want to achieve"* (5).
- *"It is meaningful to do the little projects even if they are not economic related because their contribution is very small compared to 25-year long infrastructure project. But at the same time, it is the small things that make it meaningful at the society level"* (7).
- *"I think the project managers need to have the knowledge about the sustainability and how to measure the sustainability"* (8).
- *"We are working very hard now trying to incorporate sustainability assessments and factors as part of the general project management"* (9).
- *"It is very important to have a good management plan when you have a lot of stakeholders and different milestones"* (11).
- *"We also have made a strategy, connecting sustainability to all of our building projects. For instance, how project management shall act, what kind of materials, level of emissions and things like that. We need to start in the very early planning phase to incorporate the sustainability requirements into the project value chain activities. So, it is very important to start from the concept development phase"* (16).
- *"If you have sustainable goal in your planning then it is much easier to achieve. You can organize and address these issues not only in start but throughout the whole project. It is much easier to follow up as well. It helps us to plan and aim towards sustainable activities in the projects"* (17).
- *"Early contractor involvement can help in solving these issues and also to address the sustainability issues too and then the cost of sustainable choices will be much lower"* (17).

In the next coming chapter, both the results from the interviews and the literature findings will be analyzed and discussed to talk about the different sustainability barriers and their associated drivers to promote the sustainable development. And how the sustainability impacts the financial resources of an organization.

5 DISCUSSION

The main purpose of this research study was to discover the factors that have hampered the organizations towards incorporation of sustainability principles and how these barriers can be surpassed to move in the direction of sustainable development. In the following sub-segments, these barriers and drivers have been discussed based on the literature reviewed and the conducted interviews, subsequently. Furthermore, the consequences of sustainable practices on the economic resources of a firm are also discussed as well to answer the research topic.

5.1 SUSTAINABILITY BARRIERS

As stated before, one of the sub-questions (RQ1) revolved around the main research theme was to identify the different barriers that hinders the implementation of sustainability in an organization. These various obstacles are discussed below, each having its own significance.

5.1.1 Organizational factors

The organizational factors along with time and financial constraints are the topmost significant barriers of sustainability implementation based on both the literature findings and the conducted interviews. In the organizational factors, the sub-factor *lack of capability* is the most important element of hindrance according to the different sourced literature and the interviews as well. This comprises of *lack of skills including the lack of human resources and incompetent employees* (Shafii et al. (2006); Zhang et al. (2011); Hwang and Ng (2013); Lee and Kang (2013); Eweje and Alakavuklar (2014); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Durdyev et al. (2018); Shen et al. (2018); Tokbolat et al. (2019); Walker et al. (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020); Karji et al. (2020); Pham et al. (2020)), *limited experience* (Zhou and Lowe (2003); Abidin (2010); Hwang and Ng (2013); Aghaegbuna et al. (2020)), *lack of innovation activities* (Stewart et al., 2016), *ineffective procurement systems* (Shafii et al., 2006), *difficulties related to the decision making processes and green specifications in the contract details* (Stewart et al. (2016); Aghaegbuna et al. (2020)) and *inability to capture the benefits* of sustainability (Gomes and da Silva (2005); Zhang et al. (2011); Amankwah-Amoah and Syllias (2020)).

Although the interviewees did not talk about specifically regarding these sub-factors but they do stated the *lack of capability* within an organization as a barrier. Couple of interview objects (8 and 14) linked it to the *size of the organization* as well, that is, small size firms face more capability problems in relation to the big organizations. The *size of the organization* was also

stressed as the barrier for embedding sustainability principles according to the literature (Abidin (2010); Serpell et al. (2013); Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Amankwah-Amoah and Syllias (2020)).

Another crucial dynamic regarding organizational factors is the *lack of priority and seriousness* as shown in Table 3 and Table 5. This further includes preferring the *non-sustainable practices* (Serpell et al. (2013); Stewart et al. (2016); Aleixo et al. (2018); Blanco-Portela et al. (2018); Durdyev et al. (2018); Orji (2019); Pham et al. (2020)) which is related to *stuck up with old technology and methods* as mentioned by the interviewed objects (5, 6, 9, 10, 11, 12, 13 and14). This might lead to the *overconsumption of the resources* containing the natural, economic and human factors (Chawla et al., 2018). In addition, *focusing on the economical pillar of sustainability*, neglecting the environmental and social aspects is another problem (Labuschagne et al. (2005); Abidin (2010); Collins (2011); Eweje and Alakavuklar (2014); Gan et al. (2015); Howes et al. (2017); Durdyev et al. (2018); Manzaneque-Lizano et al. (2019); Orji (2019); Tokbolat et al. (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020)).

However, this is not entirely correct according to the interviewed results. 10 of the interviewed organizations have more focused on the financial aspect of sustainability because being in business, economy is very important, it is the starting steppingstone, the backbone of sustainability otherwise the firms will shut down eventually if they do not get the positive returns on their sustainable investments. But that does not mean that the firms are neglecting the environmental and social aspects because all the interviewees stated that all the three pillars of sustainability are equally important. This can also be justified by Walker et al. (2019) and Hermundsdottir and Aspelund (2021) who mentioned that the environmental aspect of sustainability had the main focus, neglecting the other two pillars by the organizations. This means that it depends on the size of the organization and the nature of its core business in putting more emphasis on one sustainability pillar in relation to the others.

Moreover, as mentioned by Collins (2011), *measuring social aspect* of sustainability is harder compared to economic and environmental dimensions. This has been supported by the interviewed objects (2, 3, 4, 6, 7, 8, 11, 12, 16 and 17) who had the same views regarding this statement. Furthermore, *lack of institutional framework* also plays a major role in acting as an internal hindrance towards sustainable development. For example, *insufficient policies and its implementation* (Zhang et al. (2011); Stewart et al. (2016); Amankwah-Amoah and Syllias (2020)), *complex bureaucracy* (Aleixo et al. (2018); Blanco-Portela et al. (2018)), *lengthy approval process* (Hwang and Ng (2013); Aghaegbuna et al. (2020), *lack of workers' training*,

heavy work commitments and welfare packages (Shafii et al. (2006); Collins (2011); Gan et al. (2015); Aleixo et al. (2018); Blanco-Portela et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Orji (2019); Tokbolat et al. (2019); Karji et al. (2020)) and *lack of scope and strategies including the lack of business case and sustainability reporting* (Du Plessis (2007); Collins (2011); Serpell et al. (2013); Aleixo et al. (2018); Blanco-Portela et al. (2018); PwC (2020)) hampers the embedding of sustainability principles in the organizations.

Likewise, the interviewees also talked about *inconvenient organizational policies* including the *lack of responsibility of employees, lack of priority and commitment, too much additional workload for employees* which are in line with the literature findings as the barriers towards sustainability incorporation. The literature cited the obstacles of *the lack of support from management and leadership* (Eweje and Alakavuklar (2014); Gan et al. (2015); Stewart et al. (2016); Nielsen et al. (2016); Aleixo et al. (2018); Blanco-Portela et al. (2018); Orji (2019); Amankwah-Amoah and Syllias (2020); Karji et al. (2020)) which are also stated by the interviewed objects (6, 10, 13 and 15). Simlarly, the *lack of information and input data regarding sustainable solutions* were also mentioned in both the literature (Zhou and Lowe (2003); Lai et al. (2012); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016): Darko and Chan (2017); Aleixo et al. (2018); Durdyev et al. (2018); Tokbolat et al. (2019); Aghaegbuna et al. (2020) and the interviewees (5, 6 and 11)).

Additionally, some of the interview objects as shown in Table 5, also stated the sustainability problems of *green washing, compliance issues* to meet the minimum required sustainability standards in the laws, *the lack of culture* and *the lack of internal communication* in the organization as further challenges which were not highlighted that much in the literature but are important in their opinions.

5.1.2 Time and financial constraints

Time and financial constraints are the biggest obstacles of implementing sustainability. Because incorporating sustainable practices *costs more* and involve *high initial investment* according to numerous authors and majority of the interviewed objects as shown in Table 3 and Table 5, respectively. A couple of big organizations did not consider the financial factors to be a challenge, but they did recognize the problems of sustainability being a *long-term* process, *adding more time* to projects compared to traditional ones. This challenge of sustainability being a *long-term* view was stated by various sources of literature and by majority of the interviewees too as shown in the corresponding tables (Table 3 and Table 5). As a consequence,

projects can be delayed according to various interviewees and *cost overruns* are occurred as a result (Shari and Soebarto (2012); Hwang and Ng (2013); Gurjar (2016); Chofreh et al. (2019); Aghaegbuna et al. (2020)). Moreover, there is *wrong perception of higher costs* associated with sustainable practices (Zhou and Lowe (2003); Shafii et al. (2006); Adams and Frost (2008); Pearce (2008); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Serpell et al. (2013); Shen et al. (2018); Yoshino et al. (2019); Aghaegbuna et al. (2020). This factor was also supported by the interviewed object 12 who talked about the *misconception* among the people that environmentally friendly options are expensive in comparison to normal things.

Furthermore, the *lack of financial resources and funding including the lack of support from financial institutions* are other challenges in this category. The interviewed objects (2 and 13) also cited this issue of *inadequate finances* as barrier towards sustainable development especially for the small firms. Similarly, according to the interviewee 13, the budgeting of the finances year by year also act as an obstacle towards embedding the sustainability in the organization. Because the leftover money at the end of the year is not rolled over in the upcoming year's budget. As a consequence, the remaining money is spent on the non-sustainable activities. For instance, the interviewed object gave the example of an old joke about the Norwegian defense who will go to the shooting fields and empty their bullets in December so that they can buy again the new bullets in January. This kind of inappropriate budget model and not giving the organizational entities to roll over the remaining funds over the next coming years is bad choice and a hurdle towards implementation of sustainable development.

In addition, the interviewee 1 talked about the hindrance of the *hike in import prices* of sustainability related material, technology, equipment, and the like due to *unstable foreign exchange differences*, for example, rise in the US dollar rate. This lead to reevaluation of the costs of the imported material, requiring reapprovals from the higher management regarding the new higher finances; resulting in the *lengthy approval processes*, ultimately. This *lengthy approval processes* were also highlighted by Hwang and Ng (2013) and Aghaegbuna et al. (2020). Furthermore, this issue of *higher import prices* might not be a major problem for the organizations who are procuring the materials locally or operating in a country with stable foreign exchange rates but is definitely a significant problem for firms in non-stable scenarios.

Besides, some authors viewed that sustainable activities have *low economic benefits and profits* (Gan et al. (2015); Klakegg (2015); Kivilä et al. (2017); Amankwah-Amoah and Syllias (2020); Pham et al. (2020)). However, this claim has not been verified through the interview process as none of the interview objects talk about it. Nonetheless, the *long payback period*, *costly*

investments and more time linked with sustainable development are generally discouraged by the organizations; leading to in favor of the short-term trends and investments according to a variety of the reviewed literature. This sub-component can be confirmed by the interview objects (6, 7 and 15) as the organizations and clients want quick results; short-term vision.

5.1.3 Lack of knowledge and awareness

The third most significant barrier of sustainability is the *lack of knowledge and awareness* based on the combined results of the interviews and the literature reviewed. The *lack of knowledge, understanding and information* are the most cited element in this category both in the literature and the interviews, shown in Table 3 and Table 5. The *lack of knowledge and understanding* of sustainability principles, limits its implementation in the organization (Zhou and Lowe (2003); Shafii et al. (2006); Adams and Frost (2008); Abidin (2010); Collins (2011); Zhang et al. (2011); Shari and Soebarto (2012); Lee and Kang (2013); Serpell et al. (2013); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Aleixo et al. (2018); Durdyev et al. (2018); Chofreh et al. (2019); Tokbolat et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020)). Moreover, SMEs *lack sustainability related knowledge* (Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Amankwah-Amoah and Syllias (2020)). Similarly, there is *lack of knowledge* regarding how to incorporate sustainable activities in business according to various interviewees (3, 4, 5, 7, 8, 9, 10, 11, 13, 15, 16, 17 and 18).

In addition, the *lack of awareness* regarding the sustainability is another significant issue. Because customers are still *unaware* about the sustainability concept (Gomes and da Silva (2005); Abidin (2010); Støre-Valen and Buser (2019)). There is *lack of awareness and poor understanding* regarding the advantages of integrating sustainability (Zhou and Lowe (2003); Shari and Soebarto (2012); Gan et al. (2015); Orji (2019); Støre-Valen and Buser (2019); Tokbolat et al. (2019)). Similarly, employees are *unaware* about using the correct sustainability methods and procedures (Hwang and Ng (2013); Aghaegbuna et al. (2020)).

Furthermore, this *lack of knowledge and awareness* is also a consequence of sustainability being *a new, contested and complex concept with a vague and diverse definition*; making it difficult to understand and conceptualize by the professionals (Zhou and Lowe (2003); Shafii et al. (2006); Du Plessis (2007); Sev (2009); Abidin (2010); Collins (2011); Gan et al. (2015); Portney (2015); Aarseth et al. (2017); Aleixo et al. (2018); Chofreh et al. (2019)). This was also endorsed by the interviewed objects (1, 11, 14, 15 and 17) but not all the interviewees agree to

it since this is not a problem to them anymore. It could had been a challenge in the past but not in present times as mentioned by the interviewees.

Moreover, according to the interviewed objects (7 and 15), some people think that sustainability is related to the environment only. They do not understand the big picture and *lack a holistic view* (7, 8, 9 and 13) which also act as a hindrance towards implementation of sustainable practices in project.

5.1.4 Stakeholders' perspective

The stakeholders' perspective about sustainability turns out to be the fourth important barrier of sustainability on the combined basis of the literature and the interview outcomes. In this area of challenge, the *lack of willingness, commitment, cooperation, interest and mentality* of the stakeholders play a crucial role in working against the integration of sustainable practices according to numerous authors. For instance, *lack of willingness* to invest in sustainable solutions (Zhou and Lowe (2003); Stewart et al. (2016); Støre-Valen and Buser (2019); Manzaneque-Lizano et al. (2019); Karji et al. (2020)) and *lack of commitment and interest* from senior management (Klakegg (2015); Nielsen et al. (2016); Stewart et al. (2016); Kivilä et al. (2017); Aleixo et al. (2018); Blanco-Portela et al. (2018); Orji (2019); Karji et al. (2020)) are the critical obstructions. However, *lack of willingness, commitment and interest* were not considered as the barriers since the interviewed objects have the sustainability related positive leadership. But the interviewees (5 and 13) did mention about the lack of building owner's willingness and interest to integrate the sustainable actions as most of the organizations' buildings are rented offices and they simply cannot modify the internal structure including the ventilations and heating systems without the buildings owners' permission.

Nevertheless, this does not mean that these specific factors are non-existent in reality because *lack of willingness, commitment and interest* are related to the additional cost and time constraints as mentioned earlier. For example, there is *lack of demand from clients* as they want *cheap solutions and to avoid the uncertainty and risk* element associated with the sustainable practices (Zhou and Lowe (2003); Gomes and da Silva (2005); Shafii et al. (2006); Abidin (2010); Hwang and Ng (2013); Gan et al. (2015); Darko and Chan (2017); Durdyev et al. (2018); Shen et al. (2018); Støre-Valen and Buser (2019); Tokbolat et al. (2019); Walker et al. (2019); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)). This is also in accordance with the interviewed results where the interviewed objects (5, 9, 10, 12, 14 and 17) also talked about the *lack of sustainable demand* from the clients. Moreover, the interviewee

(18) also connected this *lack of willingness, commitment and interest* to the *lack of responsibility*, for instance, employees say that someone else should do the sustainable work, not them.

Additionally, there are *conflicts among stakeholders* which also hampers the sustainability implementation due to the different individual interests of each stakeholder (Zhang et al. (2011); Klakegg (2015); Stewart et al. (2016); Stewart et al. (2016); Kivilä et al. (2017); Manzaneque-Lizano et al. (2019); Aghaegbuna et al. (2020)). Interviewees (5, 6, 9 and 13) also verified this obstacle and one of the interviewed objects gave the example about the typical Norwegian term "*selvråderett*" which when translate to English means *'right to self-govern'*, that is, not taking orders from others.

Furthermore, there is also *internal resistance from the employees* regarding the change of organizations' traditional practices (Shafii et al. (2006); Hwang and Ng (2013); Portney (2015); Darko and Chan (2017; Howes et al. (2017); Aleixo et al. (2018); Blanco-Portela et al. (2018); Durdyev et al. (2018); Orji (2019); Aghaegbuna et al. (2020); Karji et al. (2020); Pham et al. (2020)). This was also mentioned by the interview object (13) but the rest of interviewees did not talk about it. Therefore, this might be related to each individual employees' *attitude, behavior and mentality* towards sustainable development. One interesting issue which was not highlighted by the literature and only mentioned by the interviewed object (6) was related to the role of media and public focusing on the specific sustainability issues one week while neglecting the others and then changing the attention on another explicit sustainability problem next week and so on; making it harder for the organizations to make a clear sustainability related strategy.

5.1.5 Lack of established standards, framework and tools

The *lack of established standards, framework and tools* are the least cited and talked about obstacles. There are *lack of universally accepted standards* including the *quantitative standards* (Collins (2011); Gan et al. (2015)), frameworks (Shafii et al. (2006); Nielsen et al. (2016)), *lack of guidelines* regarding the planning, design, construction and operation (Gomes and da Silva (2005); Lee and Kang (2013); Silvius and Schipper (2014); Aarseth et al. (2017); Aghaegbuna et al. (2020)) and *benchmark* (Stewart et al., 2016) which could help in integration of sustainability activities.

Furthermore, there are *lack of methods and tools* (Pearce (2008); Lee and Kang (2013); Nielsen et al. (2016); Stewart et al. (2016); Darko and Chan (2017); Aleixo et al. (2018)) and *gaps in*

existing models, procedures and tools (Silvius and Schipper (2014); Gan et al. (2015); Ali et al. (2016); Aarseth et al. (2017); Darko and Chan (2017); Chawla et al. (2018); Chofreh et al. (2019); Silvius and de Graaf (2019); Aghaegbuna et al. (2020)) which also hinder the implementation of sustainability principles. For example, to calculate the costs of a sustainable project, *a contingency factor* is added to the estimate of a traditional project (Pearce, 2008) which do not give the correct estimates; results in costs over estimations of the sustainable projects which are then discouraged by the organizations, ultimately. According to Nielsen et al. (2016), *new frameworks and improved tools* are required for the integration of sustainability within the building design and construction industry.

The outcome of the interviews also mentioned the *lack of tools and framework, and lack of quantitative measures* to choose the best environmentally friendly options as the barriers but only by the small number of interviewees, that is, approximately 30%. This conclude that the *lack of established standards, framework and tools* are the least important barriers of sustainable development.

5.1.6 Political and government role

The political and government role falls under the external barriers' category of sustainability incorporation and are simply divided into the *lack of policies and regulations* elements. This *lack of political and government role* was mentioned by approximately half of the conducted interviews and the literature reviewed. The *lack of policies and insufficient framework* including *its ineffectiveness, the lack of clear government approach and knowledge, lack of national priority for sustainable development, lack of financial incentives, focusing on the cheapest solutions and neglecting the other pillars of sustainability* were stated by both the literature and the interviews. For example, one of the interviewees gave the example that the government would buy the virgin steel from China made with fossil fuel instead of buying the recycled steel from Norway based on renewable energy, that is, they prefer to choose the cheapest options.

The *lack of regulations and strict rules* including the *poor enforcement of legislation, no laws* are also acting as the hurdles towards sustainable development. There is a *lack of political will, legislation and enforcement* (Gomes and da Silva (2005); Shari and Soebarto (2012); Portney (2015); Darko and Chan (2017); Howes et al. (2017); Karji et al. (2020)). Companies are doing the sustainable practices voluntarily, there is no law which bounds them legally to do so as highlighted by the interviewed objects (1, 5, 10, 11 and 15). Additionally, *too much strict*

policies and regulations, *excessive regulations and bureaucracy* also resist the sustainable development (Shafii et al. (2006); Gan et al. (2015); Stewart et al. (2016); Tokbolat et al. (2019)).

Furthermore, *conflicting laws and outdated regulations*, demand the need for *new regulations and modifications* of the existing laws to accelerate the process of sustainable development (Abidin (2010); Gan et al. (2015); Howes et al. (2017); Ziolo and Sergi (2019) and the interviewed objects (12 and 15)). While some of the interviewees (1, 6 and 8) had mixed views about the government policies and regulations, some others (7, 10, 11 and 15) believe that the government is lagging behind the industries in terms of sustainable development. This depends on the type of the industry as well because the government is indeed working towards the sustainable development especially having more focus on the environmental aspect in the form of carbon taxes and giving financial incentives on the import of electric cars as the examples.

5.1.7 Others

This category contains the barriers which are not under the control of the organizations but have indeed significance effects, that is, external factors. For instance, *the lack of sustainable materials and technologies* available locally are restricting the firms towards incorporating sustainable activities (Gomes and da Silva (2005); Gan et al. (2015); Stewart et al. (2016); Darko and Chan (2017); Shen et al. (2018); Karji et al. (2020); Pham et al. (2020)) which as mentioned earlier by the interviewed object (1) might be related to the costly import prices due to high foreign exchange rates. In addition, there are elements of *uncertainty and risk* associated with sustainable practices which also restricts its implementation due to the consequences of the *increased time* and *cost overruns* of the activities, eventually (Zhou and Lowe (2003); Geraldi et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Klakegg (2015); Stewart et al. (2016); Darko and Chan (2017); Chawla et al. (2018); Walker et al. (2019); Yoshino et al. (2019); Aghaegbuna et al. (2020) and interviewed objects (11, 12, 16 and 18)).

Likewise, market conditions in favor of non-sustainable solutions also hampers the sustainable development process (Serpell et al. (2013); Stewart et al. (2016); Støre-Valen and Buser (2019); Tokbolat et al. (2019): Walker et al. (2019); Pham et al. (2020) and the interviewees (6, 10 and 11)). In addition, dropped in revenues of the organization's financial resources due to covid-19 pandemic has also stopped the firms from pursuing the sustainable development as stressed by the interviewed objects (6 and 14).

Lastly, *poverty and economic problems of developing countries* have also played an import part in acting as an obstruction towards the sustainable development (Gomes and da Silva (2005); Shafii et al. (2006); Du Plessis (2007); Serpell et al. (2013)) because environmental and social factors are not the main concerns in comparison to the financial aspects so that the developing countries can solve the challenges of poverty and for a better economic growth.

In a nutshell, all the potential sustainability barriers have been highlighted and discussed based on the literature and the interview outcomes. This gives the answer to the sub-research question 'RQ1' in relation to the identification of the various sustainability barriers. Figure 14 shows the above-mentioned sustainability barriers in a summarized form, illustrating the main factors only.

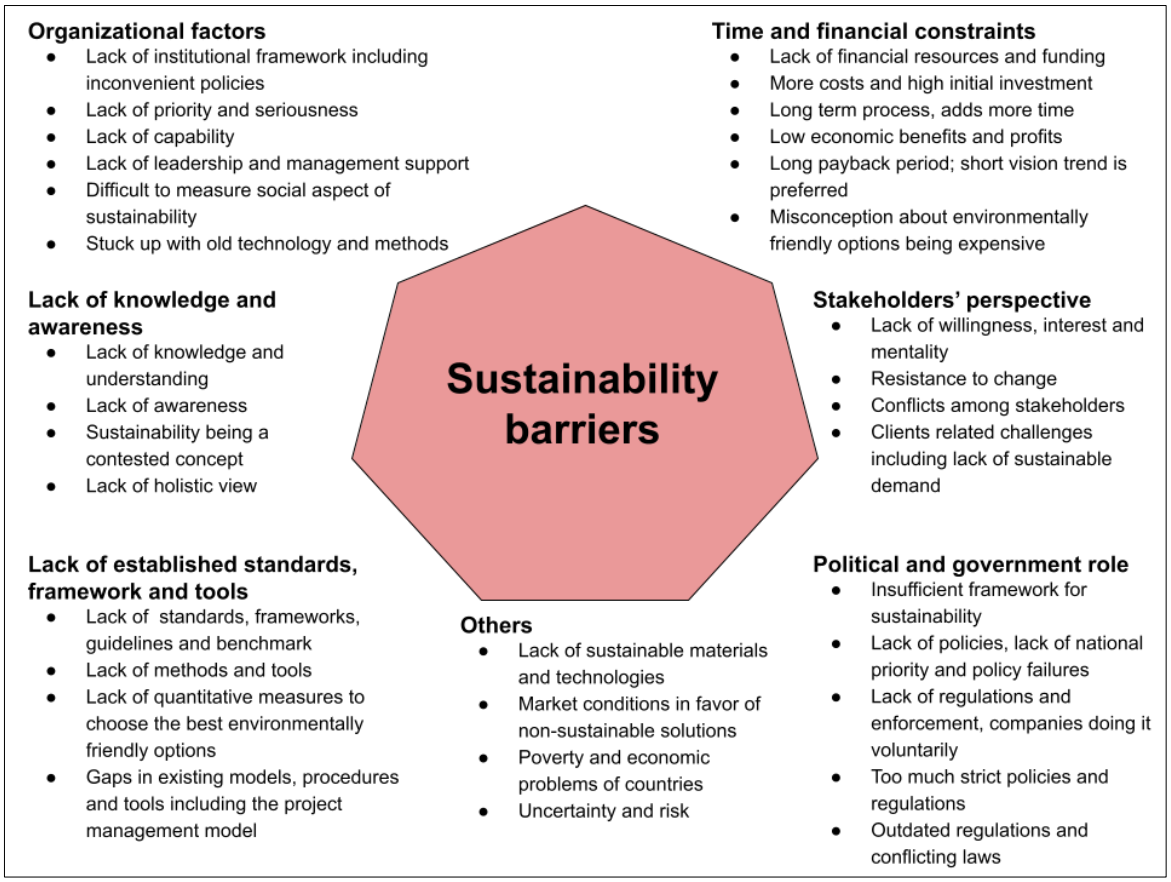


Figure 14. Heptagon model showing barriers related to sustainability implementation. [Source: own creation; based on literature reviewed and conducted interviews]

In the following segment, the significant sustainability drivers have been emphasized to overcome the aforementioned sustainability obstacles.

5.2 SUSTAINABILITY DRIVERS

The other sub-research question asked earlier involved the recognition of the potentially relevant sustainability drivers to pave the way for embedding the sustainable activities. In the following, these sustainability accelerating factors have been highlighted and discussed.

5.2.1 Organizational aspects

The literature findings and the interview results showed that the organizational aspects are the most talked about sustainability driver. In this category, there are several sub-drivers which could help the organizations in overcoming the sustainability barriers and accelerate towards sustainable development. For instance, as shown in Table 4, the *recognition of sustainable practices as value creation opportunity, competitive advantage, and enhanced brand image and reputation of the company* are vital for motivating the organizations to incorporate the sustainability principles. This is also supported by the interview outcomes in Table 6 which highlighted the driving factors such as *the enhanced reputation, branding, image and pride, an attractive place to work, business opportunity, competitive advantage, more satisfied customers (sustainability conscious) and increased number of customers and projects.*

Furthermore, the *support from top management and leadership* also plays a key role in progressing towards sustainable development (Henriques and Richardson (2004); Hwang and Ng (2013); Casey and Sieber (2016); Aleixo et al. (2018); Chawla et al. (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019); Pham et al. (2020) and the interviewees (13, 14, 15, 16 and 18)). For example, *establishing set of clear objectives and policies* are very important for incorporation of sustainability principles in an organization (Abidin (2010); Collins (2011); Robichaud and Anantatmula (2011); Zhang et al. (2011); Klakegg (2015); Casey and Sieber (2016); Kivilä et al. (2017); Mustapha et al. (2017); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020)). This will help in making a *clear strategy, priority and seriousness* for sustainable activities and assigning the *responsibility* as well according to the interviewees (7, 9, 13, 14, 15 and 18); that is, an institutional framework for sustainability. Likewise, the interviewed object (6) talked about the positive role of the leadership where the sustainability responsibility shifted from the development team to the financial team, taking all three dimensions of sustainability. This might also result in *creating the culture that supports the sustainability importance.* As stated by Henriques and Richardson (2004), the transformation process within any firm can be initiated with the right leadership.

Moreover, this will lead to the *integration of the sustainability in the processes, routines and procedures of the organizations, as well as PM measures, performance assessment system and benchmarking* (Gomes and da Silva (2005); Zhang et al. (2011); Silvius and Schipper (2014); Chawla et al. (2018); Chofreh et al. (2019); Amankwah-Amoah and Syllias (2020); IMP (2020)). Organizations need to include the sustainability criteria in the measures of PM along with the cost, time and quality factors, that is, the iron-triangle (Silvius and Schipper (2014); Ali et al. (2016); Chawla et al. (2018)). Likewise, *embedding sustainability in PM, performance measurement system regarding sustainability, good working conditions of employees, gender equality, sickness absence*, as well as utilizing eco-friendly materials and solutions also helps in achieving the different sustainability dimensions according to the conducted interviews. For instance, the SDG 3 (*good health and well-being*), SGD 5 (*gender equality*) and SDG 8 (*decent work and economic growth*) can be accomplished as well.

In addition, *encouraging the customers to implement sustainable solutions too* is also an important policy in most of the interviewees' perspective. Similarly, *implementing organizational activities having minimal negative environmental effects and setting up the targets for eco-label* help in achieving the environmental sustainability in an organization according to various interviewed objects. This aids in realizing the SDGs 11 (*sustainable cities and communities*), 12 (*responsible consumption and production*), 13 (*climate action*), 14 (*life below water*) and 15 (*life on land*) too. By doing the *sustainability reporting* on the organizations' activities regarding the sustainability, it also escorts the various benefits associated with the sustainability reporting (Gomes and da Silva (2005); Adams and Frost (2008); Stubbs and Cocklin (2008); Collins (2011); Eweje and Alakavuklar (2014); GRI (2016); Martens and Carvalho (2017); IMP (2020); PwC (2020); Ziolo and Sergi (2019); Rubino and Veltri (2020); SASB (2021)).

Proactive communication with all stakeholders and understanding their needs and prospects is another potentially critical sustainability driver in the views of different authors (Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Gan et al. (2015); Ali et al. (2016); GRI (2016); Darko and Chan (2017); Kivilä et al. (2017); Chawla et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Silvius and de Graaf (2019); Amankwah-Amoah and Syllias (2020)). The *clear communication* is important because it aids in understanding the different *interests, demands and needs* of the stakeholders and to avoid any *conflicts* during the sustainability implementation. *Understanding the demands of the stakeholders* are crucial according to the interviewed objects (6, 14 and 17). In addition, this facilitates the SMEs to connect and

collaborate with local authorities and other stakeholders regarding sharing the risk and cost of investments (Darko and Chan (2017); Amankwah-Amoah and Syllias (2020)). This was also justified by the interviewees (6, 9, 13, 14, 15 and 17) who talked about *working/cooperating with suppliers* or other actors in the value chain so that everyone is contributing towards achieving the sustainable goals. Furthermore, the decision making process for sustainable PM necessitates the participation of the stakeholders (Chawla et al., 2018) because the decisions made regarding sustainability initially have a far greater influence in contrast to decisions made at later stages of a project (Collins, 2011). As mentioned before, sustainability must be realized as a driving force for decision making (Eweje and Alakavuklar (2014); Manzaneque-Lizano et al. (2019)).

Another significant factor which drives the sustainability incorporation is linked to the increasing internal capabilities including the competence of the project participants and skilled labor (Collins (2011); Cai and Li (2018); Shen et al. (2018); Ziolo and Sergi (2019); Hermundsdottir and Aspelund (2021)). For instance, training of the employees and competence development regarding sustainability concept (interviewees (1, 3, 4, 11 and 15)). These internal capabilities including the training of employees assist the organizations to accomplish the sustainability related objectives highly efficiently (Stubbs and Cocklin (2008); Robichaud and Anantatmula (2011); Casey and Sieber (2016); Kivilä et al. (2017); Mustapha et al. (2017); Shen et al. (2018); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Karji et al. (2020); Pham et al. (2020)). By improving the internal capabilities, the organizations will also achieve the SDG 8 by UN regarding the *decent work and economic growth*.

Moreover, it also helps in driving the *innovation and change* within an organization (interviewees (3, 4, 6, 9 and 17)) including both the technical and management *innovation* (Collins (2011); Lee and Kang (2013); Kivilä et al. (2017); Martens and Carvalho (2017); Cai and Li (2018); Shen et al. (2018); Orji (2019); Ziolo and Sergi (2019); Pham et al. (2020); Hermundsdottir and Aspelund (2021)). Sustainability entails *eco-friendly innovation* (Ziolo and Sergi, 2019) which is an essential economic concept for businesses to overcome the sustainability challenges (Hermundsdottir and Aspelund, 2021). The SDG 9 about *industry, innovation and infrastructure* can also be obtained through *innovation and change* within the organizations.

Lastly, *gathering/sharing information with the members and other organizations* in the industry also opens the door for better understanding the information and knowledge associated with

sustainable solutions and for future partnerships (interviewees (8, 13, 16, 17 and 18)). This also helps in achieving the SDG 17 (partnerships for the goals) by UN.

To conclude, all the above-mentioned factors have a vital role in driving the sustainability implementation. As mentioned by one of the interviewees, the integration of sustainability principles helps the organizations become *more interconnected, internally*. For instance, the environmental department would be working with the technical department and finance department for sustainability solutions, so it develops a better cooperation within a company.

5.2.2 Financial factors

Financial factors are the second most important drivers of sustainability application. According to different sources of literature, sustainability lead to *economic benefits including cost savings, higher internal rates of returns and profits, efficiency and effectiveness*. There are *improved economic advantages and profitability* by embedding sustainability practices (Zhou and Lowe (2003); Shafii et al. (2006); Kiron et al. (2012); Shari and Soebarto (2012); Ismael and Shealy (2018); Walker et al. (2019); Ziolo and Sergi, 2019).

Similarly, sustainability *adds value, more profit* in the long-term according to the majority of the interview objects' point of view, shown in Table 6. These economic benefits are linked in the form of *cost savings, efficient utilization of resources including energy savings and waste reductions* (Zhou and Lowe (2003); Hodges (2005); Shafii et al. (2006); Pearce (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Robinson (2012); Shari and Soebarto (2012); Lee and Kang (2013); Nielsen et al. (2016); Walker et al. (2019); Amankwah-Amoah and Syllias (2020) and the interviewees (3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17 and 18)). Moreover, *the improved productivity* of the employees lead to enormous positive effects on the organization's financial resources (Zhou and Lowe (2003); Hodges (2005); Hoffman and Henn (2008); Shari and Soebarto (2012); Lee and Kang (2013); Mustapha et al. (2017) and the interviewees (6 and 10)) since 90% of an organization's annual expenses are consisted of the workers' costs (Hoffman and Henn, 2008).

Furthermore, sustainable practices also facilitate in achieving *more revenue from the customers' side* who are sustainability conscious and are willing to pay higher prices for sustainable solutions (interviewees (2 and 9)). This is backed by the various literature where the profits are correlated with sustainable practices; adding positively to the economic resources of an organization.

In addition, not all sustainable solutions are costly according to the interviewed objects (5, 12 and 18). Implementing green activities are affordable (Shen et al., 2018). For instance, in offices, switching to porcelain coffee cups from paper based disposable cups helps in reducing the environmental effects in the form of disposable waste and helps in reducing the cost; resulting in the financial savings. Similarly, reducing the time of the heating/cooling ventilation systems to the normal office timings also leads to the energy savings and reduced negative environmental effects. Another example given by one the interviewees involved the planting of the tress near the vicinity of the office buildings to counter the negative effects on the environment, improving the built environment. *Taking these types of smaller steps* is important towards advancing the long-term process of sustainability, that is, the 2030 agenda of sustainable development.

Another vital driver for incorporating sustainable activities is the availability of the financial support in the form of green banks, green bonds and loans, and sustainable products insurances (Aleixo et al. (2018); Cai and Li (2018); Yoshino et al. (2019); Ziolo and Sergi (2019) and the interviewees (16 and 18)). Green financing has a positive effect on the sustainability and the EU is developing a financial system to sponsor the sustainable economic growth (Ziolo and Sergi, 2019). The financial support system facilitates in overcoming the lack of financial resources and funding problems. Additionally, the investors can remain focus on the long-term view through the insurance of the products as it provides the financial security against the short-term risks (Ziolo and Sergi, 2019).

Furthermore, the sustainability reporting of the organization's activities, for example, ESG reporting, also results in *attracting the diversified investors*, leading to more availability of the finances (Casey and Sieber (2016); Shen et al. (2018); Ziolo and Sergi (2019); PwC (2020) and the interviewees (2, 6, 15 and 18)). Because the investors nowadays are focusing and investing in the organizations who are doing sustainability reporting (Casey and Sieber (2016); Ziolo and Sergi (2019); PwC (2020)) as it is part of the investment strategies of 80% of the institutional investors (PwC, 2020).

5.2.3 Promoting awareness

To overcome the challenge of *lack of knowledge and awareness* towards sustainable development, *promoting awareness and diffusion of knowledge* is also a critical driving force. As mentioned earlier in theory chapter, sustainability can be promoted via higher education institutes, worldwide (Shari and Soebarto (2012); Gan et al. (2015); Aleixo et al. (2018)).

Increasing the awareness is vital for *realization of sustainability being an important phenomenon* and its implementation (Serpell et al. (2013); Shen et al. (2018); Orji (2019); Karji et al. (2020) and the interviewees (1, 5, 9. 11, 14 and 15)). By *increasing the awareness* and strategic approaches to projects, more value can be created successfully (Klakegg, 2015). Diffusion of sustainability knowledge including the knowledge development excites the employees and foster the development learning (Collins (2011) and the interviewees (3, 4 and 17)).

Likewise, *educating stakeholders about the sustainability and its benefits* is also a significant driving element of sustainability implementations and innovations (Shen et al. (2018); Hermundsdottir and Aspelund (2021) and the interviewees (6, 9, 11, 14, 15 and 17)). Additionally, it is critical to *address all the sustainability aspects, not just focusing on the financial gains* (Henriques and Richardson (2004); Tokbolat et al. (2019)). Because *understanding that sustainability is a bigger picture* involving the environmental and social dimensions is a key driving component in moving towards achieving the SDGs (Tokbolat et al. (2019) and the interviewees (7, 8, 9 and 16)).

In a concise way, the *awareness itself* is simply not sufficient to drive the substantial changes alone (Serpell et al., 2013). *Understanding the big picture, a holistic perspective* is also required along with promoting awareness to truly accomplish the sustainable objectives (Zhou and Lowe (2003); Du Plessis (2007); Pearce (2008); Sev (2009); Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Gan et al. (2015); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Mustapha et al. (2017); Aleixo et al. (2018); Chawla et al. (2018); Silvius and de Graaf (2019); Walker et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Karji et al. (2020)).

5.2.4 Stakeholders' role

Role of stakeholders in the form of leadership, owners, project managers, customers and the like are vital for initiating the transformation process towards sustainable development. The significance of the stakeholders has been highlighted in both the interviews and the literature, shown in Table 4 and Table 6, respectively. The *stakeholders' involvement, contribution, and the pressure towards incorporating sustainability* is very important for embedding sustainable activities in an organization (Robinson (2012); Eskerod and Huemann (2013); Lee and Kang (2013); Eweje and Alakavuklar (2014); United Nations (2015); Ali et al. (2016); Nielsen et al.

(2016); Darko and Chan (2017); Kivilä et al. (2017); Cai and Li (2018); Chawla et al. (2018); Durdyev et al. (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019); Walker et al. (2019); Amankwah-Amoah and Syllias (2020); Hermundsdottir and Aspelund (2021)).

Additionally, the pressure from stakeholders and competitors forces the organization to adopt eco-innovation (Lee and Kang (2013); Eweje and Alakavuklar (2014); Cai and Li (2018); Amankwah-Amoah and Syllias (2020)). As stated earlier in the organizational aspects, *working/cooperating with suppliers, collaborating with local authorities and other stakeholders*, helps in accomplishing the sustainable objectives and goals.

Furthermore, the *actions by decision makers, policy makers and private sector* towards realizing the sustainable development are crucial. These measures including *human and financial resources, integration of appropriate strategies, strict standards in design, procurement and construction contracts* are vital to counteract the various challenges and threats associated with achieving the sustainable goals (Shari and Soebarto (2012); Hwang and Ng (2013); Eweje and Alakavuklar (2014); Darko and Chan (2017); Chawla et al. (2018); Mavi and Standing (2018); Shen et al. (2018); Manzaneque-Lizano et al. (2019)). For example, *assisting with the promotion and commercialization of new services, materials and tools, creating demand for efficient and healthier buildings, and using more sustainable technologies and processes in business activities* (Shari and Soebarto, 2012).

Similarly, the *sustainability demands and requirements from customers* also act as a significant driving force for the implementation of sustainability principles (Henriques and Richardson (2004); Abidin (2010); Collins (2011); Shari and Soebarto (2012); Darko and Chan (2017); Cai and Li (2018); Walker et al. (2019); Hermundsdottir and Aspelund (2021) and the interviewees (1, 2, 3, 4, 6, 7, 10, 16 and 17)). Customers are asking the companies regarding their commitment, performance and proactive position in relation to the sustainability agenda (Henriques and Richardson (2004); Collins (2011)). In addition, customers are willing to pay extra for green features (Abidin (2010); Cai and Li (2018); Walker et al. (2019)).

Finally, the *role of owners and project managers* is very critical for integrating the sustainability principles (Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Hwang and Ng (2013); Gan et al. (2015); Nielsen et al. (2016); Kivilä et al. (2017); Manzaneque-Lizano et al. (2019); Silvius and de Graaf (2019)). Project managers play a vital part in assessing, addressing and enforcing the sustainable activities throughout the project (Collins (2011); Robichaud and Anantatmula (2011)). The incompetent project managers will act as barriers towards sustainability incorporation (Pham et al., 2020). However, with proper

training and knowledge development as discussed before, this challenge of incompetency can be overcome. Additionally, the influential role of owners over the stakeholders can easily persuade them to undertake the sustainable practices (Gan et al., 2015).

In a nutshell, stakeholders have a crucial role in realization of the 2030 Agenda for Sustainable Development (United Nations (2015); Walker et al. (2019)).

5.2.5 Standards and tools

The availability of standards and tools are key aspects towards implementation of sustainable practices. Without correct tools, sustainability cannot be truly achieved (Collins, 2011). According to both the literature and the conducted interviews, *lifecycle cost analysis* is a perfect tool for effectively determining the long-term economic value of sustainability (Zhou and Lowe (2003); Hodges (2005); Sev (2009); Lai et al. (2012); Walker et al. (2019); Rubino and Veltri (2020) and the interviewees (5, 7, 9, 12, 13, 16 and 17)). It is important to use lifecycle cost analysis instead of going for the cheapest solutions involving low initial investments. Because the solutions based on lifecycle perspective will eventually turn out to be cheaper and more beneficial when compared to the low-cost alternatives at the initial stages of a project lifecycle.

In addition, developing the sustainability tools, digital tools including the PM guidance associated with sustainability can also boost the sustainable development (Ali et al. (2016) and the interviewees (5, 7, 9 and 15)). For instance, digitalization of monitoring of air and water pollution, monitoring and optimizing how energy and natural resources are consumed, presents new opportunities too (European Commission, 2019b). Likewise, foreign developed tools can be calibrated to local conditions to assess the sustainability performance. Moreover, as a result of these new developed or modified tools, a market for sustainable products can be created (Gomes and da Silva, 2005); driving the eco-innovation (Cai and Li, 2018).

Furthermore, frameworks such as LEED and BREEAM certifications have also facilitated in driving the sustainable practices (Norman et al. (2010); Collins (2011); Robichaud and Anantatmula (2011); Durdyev et al. (2018); Karji et al. (2020) and the interviewees (16 and 17)). As mentioned by Sev (2009), new standards and mandates are also aiding the companies in improving their environmental assessment systems and sustainability development. In similar manner, sustainability reporting standards such as SASB, GRI and the like are also playing a vital part for the organizations to incorporate the sustainability principles. These sustainability reporting standards disclosing the ESG information are crucial for attracting the wide range of investors who have sustainability included in their investment strategies.

5.2.6 Government policies and regulations

The role of government in the form of making *policies, regulations and legislations* is pivotal for promoting the sustainable development and removing the associated barriers. Both the literature and the interview results have signified the importance of government in accelerating the sustainable activities as shown in Table 4 and Table 6. *Policies and regulations* are the main driving force for sustainable construction (Gomes and da Silva (2005); Du Plessis (2007); Abidin (2010); Serpell et al. (2013); Darko and Chan (2017); Shen et al. (2018)). In addition, the government *sets rules, laws, standards, guidelines and strict regulations; creating a framework* regarding sustainability implementation (Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Ziolo and Sergi (2019); Hermundsdottir and Aspelund (2021)). This is also supported by the interviewees (6, 7, 8, 9, 10, 11 and 18) who mentioned about the *strict regulations including the more tougher greenhouse gas emissions taxation and the EU taxonomy* as well. This is important because the government taxations are the dominant source of financing investments available for sustainable development (Ziolo and Sergi, 2019) and the government can raise the carbon taxes steadily to support the low carbon energy systems (Yoshino et al., 2019) so that it can give *clear indication and stability regarding the sustainable development* (interviewed objects (5, 7 and 18)).

In similar manner, various interviewees (1, 3, 4, 6, 8, 9, 12, 16, 17 and 18) have also agreed regarding the importance of government policies and legislations in favor of sustainable development. For example, *financial incentives in form of capital loans, financial support, research allowances and other economic incentives* were mentioned in both the literature and the interviews which can help in overcoming the financial barriers. As mentioned earlier in theory, adequate financing is critical towards implementing sustainable activities successfully (Ziolo and Sergi, 2019). For example, some of the interviewees mentioned about the "*ENOVA*" program by the Norwegian government, giving allowances and incentives for research purposes.

In addition, the tax incentives on importing the electric cars, for example, *TESLA*, have also propelled towards environmental sustainability in persuading the public towards electric vehicles from fossil fueled automobiles. In similar manner, the authors talked about the role of government in *identifying the new types of impact and pioneering assessment methods* (Henriques and Richardson, 2004) *and encouraging the educational institutes towards research and innovation* (Cai and Li (2018); Shen et al. (2018)) to hasten the process of sustainable development.

To conclude, the government has a significant part in establishing, revising and strictly enforcing the policies and regulations associated with sustainable development to overcome the related sustainability barriers and forcing the organizations to incorporate the sustainability principles.

5.2.7 Others

These are the external drivers which were least mentioned in the literature and during the interviews. However, it does not mean that they are trivial since all these factors are in one way or another, linked to each other. For example, *advancement in technology and innovation* are interlinked in general. And the innovation perspective has already been discussed before in the organizational aspects (internal factors) that can drive the sustainability.

According to the literature and the interviewed persons shown in Table 4 and Table 6, correspondingly, *advancement in technology such as digitalization* is essential to propel the sustainability process. This in turn will facilitate in creating the market demand for sustainable products, *changing the market conditions from traditional products to sustainable solutions* (Robichaud and Anantatmula (2011); Zhang et al. (2011); Robinson (2012); Nielsen et al. (2016); Darko and Chan (2017); Shen et al. (2018); Orji (2019); Karji et al. (2020) and the interviewed objects (3, 4 and 9)). Additionally, the *advancement in technology* will also aid in removing the barriers such *lack of sustainable materials and technology*, *poverty and economic problems, and uncertainty and risk* factors. As mentioned before, the *advancement in technology* will bring in more improved and innovated solutions. Moreover, a couple of the interviewees (9 and 15) also mentioned the importance of the European green deal, 2019 as a critical step in accelerating the achievement of the 17 SDGs by UN.

To sum up all above, all the potential sustainability drivers have been highlighted and discussed to overcome the significant sustainability barriers reviewed earlier. Like sustainability barriers, the Figure 15 illustrates the above-mentioned sustainability drivers in a simplified view, enlightening the main driving elements only.

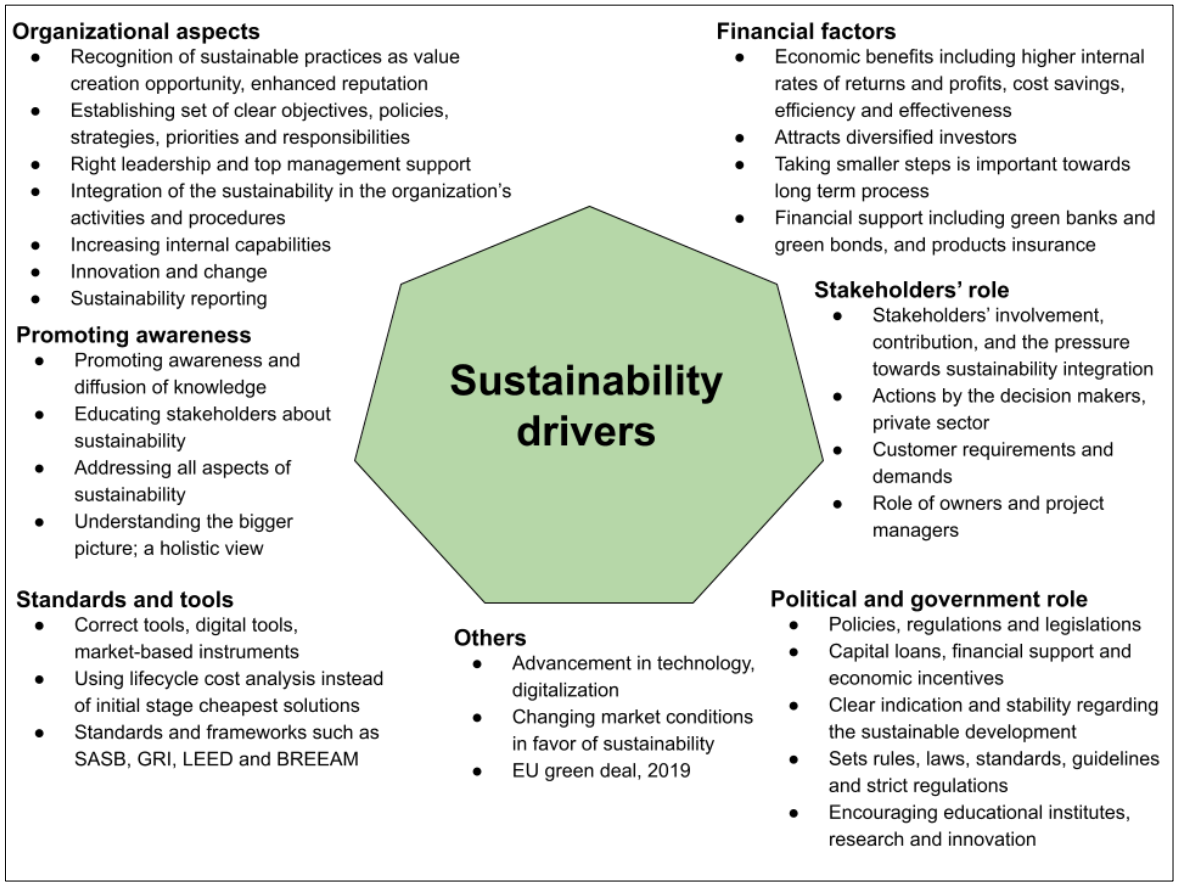


Figure 15. Heptagon model showing drivers related to sustainability implementation. [Source: own creation; based on literature reviewed and conducted interviews]

In addition, this answered the sub-research question 'RQ2' asked earlier in the introduction chapter regarding the highlighting the potential drivers to overcome the sustainability barriers; realization of the 17 SDGs by UN and aiding towards European green deal, 2019. As mentioned by Darko and Chan (2017), stakeholders would be more keen to implement green features in future when the barriers are overcome.

5.3 SUSTAINABILITY IMPACTS ON FINANCIAL RESOURCES

The last sub-research question (RQ3) asked in the introduction was related to the economic dimension of sustainability; emphasizing on finding the critical aspects which are affecting the organization's economic resources either in a negative or positive way. But first, we need to understand the importance of the economic factor to the business in general as explained below.

5.3.1 Significance of economy in businesses

The outcomes of the literature and the interviews have shown that generating profits, economic development, positive financial returns and the like, are the fundamentals of doing business. From a business perspective, generating and safeguarding the profits is significantly essential for the organizations (Serpell et al. (2013); Silvius and Schipper (2014); Gan et al. (2015); Portney (2015); Aleixo et al. (2018); Chawla et al. (2018); Manzaneque-Lizano et al. (2019); Ziolo and Sergi (2019); Hermundsdottir and Aspelund (2021)). Likewise, the interviewed persons also talked about the importance the economic part in the businesses and linked it to be a fundamental part of doing business (interviewees (1, 3, 4, 11, 12 and 14)). Organizations have to make money because that is kind of why a firm exists (interviewed objects (9, 17)). This is also the very same reason behind the companies who are in the field of sustainability just for the sake of money (interviewed object (10)). However, this might not be true since other companies have also incorporated the social and environmental pillars of sustainability as well in their businesses; not only focusing on the economic aspect.

Nevertheless, sustainability has to make the economic sense and generate profits. There would be no green future without earning money and profits. Firms simply cannot deal with the losses for many years. As a consequence, the whole projects will stop, the business will not last and the companies will turn off the lights and shut the doors, that is, the firms would be out of the businesses, eventually (interviewed object (2, 7, 8, 11, 14, 15 and 18)).

Incorporating sustainability lead to economic benefits such as *profitability, increased market share and shareholders value, improved financial performances, cost savings; efficiency and effectiveness and attracting a wide range of investors*, according to various authors, shown in Table 4. Furthermore, *making money from sustainable practices* is vital to ensure the financial benefits (interviewed object (9)). Companies should have enough separate finances for the sustainable activities and integrate them in the core business (interviewed objects (9 and 14)).

In the following segments, the financial benefits of sustainability and the negative effects as well are discussed to signify the impact of economic aspect of sustainability on the financial resources of an organization.

5.3.2 Positive impacts of sustainability

Embedding sustainable practices bring about economic gains along with environmental and social benefits, and a win-win scenario for the stakeholders and the shareholders (Collins, 2011). Since companies are stock listed, the investors are talking about the sustainability factors

besides the financial aspect (interviewed object (6)). Similarly, sustainability reporting by firms in the form of ESG, CSR, GRI and the like, lead to *attracting the diversified base of investors;* resulting in more availability of the finances (Casey and Sieber (2016); Shen et al. (2018); Ziolo and Sergi (2019); PwC (2020) and the interviewees (2, 6, 15 and 18)). A direct connection coexists between ESG practices of a firm and big profits (Ziolo and Sergi, 2019).

The economic advantages of sustainable activities are critical, diverse and stimulus (Zhou and Lowe, 2003) and they overshadow the capital cost (Ismael and Shealy, 2018). There are better economic advantages including high internal rate of return and profitability by incorporating sustainability principles (Zhou and Lowe (2003); Hodges (2005); Shafii et al. (2006); Kiron et al. (2012); Shari and Soebarto (2012); Ismael and Shealy (2018); Walker et al. (2019); Ziolo and Sergi, 2019). Sustainable companies perform better financially according to the research (interviewed object (9)). Additionally, most of the excess financial return is linked to the environmental aspect of sustainability (interviewed object (18)). As mentioned by Stubbs and Cocklin (2008), profits are the mean of achieving sustainable outcomes. Likewise, the profits are interrelated with sustainable practices (Sev (2009); Abidin (2010); Kiron et al. (2012); Serpell et al. (2013); Cai and Li (2018); Amankwah-Amoah and Syllias (2020)).

Furthermore, the financial benefits are correlated to *cost savings*, *efficient utilization of resources including energy savings and waste reductions* (Zhou and Lowe (2003); Hodges (2005); Shafii et al. (2006); Pearce (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Robinson (2012); Shari and Soebarto (2012); Lee and Kang (2013); Nielsen et al. (2016); Mustapha et al. (2017); Walker et al. (2019); Amankwah-Amoah and Syllias (2020) and the interviewees (3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17 and 18)). In addition, there is *improved productivity* of the employees which also results in massive positive impacts on the organization's financial resources (Zhou and Lowe (2003); Hodges (2005); Hoffman and Henn (2008); Norman et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Lee and Kang (2013); Mustapha et al. (2017) and the interviewees (6 and 10)). As mentioned by Hoffman and Henn (2008), the annual expenses of the organizations are comprised 90% of the employees' costs. This was also supported by the interviewed person (5) who stated that *5% of the total cost of our organization is through offices and 70% cost is related to the salaries of the employees which with improved work environment lead to better productivity and positive impact on financial resources.*

Sustainability lead to *enhanced brand image and reputation of the company* (Zhou and Lowe (2003); Adams and Frost (2008); Abidin (2010); Zhang et al. (2011); Lee and Kang (2013);

Serpell et al. (2013); Casey and Sieber (2016); Orji (2019); Silvius and de Graaf (2019); Ziolo and Sergi (2019); Amankwah-Amoah and Syllias (2020); PwC (2020); Hermundsdottir and Aspelund (2021) and the interviewed persons (1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17 and 18)). This enhanced brand image and reputation helps in *increasing the number of customers and project as well as attracting and/or retaining the sustainability conscious employees*, having a positive effect on the financial resources, ultimately. As mentioned by the interviewee (13), "*there is a good economy in sustainability for the whole supply chain actors".*

5.3.3 Negative impacts of sustainability

Although incorporating sustainable principles have various advantages including economic benefits but it is not a piece of cake for every organization to implement sustainable development. Various authors and interviewed persons considered the sustainable practices to be *more costly* and requiring *high initial investment* compared to traditional activities. For instance, the transformation to low-carbon and green economy involve massive investment (Yoshino et al. (2019); Ziolo and Sergi (2019)) and construction firms are concerned about the additional costs associated with sustainability practices (Serpell et al., 2013). There is too much cost and companies cannot pay for sustainable development in the long run (interviewed object (17)). In addition, some authors regarded the sustainable activities to have low economic benefits and profits (Gan et al. (2015); Klakegg (2015); Kivilä et al. (2017); Amankwah-Amoah and Syllias (2020)).

Furthermore, fluctuating foreign exchange differences, also lead to higher import prices of the sustainability related materials and equipment, resulting in a negative effect on the organization's financial resources (interviewed object (1)). Additionally, the *lack of financial resources and funding including the lack of support from financial institutions* further complicates the process of sustainability implementation; especially for SMEs (Zhou and Lowe (2003): Abidin (2010); Gan et al. (2015); Gurjar (2016); Howes et al. (2017); Aleixo et al. (2018); Manzaneque-Lizano et al. (2019); Støre-Valen and Buser (2019); Yoshino et al. (2019); Amankwah-Amoah and Syllias (2020) and the interviewed objects (2 and 13)). As mentioned earlier by Manzaneque-Lizano et al. (2019), the availability of economic resources is imperative for the survival of a firm. Because there are not enough finances for small firms regarding sustainable activities (interviewed objects (2)).

Moreover, the existence of sustainable activities are interlinked with the profits (Stubbs and Cocklin, 2008). If sustainable practices are not generating profits and making economic sense,

then there would be no green future (interviewed object (2)). Firms are struggling and facing problems in making profits from sustainability (interviewed person (14)). Some companies have lower carbon emissions than their competitors but still they are not getting the higher prices in the market because of their sustainable practices (interviewee (11)).

Additionally, there are also the factors of *risks and uncertainties* associated with sustainability application; resulting in cost overruns (Zhou and Lowe (2003); Geraldi et al. (2010); Robichaud and Anantatmula (2011); Shari and Soebarto (2012); Hwang and Ng (2013); Gan et al. (2015); Klakegg (2015); Stewart et al. (2016); Chawla et al. (2018); Walker et al. (2019); Aghaegbuna et al. (2020)). In short, companies cannot deal with losses for long time as sustainable projects will be deserted, and enterprises would be out of the businesses, ultimately (Kiron et al. (2012); Manzaneque-Lizano et al. (2019); Aghaegbuna et al. (2020); Amankwah-Amoah and Syllias (2020) and the interviewed objects (1, 2, 7, 8, 11, 14, 15 and 18)).

To sum up all above regarding the impacts of sustainability on the financial resources, there are both pros and cons associated with it. Figure 16 illustrates both the positive and negative effects of sustainability application on economic resources in a summarize view, concluding the RQ3.

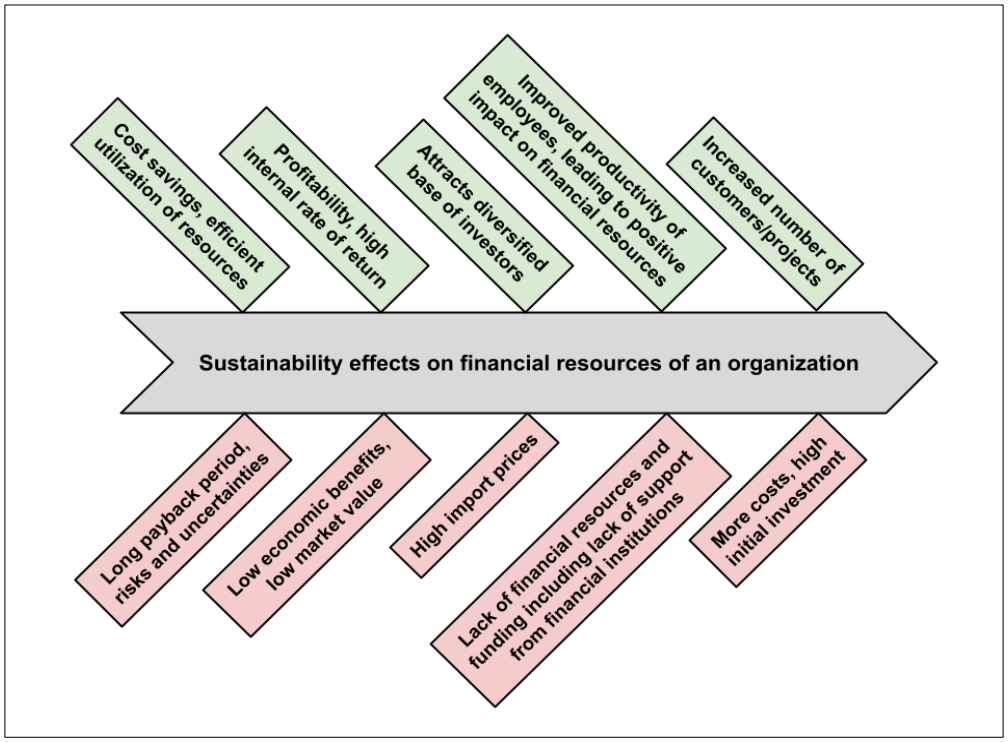


Figure 16. Effects of sustainability on the financial resources of an organization. [Source: own creation, based on the literature and interviews]

Nonetheless, the economic benefits of sustainability simply outweigh its negative counterparts. As mentioned by one of the interviewees, *"sustainability is the biggest shift happening right now and it is the biggest business opportunity of our time"* and companies worldwide are seeing sustainability issues as *an opportunity* to capture the potential business (Ali et al., 2016).

5.4 HOW PM PLAY ITS PART TOWARDS INCORPORATING SUSTAINABILITY?

The purpose of this study was to find out the factors that impedes the sustainability incorporation and how to overcome these barriers. In the previous sections, all the sustainability barriers and potential drivers have been highlighted and discussed including the effects of integrating sustainable practices on the organization's financial resources. However, the title of this research also includes the aspect of the PM. Thereby, demanding the need to discuss the role of the PM towards embedding the sustainable development.

PM have to be done in the perspective of sustainable development (Eskerod and Huemann, 2013). Projects are the means of implementing strategy (Zwikael and Smyrk, 2019). PM acts as a bridge in connecting the sustainability visions and strategies and translating them into project deliveries and goals including the long-term benefits (interviewed objects (3, 4, 15 and 16)). Sustainability in PM need to be considered as *a holistic approach, a lifecycle perspective*, that is, in terms of planning and design, execution, operations, and closeout (Zhou and Lowe (2003); Du Plessis (2007); Pearce (2008); Sev (2009); Collins (2011); Robichaud and Anantatmula (2011); Eskerod and Huemann (2013); Silvius and Schipper (2014); Gan et al. (2015); Casey and Sieber (2016); Nielsen et al. (2016); Aarseth et al. (2017); Kivilä et al. (2017); Mustapha et al. (2017); Aleixo et al. (2018); Chawla et al. (2018); Silvius and de Graaf (2019); Walker et al. (2019); Ziolo and Sergi (2019); Aghaegbuna et al. (2020); Karji et al. (2020)). Sustainability needs to be included as a goal during the planning stage, concept development as it would be then much easier to achieve, follow up throughout the whole project (interviewees (3, 4, 16 and 17)). Likewise, sustainability should be integrated into all the processes and should be viewed as one of the success factors (interviewed object (9)).

Similarly, there should be clear policies, procedures and liability towards them such as the elimination of waste including the *unutilized or overutilized resources, substandard processes or redundant processes, and ethicality, eco-friendliness, recycling practices and economic efficiency* throughout the project's life cycle is necessary for the sustainable PM (Lee and Kang (2013); Silvius and Schipper (2014); Kivilä et al. (2017); Chawla et al. (2018)). Sustainability criteria need to be included by the organizations in the measures of PM besides the cost, time

and quality factors (Silvius and Schipper (2014); Ali et al. (2016); Chawla et al. (2018) and the interviewee (9)). Likewise, *embedding sustainability in PM* in form of *using environmentally friendly materials, good working conditions of employees, gender equality and sickness absence*, also helps in achieving the different sustainability dimensions according to the conducted interviews.

The most important objective of PM is to allocate the resources in best possible way (interviewed person (1)). In addition, *choosing the procurement strategy, contractors, contract type selection and early contractor involvement* (Robichaud and Anantatmula (2011); Darko and Chan (2017); Hussein (2018); Wondimu et al. (2018)) can also act as the key success factors regarding sustainability. Likewise, sustainability related requirements must be included in the contracts and tenders (interviewed objects (13, 16 and 17)). In short, the sustainability strategies mentioned by Aarseth et al. (2017); Chawla et al. (2018) and Silvius and de Graaf (2019) earlier in the theory chapter, should be taken into account for sustainable PM.

Furthermore, project managers play a significant role in implementation of sustainable PM as they are the quintessential success factors (Labuschagne et al. (2005); Collins (2011); Robichaud and Anantatmula (2011); Silvius and Schipper (2014); Klakegg (2015) and the interviewed objects (3, 4, 8, 15 and 16)). Because the project manager has the responsibility of implementing the sustainability in a project (Silvius et al., 2012) and they need to deliver the projects both efficiently and effectively with respect to sustainability besides fulfilling the traditional project management responsibilities (Hwang and Ng (2013); Aghaegbuna et al. (2020) and the interviewees (6 and 9)).

To conclude, project managers need to have the knowledge about the sustainability and how to measure the sustainability besides a paradigm shift in relation to the iron triangle approach of traditional PM (Collins (2011); Silvius and Schipper (2014) and the interviewed object (8)). Otherwise, the incompetent project managers will act as barriers towards sustainability incorporation (Pham et al., 2020).

6 CONCLUSION

The importance of sustainability is significant and is being recognized all over the world along with its various benefits. However, there is still lack of implementation of sustainability principles by the organizations and the businesses. This steered towards the formation of this research study with the purpose of finding the barriers that hinders the implementation of the sustainability concept, forming the sub-research question 'RQ1'. Moreover, the study aimed at seeking out the potential sustainability drivers to help the organizations to overcome these barriers, that is, 'RQ2', in order to move forward in the direction of the sustainable development. This will help in realization of the 2030 Agenda for Sustainable Development and the European green deal, 2019. In addition, the effects of incorporating the sustainable activities on the organization's financial resources, the 'RQ3', were also the part of the research theme.

Based on the literature reviewed and the conducted interviews, various hindrances associated with sustainability incorporation have been identified and grouped in the form of internal factors such as *organizational factors, time and financial constraints, lack of knowledge and awareness, stakeholders' perspective* and external factors like *lack of established standards, frameworks and tools, political and governmental role and others*. According to the literature and the interviews, *organizational factors* and *time and financial constraints* were the most highlighted barriers while *lack of established standards, frameworks and tools* were the least mentioned barriers.

However, the less highlighting of the barriers does not necessarily mean that they are trivial and/or correlate directly to their significance. Every single identified obstacle has its own prominence depending on the size of the organization and the country in which the organization operates. Moreover, these individual barriers and drivers were not specifically asked from the interview objects, that is, they talked about the barriers and drivers what they had in their minds. Additionally, the barriers were summarized in form of a heptagon model; answering the sub-research question 'RQ1' about the impediments related to sustainability implementation.

In similar manner, the sustainability drivers were also categorized in the form of *organizational aspects, financial factors, promoting awareness, stakeholders' role, standards and tool, government policies and regulations, and others*, according to the sourced literature and the interview outcomes. Again, like barriers, *organizational aspects* and *financial factors* were the most emphasized sustainability drivers while *others* were the least mentioned drivers. In

addition, these drivers were also encapsulated in a simplified view, in form of a heptagon model to answer the sub-research question ‘RQ2’ regarding the potential sustainability drivers.

Furthermore, the impacts of sustainability on the organizational financial resources were also explored. The positive economic impacts include *cost savings* through energy efficient methods and waste reductions; resulting in reduced costs as well as *enhanced brand image and reputation of the company* and *profiting* the organizations eventually. Meanwhile, sustainability reporting by firms such as *ESG, GRI, CSR* and the like, also attracts a wide range of investors, leading to a positive effect on the financial resources. In addition, the improved productivity of the built environment further contributes to the economic gains enormously.

Nevertheless, there also exist negative impacts too in terms of sustainable practices being *too costly* and requiring the *high initial investment*; especially for SMEs due to the *lack of financial resources and funding including the lack of support from financial institutions*. If sustainable practices are not generating profits and making economic sense in the short period of time, there is possibility of firms going out of the businesses and bankrupt, ultimately. The organizations simply cannot bear the cost strains of sustainable practices in the long-term; especially the SMEs. This answered the last sub-research question ‘RQ3’ about the impacts of sustainability on an organization’s financial resources.

Last but not least, the crucial role of PM towards incorporating the sustainable activities was also emphasized. PM acts as bridge in transferring the sustainability visions and strategies into the goals and objectives. To achieve the long-term sustainability benefits from projects, a holistic approach is required in the form of a project lifecycle perspective. In addition, the role of project managers including their competency is essential for the successful implementation of sustainable activities. Else, the incompetent project managers will act as barriers towards the sustainability integration.

This concludes the research study which started from the identification of the sustainability barriers and the potential drivers to finding out the financial impacts of the sustainable practices on the organization’s economic resources. In addition, highlighting the significance of the PM towards sustainable development; fulfilling the purpose of this study in a systematic way.

7 FUTURE WORK

The sustainability barriers and the drivers highlighted in this research report have a lot of substantial significance in overcoming the barriers towards the sustainable development. However, the research study was focused on the primary factors that were linked with the internal characteristics of a firm only besides the government policies and regulations associated with the implementation of sustainability. That is, the research was performed merely from an organization's internal point of view. As a result, different types of green technologies and their associated pros and cons, as well as the role of value chain actors were not considered in this research. In addition, the secondary internal factors such as language barriers and cultural dimensions of an organization were also excluded from this studied area of focus.

Additionally, the role of PM is critical towards implementation of sustainable practices. For future research, a framework should also be developed highlighting both the sustainability barriers and drivers in different phases of the project. This will help in integrating the sustainability principles throughout the lifecycle of the project.

Moreover, the interviews were conducted digitally (online) as it was not safe to perform the physical interviews in current circumstances, that is, COVID-19 (coronavirus) pandemic, globally. Therefore, it was noticed during the interviews that the one-hour time limit of the interviews was not enough for some of the interviewed persons as they could not manage to talk about in detail regarding some of the interviewed questions. As a consequence, the sustainability barriers and drivers found in the literature were not specifically asked during the interviews. The interviewees gave the answers according to the thoughts they had in their minds and the interview process was carried forward as most of the interviewed people had another meeting just after my interview. In short, there was an element of rush presence in some of the conducted interviews. Thereby, this suggested the need to conduct the surveys in future based on the sustainability barriers and drivers found in the literature. This in turn would compare the theoretical results with the professionals' experience and their knowledge to further justify the performed research study.

8 REFERENCES

AARSETH, W., AHOLA, T., AALTONEN, K., ØKLAND, A. & ANDERSEN, B. 2017. Project sustainability strategies: A systematic literature review. *International journal of project management,* 35**,** 1071-1083.

ABIDIN, N. Z. 2010. Investigating the awareness and application of sustainable construction concept by Malaysian developers. *Habitat international,* 34**,** 421-426.

ADAMS, C. A. & FROST, G. R. Integrating sustainability reporting into management practices. Accounting forum, 2008. Elsevier, 288-302.

AGHAEGBUNA, O., TASMIYAH, C., ZANOXOLO, B. & NIKIWE, M. 2020. Sustainability in Project Management Practice. *MATEC web of conferences,* 312**,** 2015.

ALEIXO, A. M., LEAL, S. & AZEITEIRO, U. M. 2018. Conceptualization of sustainable higher education institutions, roles, barriers, and challenges for sustainability: An exploratory study in Portugal. *Journal of cleaner production,* 172**,** 1664-1673.

ALI, F., BOKS, C. & BEY, N. 2016. Design for sustainability and project management literature–a review. *Procedia CIRP,* 48**,** 28-33.

AMANKWAH-AMOAH, J. & SYLLIAS, J. 2020. Can adopting ambitious environmental sustainability initiatives lead to business failures? An analytical framework. *Business Strategy and the Environment,* 29**,** 240-249.

BADEWI, A. 2016. The impact of project management (PM) and benefits management (BM) practices on project success: Towards developing a project benefits governance framework. *International journal of project management,* 34**,** 761-778.

BLANCO-PORTELA, N., R-PERTIERRA, L., BENAYAS, J. & LOZANO, R. 2018. Sustainability Leaders' Perceptions on the Drivers for and the Barriers to the Integration of Sustainability in Latin American Higher Education Institutions. *Sustainability (Basel, Switzerland),* 10**,** 2954.

CAI, W. & LI, G. 2018. The drivers of eco-innovation and its impact on performance: Evidence from China. *Journal of Cleaner Production,* 176**,** 110-118.

CARVALHO, M. M. D., PATAH, L. A. & DE SOUZA BIDO, D. 2015. Project management and its effects on project success: Cross-country and cross-industry comparisons. *International journal of project management,* 33**,** 1509-1522.

CASEY, D. & SIEBER, S. 2016. Employees, sustainability and motivation: Increasing employee engagement by addressing sustainability and corporate social responsibility. *Research in Hospitality Management,* 6**,** 69-76.

CHAWLA, V., CHANDA, A., ANGRA, S. & CHAWLA, G. 2018. The sustainable project management: A review and future possibilities. *Journal of Project Management,* 3**,** 157-170.

CHOFREH, A. G., GONI, F. A., MALIK, M. N., KHAN, H. H. & KLEMEŠ, J. J. 2019. The imperative and research directions of sustainable project management. *Journal of Cleaner Production,* 238**,** 117810.

COLLINS, R. J. 2011. Project management. Hauppauge, NY: Nova Science Publishers, Inc.

CRAWFORD, L. 2005. Senior management perceptions of project management competence. *International journal of project management,* 23**,** 7-16.

CRESWELL, J. W. & CRESWELL, J. D. 2017. *Research design: Qualitative, quantitative, and mixed methods approaches,* Sage publications.

DARKO, A. & CHAN, A. P. C. 2017. Review of Barriers to Green Building Adoption. *Sustainable development (Bradford, West Yorkshire, England),* 25**,** 167-179.

DE MARCO, A. 2018. Project Management for Facility Constructions : A Guide for Engineers and Architects. 2nd ed. 2018. ed. Cham: Springer International Publishing : Imprint: Springer.

DENYER, D. & PILBEAM, C. 2015. *Doing a literature review in business and management* [Online]. Cranfield University, School of Management.
Available: https://www.bam.ac.uk/sites/bam.ac.uk/files/W%2015%20Conducting%20a%20Literature%20Review.pdf [Accessed 20, October 2020].

DU PLESSIS, C. 2007. A strategic framework for sustainable construction in developing countries. *Construction management and economics,* 25**,** 67-76.

DURDYEV, S., ZAVADSKAS, E. K., THURNELL, D., BANAITIS, A. & IHTIYAR, A. 2018. Sustainable construction industry in Cambodia: Awareness, drivers and barriers. *Sustainability,* 10**,** 392.

ESKEROD, P. & HUEMANN, M. 2013. Sustainable development and project stakeholder management: What standards say. *International Journal of Managing Projects in Business*.

EUROPEAN COMMISSION 2006. NACE Rev. 2 - Statistical classification of economic activities.

EUROPEAN COMMISSION 2019a. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. The European Green Deal. Brussels.

EUROPEAN COMMISSION. 2019b. *A European Green Deal* [Online].
Available: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en [Accessed 03 March 2021].

EWEJE, G. & ALAKAVUKLAR, O. N. 2014. Corporate social responsibility and sustainability : emerging trends in developing economies. Bingley, England: Emerald.

GAN, X., ZUO, J., YE, K., SKITMORE, M. & XIONG, B. 2015. Why sustainable construction? Why not? An owner's perspective. *Habitat International,* 47**,** 61-68.

GERALDI, J. G., LEE-KELLEY, L. & KUTSCH, E. 2010. The Titanic sunk, so what? Project manager response to unexpected events. *International journal of project management,* 28**,** 547-558.

GOMES, V. & DA SILVA, M. G. 2005. Exploring sustainable construction: implications from Latin America. *Building Research & Information,* 33**,** 428-440.

GONI, F. A., SHUKOR, S. A., MUKHTAR, M. & SAHRAN, S. 2015. Environmental Sustainability: Research Growth and Trends. *Advanced Science Letters,* 21**,** 192-195.

GREEN, B. N., JOHNSON, C. D. & ADAMS, A. 2006. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. *Journal of chiropractic medicine,* 5**,** 101-117.

GRI 2016. GRI 101: Foundation 2016. *Amsterdam: Global Reporting Initiative. https://www. globalreporting. org/standards/media/1036/gri-101-foundation-2016. pdf.*

GRIFFITH UNIVERSITY. 2020. *Systematic literature reviews for education and social sciences* [Online]. Griffith University, Australia. Available: https://libraryguides.griffith.edu.au/systematic-literature-reviews-for-education [Accessed 18 October 2020].

GURJAR, N. 2016. *A Forward Looking Approach to Project Management: Tools, Trends, and the Impact of Disruptive Technologies,* Singapore, Singapore: Springer Singapore Pte. Limited.

HEDSTROM, G. S. 2018. *Sustainability,* De Gruyter.

HENRIQUES, A. & RICHARDSON, J. 2004. *The triple bottom line: Does it all add up? Assessing the Sustainability of Business and CSR,* London, Sterling, VA, Earthscan Publications Ltd.

HERAVI, G., FATHI, M. & FAEGHI, S. 2015. Evaluation of sustainability indicators of industrial buildings focused on petrochemical projects. *Journal of Cleaner Production,* 109**,** 92-107.

HERMUNDSDOTTIR, F. & ASPELUND, A. 2021. Sustainability innovations and firm competitiveness: A review. *Journal of Cleaner Production,* 280**,** 124715.

HODGES, C. P. 2005. A facility manager's approach to sustainability. *Journal of Facilities Management,* 3**,** 312-324.

HOFFMAN, A. J. & HENN, R. 2008. Overcoming the social and psychological barriers to green building. *Organization & Environment,* 21**,** 390-419.

HOWES, M., WORTLEY, L., POTTS, R., DEDEKORKUT-HOWES, A., SERRAO-NEUMANN, S., DAVIDSON, J., SMITH, T. & NUNN, P. 2017. Environmental sustainability: a case of policy implementation failure? *Sustainability,* 9**,** 165.

HUSSEIN, B. 2018. *The road to success: narratives and Insights from real-life projects,* Fagbokforlaget.

HWANG, B.-G. & NG, W. J. 2013. Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management,* 31**,** 272-284.

IFMA. 2018. *IFMA Certified Facility Manager (CFM) COMPETENCY GUIDE* [Online]. Available: https://www.fm.training/sites/collabstore/files/images/Competency_Guide_Context_Public_v1_7-12-18.pdf [Accessed 02 September 2020].

IMP. 2020. *Statement of intent to work together towards comprehensive corporate reporting* [Online]. Available: https://impactmanagementproject.com/structured-network/statement-of-intent-to-work-together-towards-comprehensive-corporate-reporting/ [Accessed 10 February 2021].

ISMAEL, D. & SHEALY, T. 2018. Sustainable Construction Risk Perceptions in the Kuwaiti Construction Industry. *Sustainability (Basel, Switzerland),* 10**,** 1854.

KARJI, A., NAMIAN, M. & TAFAZZOLI, M. 2020. Identifying the Key Barriers to Promote Sustainable Construction in the United States: A Principal Component Analysis. *Sustainability,* 12**,** 5088.

KIRON, D., KRUSCHWITZ, N., HAANAES, K. & VELKEN, I. V. S. 2012. Sustainability nears a tipping point. *MIT Sloan management review,* 53**,** 69.

KIVILÄ, J., MARTINSUO, M. & VUORINEN, L. 2017. Sustainable project management through project control in infrastructure projects. 1167-1183.

KLAKEGG, O. J. 2015. In pursuit of relevance and sustainability. *Open Economics and Management Journal,* 2.

KRISTOFFERSEN, E., BLOMSMA, F., MIKALEF, P. & LI, J. 2020. The smart circular economy: A digital-enabled circular strategies framework for manufacturing companies. *Journal of business research,* 120**,** 241-261.

KUTSCH, E., WARD, J., HALL, M. & ALGAR, J. 2015. The Contribution of the Project Management Office: A Balanced Scorecard Perspective. *Information Systems Management,* 32**,** 105-118.

LABUSCHAGNE, C., BRENT, A. C. & CLAASEN, S. J. 2005. Environmental and social impact considerations for sustainable project life cycle management in the process industry. *Corporate Social Responsibility and Environmental Management,* 12**,** 38-54.

LAI, J. H. K., YIK, F. W. H. & MAN, C. S. 2012. Carbon audit: a literature review and an empirical study on a hotel. *Facilities (Bradford, West Yorkshire, England),* 30**,** 417-431.

LEE, S. Y. & KANG, M. 2013. Innovation characteristics and intention to adopt sustainable facilities management practices. *Ergonomics,* 56**,** 480-491.

MANZANEQUE-LIZANO, M., ALFARO-CORTES, E. & PRIEGO DE LA CRUZ, A. M. 2019. Stakeholders and Long-Term Sustainability of SMEs. Who Really Matters in Crisis Contexts, and When. *Sustainability,* 11**,** 6551.

MARTENS, M. L. & CARVALHO, M. M. 2017. Key factors of sustainability in project management context: A survey exploring the project managers' perspective. *International journal of project management,* 35**,** 1084-1102.

MAVI, R. K. & STANDING, C. 2018. Critical success factors of sustainable project management in construction: A fuzzy DEMATEL-ANP approach. *Journal of cleaner production,* 194**,** 751-765.

MUSTAPHA, M. A., MANAN, Z. A. & WAN ALWI, S. R. 2017. Sustainable Green Management System (SGMS) – An integrated approach towards organisational sustainability. *Journal of cleaner production,* 146**,** 158-172.

NIELSEN, S. B., SARASOJA, A.-L. & GALAMBA, K. R. 2016. Sustainability in facilities management: an overview of current research. *Facilities (Bradford, West Yorkshire, England),* 34**,** 535-563.

NORMAN, G. M., DAVE, P., JERYLDINE, S. & CHARLES, T. 2010. The Operations and Management of Green Buildings in the United States. *The journal of sustainable real estate,* 2**,** 51-66.

OECD 2017. *Entrepreneurship at a Glance 2017*.

OLSSON, N. 2020. Method and Literature. *TPK4220 Project Flexibility.* NTNU.

ORJI, I. J. 2019. Examining barriers to organizational change for sustainability and drivers of sustainable performance in the metal manufacturing industry. *Resources, Conservation and Recycling,* 140**,** 102-114.

PADALKAR, M. & GOPINATH, S. 2016. Six decades of project management research: Thematic trends and future opportunities. *International journal of project management,* 34**,** 1305-1321.

PEARCE, A. R. 2008. Sustainable capital projects: leapfrogging the first cost barrier. *Civil Engineering and Environmental Systems,* 25**,** 291-300.

PHAM, H., KIM, S.-Y. & LUU, T.-V. 2020. Managerial perceptions on barriers to sustainable construction in developing countries: Vietnam case. *Environment, Development and Sustainability,* 22**,** 2979-3003.

PMI 2017. *A guide to the project management body of knowledge : (PMBOK guide),* Newtown Square, Pennsylvania, USA, Project Management Institute.

PORTNEY, K. E. 2015. Sustainability. Cambridge, Massachusetts: The MIT Press.

PWC. 2020. *ESG oversight:The corporate director's guide* [Online]. Available: https://www.pwc.com/us/en/services/governance-insights-center/esg-guidebook-layout-final.pdf [Accessed 09 February 2021].

ROBICHAUD, L. B. & ANANTATMULA, V. S. 2011. Greening project management practices for sustainable construction. *Journal of management in engineering,* 27**,** 48-57.

ROBINSON, Z. 2012. Sustainability. Singapore: Marshall Cavendish Editions.

ROPER, K. O. & PAYANT, R. P. 2014. The facility management handbook. 4th ed. ed. Broadway, New York: AMACOM.

RUBINO, F. E. & VELTRI, S. 2020. Accounting for Sustainability—Could Cost Accounting Be the Right Tool? *In:* DEL BALDO, M., DILLARD, J., BALDARELLI, M.-G. & CIAMBOTTI, M. (eds.) *Accounting, Accountability and Society: Trends and Perspectives in Reporting, Management and Governance for Sustainability.* Cham: Springer International Publishing.

RUTGERS. 2020. *Systematic Reviews in the Health Sciences: Handsearching* [Online]. Rutgers, University Libraries: Rutgers, The State University of New Jersey. Available: https://libguides.rutgers.edu/c.php?g=337288&p=2269575#:~:text=Hand%2Dsearching%20in%20Systematic%20Reviews,missed%20during%20the%20indexing%20process. [Accessed 20 October 2020].

SAMSET, K. 2010. *Early Project Appraisal: Making the Initial Choices,* London, London: Palgrave Macmillan UK.

SASB. 2021. *SASB & Other ESG Frameworks* [Online]. Available: https://www.sasb.org/about/sasb-and-other-esg-frameworks/ [Accessed 11 February 2021].

SERPELL, A., KORT, J. & VERA, S. 2013. Awareness, actions, drivers and barriers of sustainable construction in Chile. *Technological and Economic Development of Economy,* 19**,** 272-288.

SEV, A. 2009. How can the construction industry contribute to sustainable development? A conceptual framework. *Sustainable development (Bradford, West Yorkshire, England),* 17**,** 161-173.

SHAFII, F., ARMAN ALI, Z. & OTHMAN, M. Z. 2006. Achieving sustainable construction in the developing countries of Southeast Asia.

SHARI, Z. & SOEBARTO, V. 2012. DELIVERING SUSTAINABLE BUILDING STRATEGIES IN MALAYSIA: STAKEHOLDERS'BARRIERS AND ASPIRATIONS. *ALAM CIPTA, International Journal of Sustainable Tropical Design Research and Practice,* 5**,** 3-12.

SHEN, W., TANG, W., SIRIPANAN, A., LEI, Z., DUFFIELD, C. F. & HUI, F. K. P. 2018. Understanding the green technical capabilities and barriers to green buildings in developing countries: A case study of Thailand. *Sustainability,* 10**,** 3585.

SILVIUS, A. J. G. & DE GRAAF, M. 2019. Exploring the project manager's intention to address sustainability in the project board. *Journal of cleaner production,* 208**,** 1226-1240.

SILVIUS, A. J. G. & SCHIPPER, R. P. J. 2014. Sustainability in project management: A literature review and impact analysis. *Social business,* 4**,** 63-96.

SILVIUS, G., SCHIPPER, R., PLANKO, J. & BRINK, J. V. D. 2012. *Sustainability in Project Management,* Milton, Milton: Routledge.

SPARKES, A. C. & SMITH, B. 2014. *Qualitative Research Methods in Sport, Exercise and Health: From Process to Product,* London, London: Routledge.

STATISTICS NORWAY. 2016. *Classification of Standard Industrial Classification* [Online]. Available: https://www.ssb.no/en/klass/klassifikasjoner/6 [Accessed 03 March 2021].

STEWART, R., BEY, N. & BOKS, C. 2016. Exploration of the barriers to implementing different types of sustainability approaches. *Procedia CIRP,* 48**,** 22-27.

STØRE-VALEN, M. & BUSER, M. 2019. Implementing sustainable facility management: Challenges and barriers encountered by Scandinavian FM practitioners. *Facilities (Bradford, West Yorkshire, England),* 37**,** 550-570.

STUBBS, W. & COCKLIN, C. 2008. Conceptualizing a "sustainability business model". *Organization & environment,* 21**,** 103-127.

THOMAS, J. & MENGEL, T. 2008. Preparing project managers to deal with complexity – Advanced project management education. *International journal of project management,* 26**,** 304-315.

TOKBOLAT, S., KARACA, F., DURDYEV, S. & CALAY, R. K. 2019. Construction professionals' perspectives on drivers and barriers of sustainable construction. *Environment, development and sustainability,* 22**,** 4361-4378.

TRANFIELD, D., DENYER, D. & SMART, P. 2003. Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British journal of management,* 14**,** 207-222.

UNESCO. 2019. *Sustainable Development* [Online].
Available: https://en.unesco.org/themes/education-sustainable-development/what-is-esd/sd [Accessed 02 March 2021].

UNITED NATIONS. 2012. *United Nations Conference on Sustainable Development, Rio+20* [Online]. Available: https://sustainabledevelopment.un.org/rio20 [Accessed 02 March 2021].

UNITED NATIONS. 2015. *Transforming our world: the 2030 Agenda for Sustainable Development* [Online] Available: https://sustainabledevelopment.un.org/post2015/transformingourworld [Accessed 02 March 2021].

UNITED NATIONS. 2020. *Sustainable Development Goals. Guidelines for the use of the SDG logo including the colour wheel, and 17 icons.* [Online].
Available: https://www.un.org/sustainabledevelopment/wpcontent/uploads/2019/01/SDG_Guidelines_AUG_2019_Final.pdf [Accessed 02 March 2021].

WALKER, T., KROSINSKY, C., HASAN, L. N. & KIBSEY, S. D. 2019. Sustainable Real Estate : Multidisciplinary Approaches to an Evolving System. 1st ed. 2019. ed. Cham: Springer International Publishing : Imprint: Palgrave Macmillan.

WIRICK, D. 2011. *Public-Sector Project Management: Meeting the Challenges and Achieving Results,* Newtown Square, PA Hoboken, N.J, Newtown Square, PA Hoboken, N.J: Wiley.

WOHLIN, C. Guidelines for snowballing in systematic literature studies and a replication in software engineering. Proceedings of the 18th international conference on evaluation and assessment in software engineering, 2014. 1-10.

WONDIMU, P. A., HOSSEINI, A., LOHNE, J. & LAEDRE, O. 2018. Early contractor involvement approaches in public project procurement. *Journal of Public Procurement*.

YOSHINO, N., TAGHIZADEH-HESARY, F., SACHS, J. D. & WOO, W. T. 2019. *Handbook of Green Finance: Energy Security and Sustainable Development,* Singapore, Singapore: Springer Singapore Pte. Limited.

ZHANG, X., PLATTEN, A. & SHEN, L. 2011. Green property development practice in China: Costs and barriers. *Building and environment,* 46**,** 2153-2160.

ZHOU, L. & LOWE, D. Economic challenges of sustainable construction. Proceedings of RICS COBRA foundation construction and building research conference, 2003. 1-2.

ZIOLO, M. & SERGI, B. S. 2019. *Financing Sustainable Development: Key Challenges and Prospects*, Cham, Cham: Springer International Publishing AG.

ZWIKAEL, O. & SMYRK, J. R. 2019. Project Management : A Benefit Realisation Approach. 1st ed. 2019. ed. Cham: Springer International Publishing : Imprint: Springer.

APPENDIX A: THE INTERVIEW GUIDE

Type of organization:	*Size of organization:*
Country of operation:	
Role description:	*Date/time of interview:*

Introduction

Welcome to interview; information about the project and the interview process

1. *Could you tell me a bit about yourself and your background?*
2. *What is your role and the work you do in your organization?*
3. *How would you describe your organization?*
4. *What is the mission of your organization?*
   (A mission statement defines what an organization is, why it exists, its reason for being.)
5. *How do you or your organization perceive project management success? (in terms of traditional values (time and cost) only or/and other factors such as sustainability, relevance and impact of projects are also considered)*
6. *How project management can be helpful to lead sustainable activities in your organization?*

Sustainability

7. *What is your experience with sustainability?*
8. *How do you or your organization work with sustainability*
   a. *in terms of economic, environment and social aspects, and*
   b. *in terms of the number and type of projects and/or programs, and*
   c. *the targets you set for them?*
9. *How and in what ways have your organization implemented sustainability into your organization's business case/strategy?*
10. *From you and your organizations point of view, which pillar of sustainability is considered most important (economic, environment or social) and how come is this regarded most important?*
11. *How do your organization measure sustainability?*
12. *How does sustainability add value to your organization? (in terms of all three pillars of sustainability)*

Sustainability barriers and enablers

13. *What kind of different barriers do you and your organization face in implementing sustainable activities?*
14. *How do different stakeholders in your organization view and/or (re)act to the sustainability concept?*
15. *How do your organization view sustainable projects/program in terms of time perspective?*
16. *What time frame (project life span) does your sustainability project have?*
17. *How do your organization perceive the effects of implementing sustainability on financial resources?*
18. *How do your organization ensure financial benefits and profitability in your sustainable development activities?*
19. *What are your organization's experiences with the role of government and political factors for implementation of sustainable activities?*

Ending of the interview

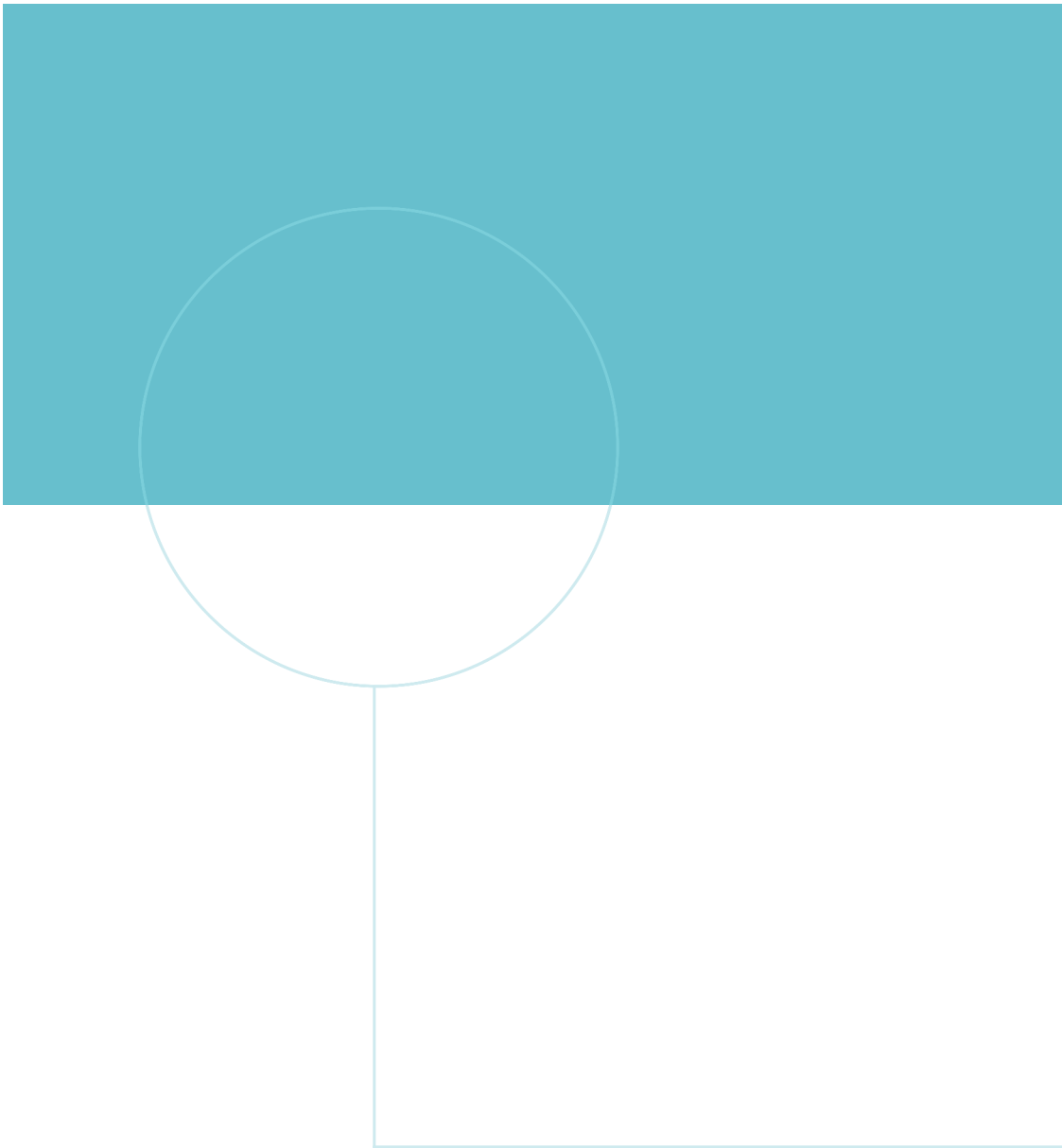
20. *Something to add. Something else to be considered, asked or thought of?*

APPENDIX B: DESCRIPTION OF THE INTERVIEWED ORGANIZATIONS

#	Size of organization	NACE	NACE industry description				
			Sector	Division	Group	Class	Sub-class
1	Micro	94.110	Other service actitvities	Activities of membership organizations	Activities of business, employers and professional membership organizations	Activities of business and employers membership organizations	Activities of business and employers membership organizations
2	Micro	70.220	Professional, scientific and technical actvities	Activities of head offices; management consultancy activities	Management consultancy activities	Business and other management consultancy activities	Business and other management consultancy activities
3	Micro	NA	NA	NA	NA	NA	NA
4	Small	94.110	Other service activities	Activities of membership organizations	Activities of other membership organizations	Activities of other membership organizations	Activities of other membership organizations
5	Small	94.991	Other service activities	Activities of membership organizations	Activities of other membership organizations	Activities of other membership organizations	Activities of other membership organizations
6	Medium	71.129	Professional, scientific and technical actvities	Architectural and engineering activities;	Architectural and engineering activities and	Engineering activities and related technical consultancy	Other technical consultancy activities

				technical testing and analysis	related technical consultancy		
7	Medium	71.129	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Other technical consultancy activities
8	Medium	70.220	Professional, scientific and technical actvities	Activities of head offices; management consultancy activities	Management consultancy activities	Business and other management consultancy activities	Business and other management consultancy activities
9	Big	NA	NA	NA	NA	NA	NA
10	Big	71.121	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Civil engineering activities
11	Big	81.101	Administrative and support service activities	Services to buildings and landscape activities	Combined facilities support activities	Combined facilities support activities	Caretaker services
12	Big	71.121	Professional, scientific and technical actvities	Architectural and engineering activities; technical testing and analysis	Architectural and engineering activities and related technical consultancy	Engineering activities and related technical consultancy	Civil engineering activities
13	Big	41.100	Construction	Construction of buildings	Development of building projects	Development of building projects	Development of building projects

14	Big	84.110	Public administration and defence; compulsory social security	Public administration and defence; compulsory social security	Administration of the State and the economic and social policy of the community	General public administration activities	General public administration activities
15	Big	84.120	Public administration and defence; compulsory social security	Public administration and defence; compulsory social security	Administration of the State and the economic and social policy of the community	Regulation of the activities of providing health care, education, cultural services and other social activities; excluding social security	Regulation of the activities of providing health care, education, cultural services and other social activities; excluding social security
16	Big	18.110	Manufacturing	Printing and reproduction of recorded media	Printing and service activities related to printing	Printing of newspapers	Printing of newspapers
17	Big	81.109	Administrative and support service activities	Services to buildings and landscape activities	Combined facilities support activities	Combined facilities support activities	Other combined facilities support activities
18	Big	41.200	Construction	Construction of buildings	Construction of residential and non-residential buildings	Construction of residential and non-residential buildings	Construction of residential and non-residential buildings



NTNU

Norwegian University of
Science and Technology