T.C.
ISTANBUL GEDİK NIVERSITY
INSTITUTE OF GRADUATE STUDIES

IMPACT OF PROJECTS MANAGEMENT IN SUSTAINABLE BUILDING CONSTRUCTION

MASTER THESIS

Abdulrazaq Hameed A.R. ABDULRAZAQ

Civil Engineering Department

Master in Civil Engineering English Program

AUGUST 2023

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İSTANBUL GEDİK ÜNİVERSİTESİ
LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ MÜDÜRLÜĞÜ

Yüksek Lisans Tez Onay Belgesi

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DECLARATION

I Abdulrazaq Hameed A.R. ABDULRAZAQ as a result of this declare that this thesis titled “Impact of Projects Management in Sustainable Building Construction” is original work I did for the award of the master's degree in the faculty of Civil Engineering Program I also declare that this thesis or any part of it has not been submitted and presented for any other degree or research paper in any other university or institution. (01/08/2023)

Abdulrazaq Hameed A.R. ABDULRAZAQ

PREFACE

Throughout the writing of this research paper, I have received a great deal of assistance and support. I would like to begin by expressing my deepest gratitude to my first supervisor, Assist. Prof. Dr. Hasan Bozkurt Nazilli, for his guidance, effusive encouragement, career orientation, and insightful critiques of this research work throughout the entirety of my M.Sc. program. I would like to thank the 134 individuals who participated in the data collection and research validation; without their kind assistance, this research could not be completed.

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August 2023 Abdulrazaq Hameed A.R. ABDULRAZAQ

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ABBREVIATIONS

IPMA : International Project Management Association
PMBOK : Project Management Body of Knowledge
PMI : Project Management Institute
PMKA : Project Management Knowledge areas
POE : Post Occupancy Evaluation
PPSP : Project Performance and Stakeholder satisfaction
PRISM : Project Integrating Sustainable Methods
SC : Sustainability champion(s)
SDGs : Sustainable Development Goals
SoS : Social Sustainability
SPM : Sustainable Project Management
SPS : Sustainable Project Success

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IMPACT OF PROJECTS MANAGEMENT IN SUSTAINABLE BUILDING CONSTRUCTION

ABSTRACT

Sustainable development has, for many years, been concerned with improving people's standard of living by enhancing the community's natural resources, infrastructure, and economy. The building industry is crucial to achieving sustainable development and should therefore embrace the sustainability concept. The adoption of new processes and working practices in sustainable building can be difficult because of the need to adapt to new technology, which in turn necessitates careful consideration of risk.

In order to solve these obstacles, it is vital to learn about new duties, performers, and parts. Project managers are in a unique position within the context of a given project, and as such, they deserve special consideration from all other parties involved.

Because of their role in the construction process, project managers have a responsibility to ensure that sustainable building projects are completed successfully.

In order to do this, a literature analysis was performed to learn more about the distinctions between conventional and green building, the difficulties regarding the green construction process, and the roles and duties of project managers.

The challenges that they must solve, their part in the process of sustainable building is crucial. Thanks to the unique demands of sustainable construction, they can help enable the necessary shifts. In response to the complexity of sustainable building projects, one of their primary functions is to facilitate improved communication and coordination among project participants.

Keywords: *Sustainable development, Sustainable construction, Green Building, Project Management, Sustainable building process*

SÜRDÜRÜLEBİLİR BİNA İNŞAATINDA PROJE YÖNETİMİNİN ETKİSİ

ÖZET

Sürdürülebilir kalkınma, uzun yıllardır toplumun doğal kaynaklarını, altyapısını ve ekonomisini geliştirerek insanların yaşam standartlarını iyileştirmekle ilgilenmektedir. İnşaat endüstrisi, sürdürülebilir kalkınmayı sağlamak için çok önemlidir ve bu nedenle sürdürülebilirlik kavramını benimsemelidir. Sürdürülebilir binada yeni süreçlerin ve çalışma uygulamalarının benimsenmesi, yeni teknolojiye uyum sağlama ihtiyacı nedeniyle zor olabilir ve bu da riskin dikkatli bir şekilde değerlendirilmesini gerektirir.

Bu engelleri aşmak için yeni görevler, icracılar ve roller hakkında bilgi sahibi olmak çok önemlidir. Proje yöneticileri, belirli bir proje bağlamında benzersiz bir konumdadır ve bu nedenle, dahil olan tüm diğer taraflardan özel ilgiyi hak ederler.

İnşaat sürecindeki rolleri nedeniyle, proje yöneticilerinin sürdürülebilir bina projelerinin başarıyla tamamlanmasını sağlama sorumluluğu vardır.

Bunu yapmak için, geleneksel ve yeşil bina arasındaki farklar, yeşil inşaat sürecine ilişkin zorluklar ve proje yöneticilerinin rolleri ve görevleri hakkında daha fazla bilgi edinmek için bir literatür analizi yapılmıştır.

Çözmeleri gereken zorluklar, sürdürülebilir bina sürecindeki rolleri çok önemlidir. Sürdürülebilir inşaatın benzersiz talepleri sayesinde, gerekli değişimlerin sağlanmasına yardımcı olabilirler. Sürdürülebilir bina projelerinin karmaşıklığına yanıt olarak, birincil işlevlerinden biri, proje katılımcıları arasında gelişmiş iletişim ve koordinasyonu kolaylaştırmaktır.

Anahtar Kelimeler: *Sürdürülebilir kalkınma, Sürdürülebilir inşaat, Yeşil Bina, Proje Yönetimi, Sürdürülebilir bina süreci*

1. INTRODUCTION

1.1 Background

Consistent with the goals of sustainable development, i.e. “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987), The construction sector must take on the lot of responsibility because of what it does for the economy, society, and environment. In order To achieve the necessary requirements, An industry has presented the market with stricter standards of sustainable buildings, (Kibert, 2013).

To reach the goal of reducing carbon emissions, buildings or net-zero buildings are needed.

However, Sustainable building practices are currently concentrating on a large scale. (i.e. government policies/incentives and corporate development strategies). Insufficient efforts have been made at the project level to enhance management practices in order to implement projects in a sustainable manner. Consequently, construction structures are currently implemented without a long-term strategy for project management. lacking a sustainable process, the outcome cannot be sustainable (Marcelino-Sádaba, 2015).

Existing guidelines for managing projects don't take environmental concerns into account (Eid, 2009). is the primary reason for the absence of a sustainable management approach in practice. For instance, standards for project management such as IPMA, AIPM, APM, and ENAA pay "no special attention to the issue of sustainability" (Martens & Carvalho, 2016). Analyzing process-based project management standards (PMBOK guide, PRINCE2 and ISO21500), (Silvius ,2013) discovered that these standards "refer to sustainability in a manner that is largely implicit." As Silvius & Brink (2014) explain in Figure 1.1, Those standards are at tension with the theory of sustainable development and have shaped the ideas and traits of project management as a result. Because clients and investors often regard sustainability to be an additional cost, time, resources, and risk due to its uncertainty,

Present assignment management practice is oriented by a short-term viewpoint to achieve primarily financial aims.. Therefore, sustainability objectives are frequently given a lower priority than schedule and cost objectives. When the endeavor encounters obstacles

In conclusion, an exhaustive guideline is required to support project managers in starting and finishing eco-friendly building projects. In addition to stressing the significance of incorporating sustainability assessment and planning, the guideline also should assist the industry in overcoming human-related obstacles (such as human resource, competencies, or stakeholder engagement and communication). Understanding essential sustainability management in construction components and how they can influence the success of a sustainable project should be the first step in constructing the framework, Fig. (1.1) . To serve as detailed instructions for project management.

Sustainable Development		**Project Management**
Long- term + short term oriented	⟷	Short -term oriented
In the interest of this generation and future generations	⟷	In the interest of sponsor / stakeholders
Life cycle oriented	⟷	Deliverable / result oriented
People, plant, profit	⟷	Scope, Time ,Budget
Increasing complexity	⟷	Reduce complexity

Figure 1.1: The disparity between the Present Approach to Management of Projects and Sustainability

Source: (Silvius & Brink, 2014)

1.2 Questions, Aims, and Expectations for the Research

This research seeks to importance of the manager in managing private projects in building sustainable buildings that incorporates sustainability into the theory and practice of project management. This thesis is intended to serve as a practical guide for project managers throughout the entire challenges of sustainable construction application. It is projected that the structure will close the disparity between principles for sustainable project management and existing requirements. To achieve the primary objective, three objectives are established:

1. The main obstacles that project managers face when managing green buildings in Iraq.
2. The Impact of Engineering Management in sustainable.
3. The factors effect in manager's management in sustainable projects.

1.3 The Research Methodology

A Figure 1.2 depicts a map of the employed research techniques, research objectives, and thesis structure. The research methodology is described in detail in Chapter 4, but some context is provided below.

In order to identify the research problem, Chapter 2 presents the results of an examination of the literature concerning sustainable building and sustainable project management. These evaluations were based on secondary sources, including journal articles, books, conference papers, reports, and doctoral dissertations.

After that, a comprehensive literature evaluation was conducted on project management-related topics, resulting in the determination of twenty-five potential factors that contribute to the sustainability of construction initiatives. Then, these variables were separated into three different groups.

Three hypotheses were proposed to comprehend the relationships between these categories of factors and each of these components and the success of sustainable initiatives in practice. Chapter 3 demonstrated the identification, supporting theories, and hypotheses for these components.

This research employed a survey methodology data collection of confirmatory factor data and assessment of The assumptions of the structure of concepts. A questionnaire was disseminated online to project administrators, members of project management teams, and engineers with more than two years of experience in Iraqi construction project management. Participant was requested to provide background information, an evaluation of the actual performance of selected critical success factors for a sustainable project management approach, and an evaluation of their most recent project's success criteria.

The research employs descriptive statistics and structural equation modeling (Spss) program for data analysis. An examination of average, median, and mode, standard

of deviation, normality, and the correlation test was supported by SPSS statistics. Software for data analysis assisted with the confirmatory factor's analysis.

In the conclusion, the outcomes and summary document of the questionnaire analysis were presented.

1.4 Thesis Structure

A structure of A thesis was depicted in the final column of Figure 1.2. The dissertation comprises of five chapters with short introductions as follows:

- Chapter 1 – Introduction:

This chapter provides a general introduction to the research, including context, research justification, a summary of the methodology employed, and the thesis structure.

- Chapter 2 - Review of "Sustainability in Construction and Project Management":

This chapter examines the literature on project management and sustainability in the construction industry. It includes sustainable development, sustainable construction, sustainable project accomplishment building initiatives, and the incorporation of sustainability into project management.

- Chapter 3 - Research methodology:

This chapter describes the methodology utilized to this study. It begins with a discussion of the selection of the research model and the general conceptual foundation of the research design approach, which aided in the selection of adopted research methodologies. The chapter describes the methodologies used for data acquisition, data analysis, research result quality (validity and reliability), standard deviation, and the mean.

- Chapter 4 – Data analysis:

This chapter provides the results of the procedure for data analysis. It begins with a demographic analysis of respondents and a list of projects chosen by respondents. Descriptive analysis of results from an initial examination.

- Chapter 5 – conclusion:

This chapter describes the research's main findings and conclusions. In addition, it describes the study's limitations and makes suggestions for future research.

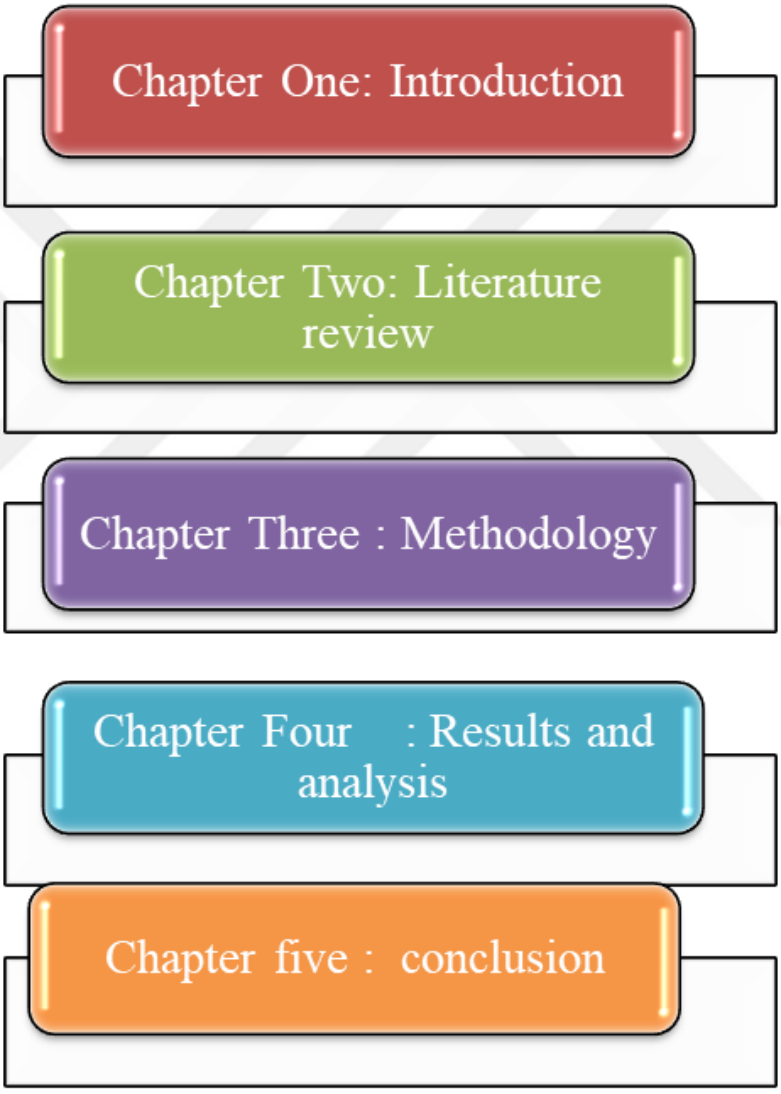

Figure 1.2: Thesis Structure

2. LITERATURE REVIEW

2.1 Sustainability Concept

There are several definitions of sustainability, but none are applicable in all circumstances. Getting sustainability functional as opposed to abstract and theoretical is a difficult task, which is made more difficult by the different definitions of sustainability.

Theoretically, sustainability might be described as "enduring forever." However, this definition is neither useful nor practical.

Very little, if any, can be considered successful, yet a great deal can be sustained in short-term thinking. Typically, timeline of 50 to 100 years, covering two to four generations, is seen many reasonable.

According to (Ehrenfeld,2005) offered a straightforward concept of sustainability, who issues to consider as "the likelihood that human and other There will be an endless variety of life forms on Planet"? Despite that Including environmentally and social considerations, the timeframe is unrealistic.

Technically, sustainability may be described in terms of carrying capacity, which represents a total number of individuals which may maintained in a particular region, taking into consideration the resources available and the ability of the ecosystem to absorb waste emissions. Particularly, the carrying capacity of an area depends on the demand and supply of natural resources.

Therefore, sustainability covers more than technical considerations and cannot be defined simply from an environmental standpoint. Instead, sustainability is sometimes theoretically characterized as comprising three dimensions: environmental, economic, and social. The expansion of sustainability beyond carrying capacity to encompass economic and social factors is an essential aspect of this strategy. A holistic perspective on sustainability is compatible with the knowledge that several variables determine whether civilizations flourish or decay.

But these three aspects are sometimes at odds (Example: if we prioritize environmental and social sustainability over economic sustainability, we may end up with the former). It is difficult to reach a sustainable stability. Sustainability and its three primary elements may be philosophically exemplified in a number of ways:

- The three columns signify environmental, economic, and social sustainability will be considered as the foundation or support of the structure (fig. 2.1). This resembles the three-legged table that can to keep erectness if environmental, economic, and social components of sustainability are fulfilled. The stability will be difficult to achieve since the sustainability elements are frequently in conflict.

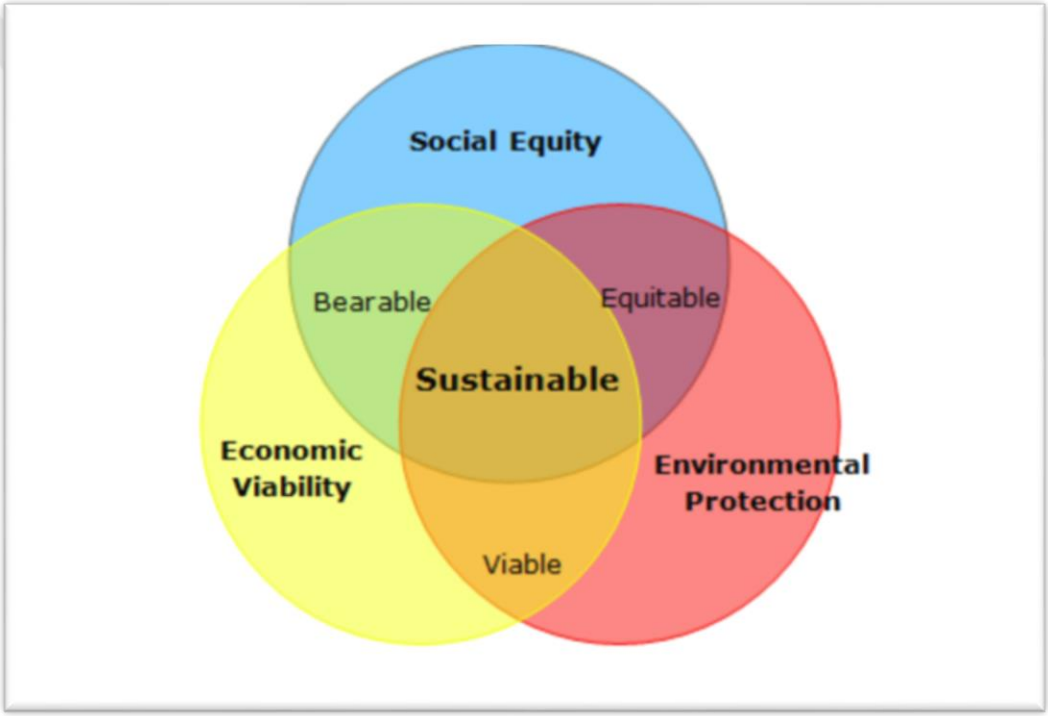

Figure 2.1: Columns of Sustainable Considered

Source: (Lee and O'Neil: 2004)

Sustainability may alternatively be viewed as the point of overlap between three intersecting circles representing the environmental, economic, and social components of sustainability (Lozano, R. 2008). (fig. 2.1).

- The variation of this diagram uses concentric circles to depict sustainability (fig. 2.2). Economic sustainability, as a human activity occurring in communities, is viewed as a subset of social sustainability, which encompasses several social and cultural characteristics in addition to

economic concerns. Consequently, social sustainability is considered a subset of environmental sustainability, as human and societal activities within the environment pose a danger to environmental sustainability.

- The three elements of sustainability can also be represented hierarchically, with the economy as a component of society and society being embedded inside the environment Harris, (J. M. 2003) (fig 2.3).
- These drawings are similar, but there are tiny variances between them. All of the examples illustrate the interdependence of the environment, economy, and society, as well as their influence on the sustainability of any system or process.

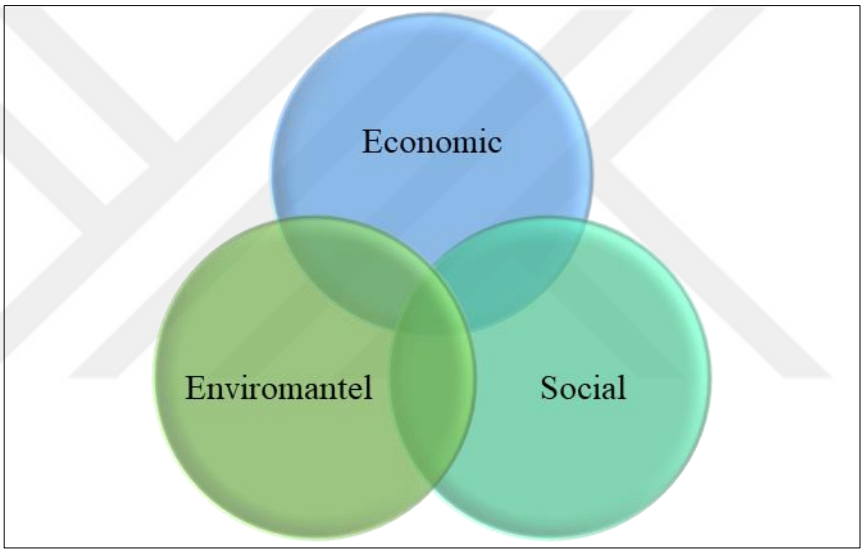

Figure 2.2: Circles to Depict Sustainability

Source: Lozano, R. (2008)

In addition, the aforementioned examples illustrate the really interdisciplinary character of sustainability and its ties to a variety of disciplines, sciences, economics, business, sociology, and philosophy are all included. Considering problems uses of energy and materials, economic growth, social progress, health, ecological responsibility, technological innovation (engineering, design, and architecture), and so on and continuing. is necessary for addressing sustainability. It also necessitates a comprehension of how individuals from the various disciplines interact and communicate when tackling these problems.

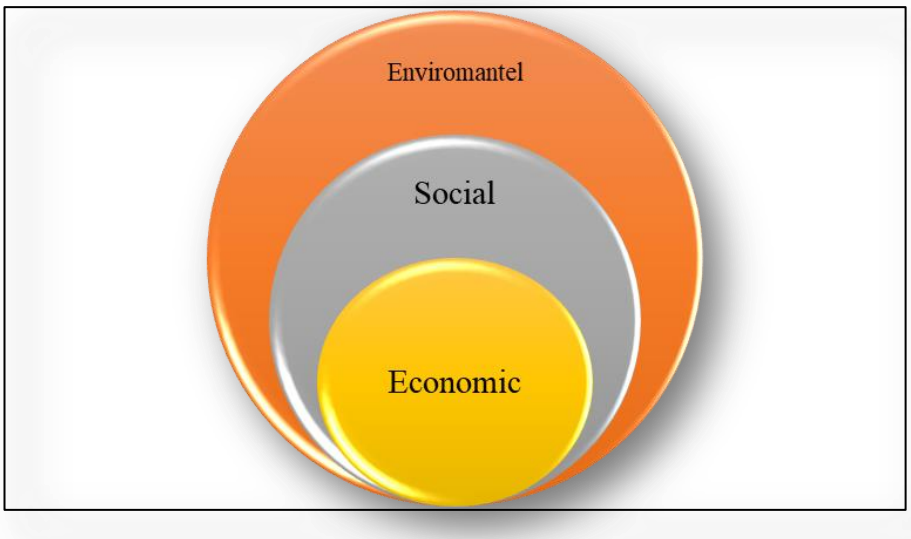

Figure 2.3: The Three Elements of Sustainability

Source: Harris, J. M. (2003)

When necessary or appropriate, Some topics could serve as focal points for sustainability principles. Consider, for example, the concept of sustainability in engineering, which refers to the use of scientific and mathematical principles in the creation and maintenance of products and processes, with consideration given to monetary, ecological, social, and other factors. Economics, living standards, social welfare, the environment, and cultural advancement are only few of the areas where engineering have a significant impact. To achieve engineering sustainability (figure 2.4), many factors must be addressed, such as the careful selection of resources using sustainability criteria, the implementation of sustainable engineering processes, the enhancement of engineering process and resource use efficiency, and the acceptance of environmental management in engineering activities. (Rosen, M. A. ,2012).

Economics, equity, land usage, lifestyle, sociopolitical factors, and population growth are also crucial sustainability criteria that must be addressed if engineering sustainability is to make any headway. Due to the complexity of sustainability, solving it requires a comprehensive approach. The complete interaction between all of the components of a system or process is must Between subsystems must be incorporated. The three primary characteristics of sustainability are discussed individually show in figure (2.4) for clarity.

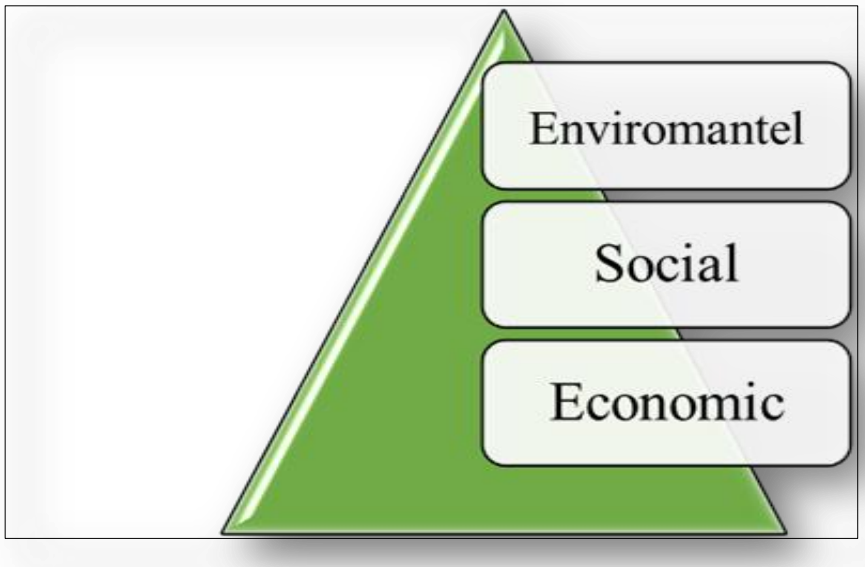

Figure 2.4: Sustainability Principles

Source: (Rosen, M. A. 2012)

2.2 Environmental Sustainability

Materials and energy are constantly flowing into and out of the environment. Ecosystems include the economic and social systems. Maintaining Earth's ability to house humans and their associated activities is essential to preserving humanity. As the human population and economy continue to grow, the repercussions of anthropogenic activities are becoming increasingly global and lasting. These have the potential to reduce Earth's habitability (Rosen ,2018).

Numerous environmental challenges have an impact on sustainability. Due to economic development and other causes, the loss of biodiversity around the planet threatens sustainability. Deforestation and development frequently contribute to the degradation of natural habitats, causing animals to migrate to more appropriate environments, (Aghbashlo,2018).

The gasoline and diesel engines in automobiles, fossil fuel-fired electrical power plants, and countless industrial processes are all major contributors to poor air quality and the health problems it can cause for humans and other living things. Wastewater and agricultural runoff are two examples of difficulties caused by industrial liquid emissions include eutrophication of water bodies and the bioaccumulation of toxic

substances in the tissues of aquatic organisms. Environmental concerns that rank highest include:

2.2.1 Climate change

Re-establishing the quantities of the majority of research agree that reducing atmospheric concentrations of greenhouse gases (GHGs) is the most effective way to mitigate global warming and its associated problems., one of the greatest problems of our time. In the atmosphere, greenhouse gases absorb infrared light released by the Earth's surface. This results in a greenhouse effect and the subsequent warming of the globe. Carbon dioxide (CO2) is the principal greenhouse gas, although there are others, such as methane (CH4) and nitrous oxide (N2O). Principal human sources of greenhouse gas emissions.

Positive feedback effects, such as greater solar radiation absorption as a result of the loss of reflecting surfaces such as ice, intensify global warming and climate instability threats. The Organizational Since 1990, Most recent climate studies and projected trends have been thoroughly evaluated by the Intergovernmental Panel on Climate Change (IPCC) in a series of comprehensive assessment reports. The most recent, in-depth evaluation was finished in 2014 and it indicates that warming trends attributable to human activity are "very probable." As climate models have gotten increasingly complex, both the expected amount of warming and the associated climatic and other consequences have increased. Greenhouse gas concentrations in the atmosphere are stabilized at an amount that precludes a severe human-caused climate crisis by international accords or treaties that are the focus of much effort around the world and at the United Nations. Include nitrogen use in agriculture, intestinal fermentation in ruminant animals, and burning of fossil fuels,(Berthiaume, Rosen 2017).

2.2.2 Loss of ozone in the stratosphere

The ozone (O3) layer in the stratosphere blocks some of the sun's rays, protecting Earth's surface from unnecessary heating. Stratospheric ozone protects life on Earth by soaking up dangerous UV rays, especially UV-B rays. Stratospheric ozone levels have been decreasing, notably over the poles, since the late 1970s. Chlorofluorocarbons (CFCs), widely used as refrigerants for decades, contribute to chemical processes in the stratosphere

that deplete ozone. The Montreal Protocol called for the elimination of CFCs in 1989, although their usage persists in developing nations. CFCs have a very long lifetime in the atmosphere; hence the ozone depletion will continue for a very long period.

2.3 Economic Sustainability

For a society to endure, it needs an economy that can deliver decent wages, the essential goods and services its members need, and stable employment opportunities. Long-term economic development, not simply economic growth, is necessary for a sustainable society. This latter is what happens in modern capitalist economies, which rely on economic development to provide wealth and employment opportunities. Constant economic expansion may not be sustainable in the long run given that the Earth has finite resources and capacity (Aghbashlo, Rosen 2018). The world economy must therefore move toward a steady-state mode of operation, with low or no growth, at some point in the future.

In terms of economic viability, the greatest choices may differ from one nation to the next. To preserve their resource and waste-assimilation capacity, wealthier countries.

According to (Daly ,1990), should focus on economic development rather than expansion. In contrast, developing nations gain more from economic expansion. Depending on how convincing they are, arguments for the economy's long-term viability are sometimes classified as strong or weak:

2.3.1 Strong sustainability

This sustainable viewpoint is predicated on natural capital, which includes the Earth's stock of natural resources such as its air, water, geology, soils, and all living species, and which in turn provides irreplaceable ecosystem services). This is the concept of sustainability most favored by ecologists and other natural scientists, who tend to consider natural and human capital as supplementary rather than replaceable.

2.3.2 Weak sustainability

Human capital may be used as a substitute for natural capital under this sustainability framework, which assumes a stable total capital stock consisting of both natural and human capital. This perspective on sustainability is popular among economists since

it allows for the depletion of natural resources so long as there is a rise in human capital understanding.

This divergence in economic sustainability theories centers on the relative value of human and natural capital.

2.4 Societal Sustainability

Health, equity, cultural advancement, and many other facets all contribute to a society's ability to remain viable throughout time. No one seems to agree on a single, unified definition of social sustainability or its contributing factors.

All of this took some time for sustainability theories to expand to incorporate a robust social component. Environmental sustainability or economic sustainability generally took the stage in early works on sustainability. Recent decades have seen a shift in focus on improving the human condition and our communities.

There may be a historical shift in the criteria for what makes a society sustainable. In the future, individuals may, for example, live in more densely populated areas, own fewer possessions, and take fewer trips due to the cost and inconvenience of doing so. Perhaps a greater quality of life is worth the potential drop in future GDP per capita. Here are two crucial elements in maintaining a healthy society:

2.4.1 Equity

Equality within and between generations is central to the idea of a sustainable society. In order to achieve equity within a single generation, there must be a more equitable allocation of resources. To address this, it may be necessary to redistribute resources between and maybe even inside the world's wealthier and poorer countries. The goal of intergenerational equality is to ensure that future generations will be able to enjoy a standard of living that is at least comparable to that of today's. Two to four generations into the future, or around 50 to 100 years, is generally envisioned as a crucial aspect for societal sustainability.

2.4.2 Health

Safety of the Health and happiness of society's inhabitants is crucial to that future. Life expectancy and infant mortality rates are two key indicators of human health (Smil 2007). the availability of good and clean food and drinking water, proper waste

disposal, and an environment free of dangerous compounds that might cause chronic or acute diseases are all important contributors to a healthy human population (e.g. toxins and carcinogens).

2.5 Sustainable Development and Construction Industry

DuBose,1997 define sustainability as "a manner of engaging with our environment that reconciles the ubiquitous human need for a good quality of life with the realities of our global setting. It necessitates novel approaches to enhancing human well-being that do not negatively affect the environment or infringe on the rights of others.

According to (WCED 621) sustainable development (also known as environmentally sustainable development) is growth that satisfies the demands of the present without jeopardizing the potential of future generations to do the same.

It's important to note that the term "development" encompasses endeavors in many different fields. The building sector has a disproportionately large influence on the environment, making it a prime target for environmental regulation; this has led to the birth of the concept of "sustainable construction."

The first step in any such analysis should be to define "sustainable construction" as a specific type of sustainable development. The term "construction" as used here refers to an extensive process that begins long before any physical construction takes place and continues through commissioning and asset management after the project is completed. As a matter of fact, it encompasses the entirety of the PDL process.

The SDGs have inspired individuals from all walks of life, all corners of the globe, and every culture on the planet since they were adopted by 193 countries in 2015. It will need heroic and creative effort, a willingness to learn what works, and the ability to adapt to new knowledge and shifting trends to achieve the goals by 2030.

The United Nations Foundation prioritizes proposals that would have a significant impact, further the Sustainable Development Goals' (SDGs') goal to "leave no one behind," and are supported by evidence, tangible pledges, and action. The potential and promise of the SDGs are being realized thanks to the efforts of people, technologies, and actions taken on a global scale.

Based on a survey of the relevant literature (Minin A.,2014) we may deduce that the key research interests, connections, and answers to sustainable development problems all revolve around the following themes:

the ecological benefits provided by the world's natural areas, the decline of which threatens the well-being of humanity as a whole. Services of this nature are provided for the ecology of a territory, and they often involve the consumption of resources that are not replenish able (in particular, for construction purposes).

There has been an increase in environmental incursion for the purpose of creating recreation zones, which has been linked to the deterioration of natural ecosystems and the depletion of environmental services.

prohibiting the elimination of single-use communities and preparing them for the next phase of economic and environmental development within a reasonable time frame, in accordance with the principles of the group policy.

Important avenues pertinent to sustaining mono-towns and guaranteeing sustainable growth include energy efficient reconstruction, eco-reconstruction of space via suburbanization of metropolitan areas, as discussed by the author in the works (Abramyan S.,2016).

It is feasible to reduce the environmental impact of industrial expansion in any area of the material economy if certain guidelines are strictly adhered to. See Figure (2-6) for a high-level overview of sustainable building practices.

Construction industry processes that envision the use of energy efficient and environmentally safe technologies with minimal adverse environmental emissions and waste generation; final product that complies with all applicable environmental criteria (a finished construction or reconstruction project featuring a building or facsimile that meets all applicable environmental criteria) are the only tangible domains indicated by the scheme

Figure 2.5: Sustainable Development Goals

It is only via the coordinated application of all the intangible facets of sustainable development, such as environmental education, auditing, insurance, etc., that the aforementioned goals may be achieved.

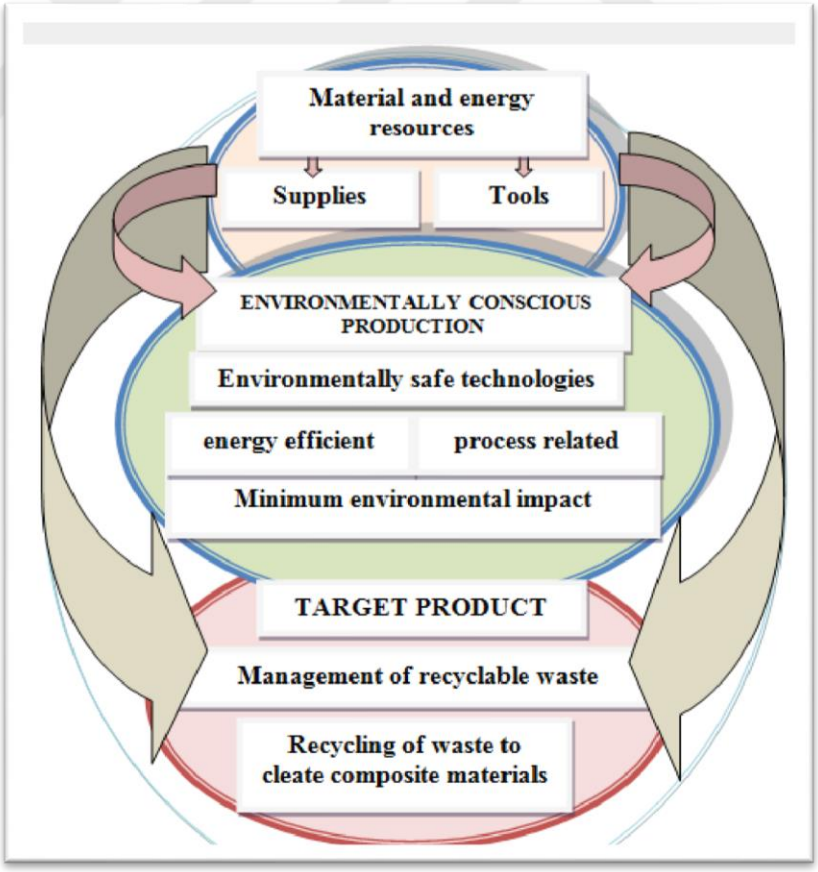

Figure 2.6: Schematic Representation of a Future-Proofing Plan for the Building Sector

Source: (Love, P. E.2018)

Environmental security for the entirety of a building's lifespan is being examined (Abramyan S,2016). The authors emphasize the significance of using GIS and BIM technology to determine the extent to which building operations damage the surrounding environment, particularly in the case of long linear structures.

2.6 Sustainable Building Versus Conventional Building Focuses

To achieve its goals of improving the environment and people's quality of life, the process of constructing sustainably must pay attention to a wider range of considerations than are often given in the construction industry. In terms of meeting cost, performance, and quality targets, conventional building methods are prioritized. Sustainable building improves upon this conventional emphasis by incorporating three additional criteria: the conservation of natural resources, the preservation of environmental quality, and the promotion of human health in the built environment (Koskela, 1998).

According to (Huovila et al., citing Vanegas et al., 1996), a novel model has been proposed (1998).

The updated model is shown in Figure 2.7. Sustainable goals are taken into account throughout the model's decision-making process, from planning to execution to closure.

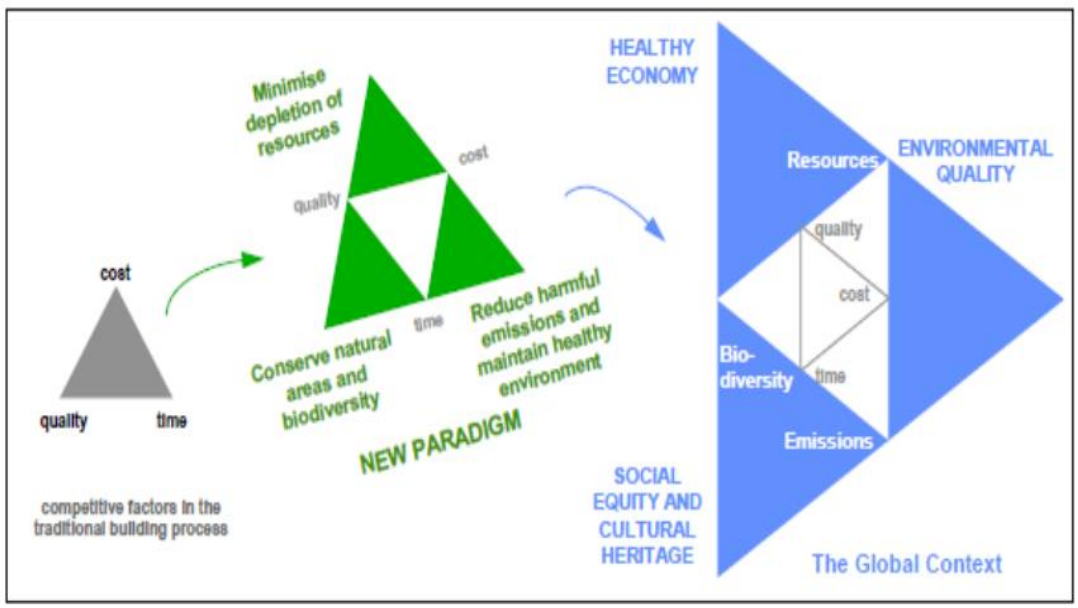

Figure 2.7: Sustainability in Building An Universal Challenge

Source: (Huovilla & Koskela, 1998)

Sustainable designers and builders should consider more than just the initial cost when planning a structure. They need to take into account not just the natural and constructed environments, but also the material and energy flows and exchanges between them. A non-living components of the built environment are important, but it's equally important to take into account the living components (plants, animals, and humans) since They function as an integrated whole (Vanegas, 1996).

Additionally, this new paradigm is projected to present difficulties for project managers. The increasing emphasis that must be placed on green building practices may be at the root of these difficulties. There's also the possibility that the combination of the new and old criteria is to blame.

2.7 A Comparison of Traditional Construction with Eco-Friendly Methods

Mills et al. (2009) suggest a sustainable building process based on the conventional building process that is presented in Outline Plan of Work 2007 by Royal Institute of British Architects (RIBA).

Work stages of a building process according to the RIBA (2007) are preparation,design, pre-construction, construction and use. These stages are divided into some detailed stages that are shown in (Figure 2.8).

Depending on the chosen method of procurement, several of these steps may occur simultaneously or in a different order (RIBA, 2007).

Mills et al. (2009) propose a sustainable the building technique dependent on these steps, with sustainable building design and sustainable construction as its two core parts. The term "sustainable building" refers to the end result of a design and construction process that is themselves environmentally responsible.

Figure (2.8) shows how one of these phases in the process of constructing sustainably resembles more traditional phases of construction. Therefore, the pre-construction phase, which includes the tendering process, is an integral part of sustainable building design.

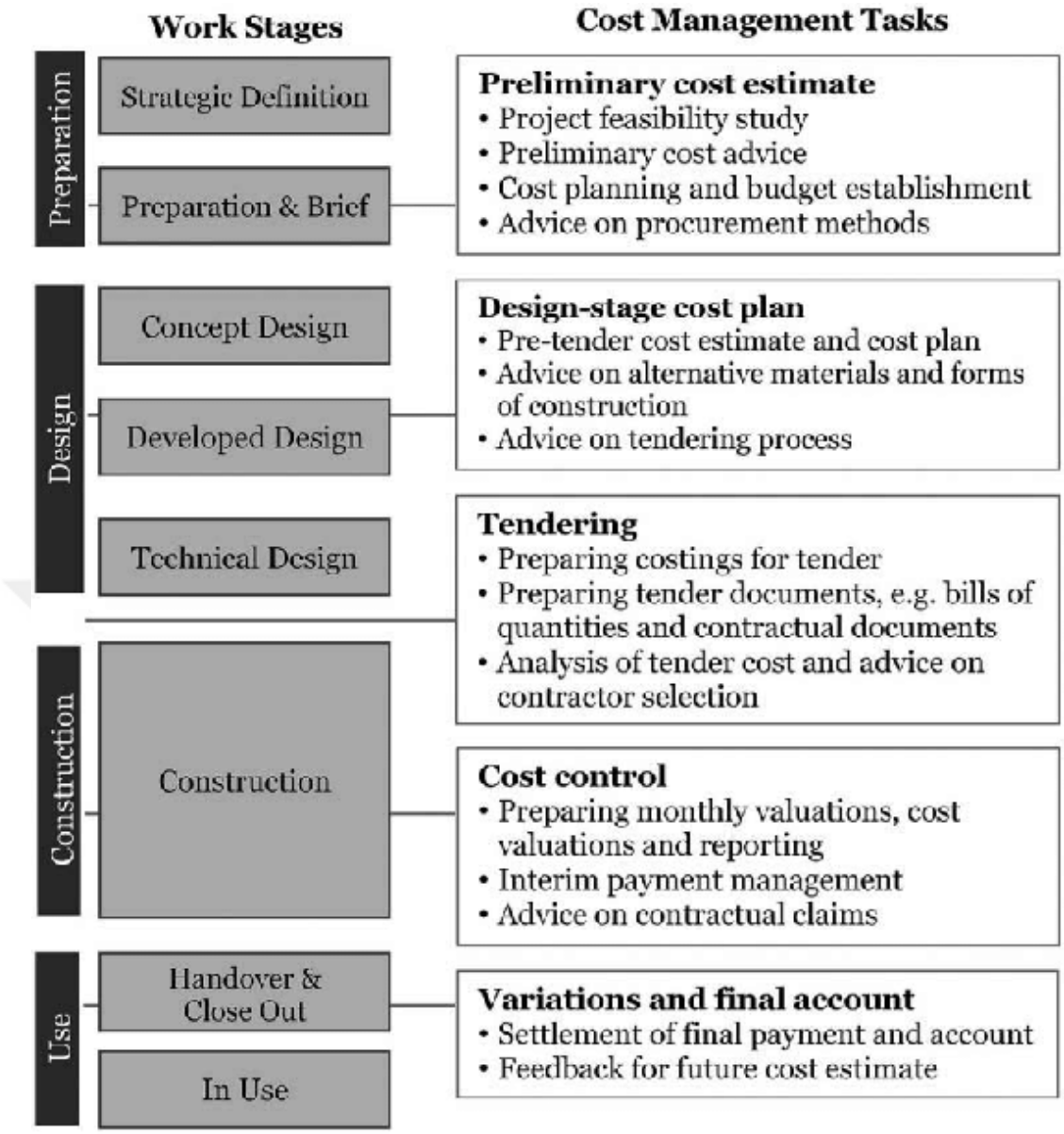

Figure 2.8: Comparison of the Phases of Sustainable Construction with the Major and Specific Work Stages of a Building Process

Source: (Mills & Glass, 2009; RIBA, 2007)

In addition, the sustainable building incorporates the phases of preparation, construction, and final inspection. As part of a sustainable building's deliverables, post-completion and post-occupancy assessments are conducted.

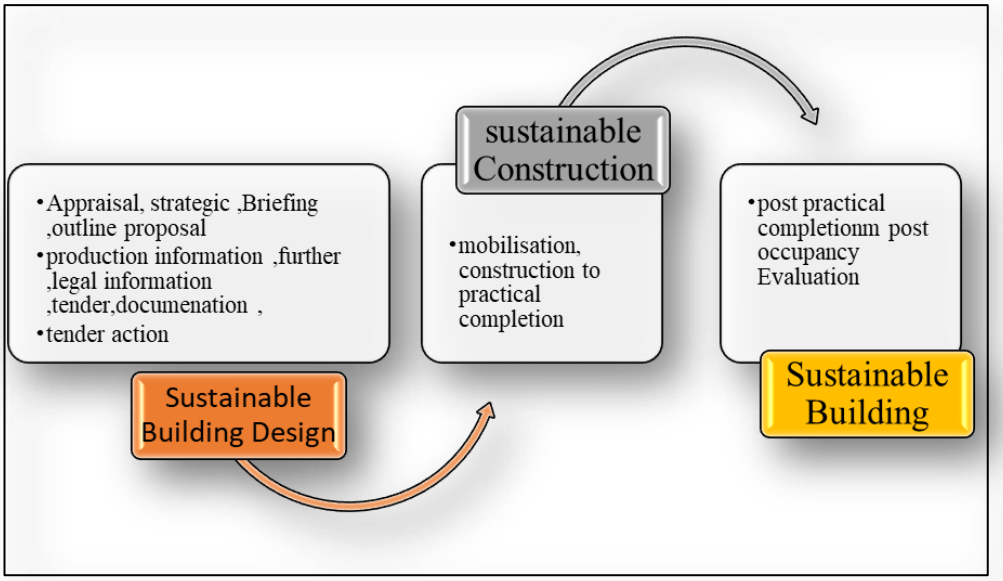

Figure 2.9: Substantial Variations between the Conventional Building Process and the Sustainable Building Method

Source: (Mills & Glass, 2009).

In contrast, a common understanding of sustainable building design is presented by Mills et al. (2009), who define it as the process of creating a structure that:

- Are constructed using environmentally friendly techniques
- Encourage people to retain a healthy life style.
- Describe the triple bottom-line idea and discuss brundtland's definition (economic, social and environmental).

2.8 The Difficulties of a Sustainable Building Process and the Responsibilities of Construction Projects

A thorough literature analysis was undertaken, and the problems that project management teams may face while implementing sustainable construction methods were identified. Among the most significant obstacles identified by the existing review are the following: (Silvius, A. G .,2019).

2.8.1 Higher prices for sustainable building materials and processes

Dwaikat and Ali (2016) estimate that the cost of green construction will be between 1% and 25% higher than the cost of conventional construction. The complexity of

the design layout, together with modeling and green practices, is to blame for the higher cost. Sustainable building supplies are about 3–4% more expensive than their non-sustainable counterparts (Zhang., 2011). Since project managers are accountable for managing and delivering projects within a set budget, they feel the effects of the high costs of sustainable construction.

2.8.2 Construction procedure specifics

The processes involved in the development of sustainable buildings may be excessively difficult due to the presence of complex technology and construction methods (Wu et al., 2019). The entire effectiveness of the project management team might be impacted if the complexity of the construction procedures are not conveyed early on. Nevertheless, for a project to accomplish its stated goals, project management teams must properly apply project management methods (Robichaud, 2011).

2.8.3 Protracted procedures of government

According (Graeber 2015), the regulatory procedure for approving the use of innovative and contemporary technology in building projects might lengthen the duration of the project.

Zhang et al. (2011a,b) also described the extensive approval processes that management must go through in order to gain support for their building operations. This lengthy approval process presents several difficulties, particularly for the project management.

2.8.4 Lack of knowledge on sustainable technologies

According to (Silvius, 2012), project management teams tend to have limited awareness of sustainable building materials and methods. (Darko ,2018) emphasized that unfamiliarity with sustainable technology has a negative impact on the outcome and performance of the entire project. Teams responsible for project management must ensure that actual performance does not depart from anticipated performance.

2.8.5 Insufficient awareness Exists the conventional concept of how a building

Must be constructed, however due to perceived risks, many contractors do not choose to engage in sustainable construction (Kibert, 2016). Environmental auditing,

a beneficial sustainable construction technique, is seldom used due to a lack of awareness (Agyekum et al., 2019). Due to the scarcity of sustainability research, there is little public education on the benefits of sustainable design, particularly in regards to internal environmental condition, productivity, and occupant health (Darko, 2019). Opoku (2019b) hypothesized that this lack of knowledge is a significant obstacle for sustainable building processes.

2.8.6 Lack of environmentally product

Information An obstacle for project management teams is a lack of sustainable product knowledge on sustainable materials and sustainable construction methods, both of which are crucial to understanding sustainable buildings (Häkkinen and Belloni, 2011). Constantly, builders must network with specialists who have this knowledge. The need for extra time on construction sites to apply sustainable building practices, as well as communication and the interests of project team members, are two other recognized challenges (Koolwijk et al., 2018).

2.9 Challenges of the Feasibility and Design Phases and the Project Manager's Role

According to Robichaud. (2011), the most important stages toward producing a sustainable building occur throughout the stages of planning and creation. This phase is regarded significant since it is at this planning phase that materials and building methods are selected, as well as how occupants would live (Mills, 2009).

In this phase, the primary obstacles are establishing clear objectives, client comprehension, end-user comprehension, evaluation techniques and instruments, timeliness, communication and coordination, steering mechanisms, and economics.

Following is a discussion of these primary obstacles and the project manager's associated responsibility throughout this phase.

2.9.1 Setting organizational targets

The inability to generate a project outline including a defined objective is the barrier to sustainable building (Hakkinen, 2011). Besides the market, circumstances and physical necessities, which they often addressed in conventional building, environmental goals, the amount of cash invested in environmentally friendly

projects, and the desired intensity of a rating system. (Robichaud, 2011). Before to selecting a location and commencing design, the customer must make decisions and establish project goals. It is suggested that a professional team consisting of a manager, an architect, and a contractor be assembled in order to guide the customer in identifying goals and priorities. Financial savings can also be achieved through the employment of a manager who is well-versed in all facets of green development. (Robichaud, 2011).

2.9.2 The client incorporates

In the building industry, clients are viewed as developers, and it is crucial that they have a thorough grasp of project goals and objectives in order to select the most appropriate solution. Given the long-term nature of the aims and the elusive nature of the rewards, it is even more crucial that they have a firm grasp of the concept of sustainable building. As a result, consumers are not persuaded of the merits of green buildings, and they do not see a pressing need to embrace such structures (Hwang & Tan, 2010).

If we use case study by, cited over (Griffin ,2010) as an example, we find that the major supporters for green structural materials are clients and design teams by polling There were four different study groups. Customers who have the most skin in the game were considered as being particularly valuable. Customers need to be convinced of the benefits of using eco-friendly building materials. Therefore, it's crucial that they fully grasp the value that may be accrued from taking into account sustainability principles.

Various types of the clientele can impact the development of sustainable buildings in various ways. Investors who own and develop privately-owned structures are a key clientele. Local and national governments entities that own and develop public buildings constitute the second major group (Hakkinen, 2011).

In contrast side, government agencies have complete management of sustainable construction projects, particularly when legislation mandate the adoption of sustainability objectives (such as happened in EU directives). In this instance, government organizations should establish sustainability objectives to encourage private design and construction firms to embrace sustainable building practices (Hutchinson, 2000). Construction company Detailed goals and constraints

documentation, rigorous design inspection to assure compliance with project standards, and independent design and tender review should all be part of a project manager's checklist for a successful project (Jaworski, 2006).

2.9.3 Client comprehension

First as the frequency of professional clients who need assistance grows, so does the need of establishing rapport and communicating effectively with them (the person who are both private investors and government agencies) who own and develop both public and private structures). And yet, it is also important to increase demand among end users, who include both homebuyers and renters (Häkkinen & Belloni, 2011). It may be a problem at the beginning of the marketing phase because of the way it influences the eagerness of business clients to invest in green structures. If commercial clients become aware of the growing or already existent demand from building occupants for environmentally friendly structures, they will likely elect to cater to it.

In examples, (Hakkinen ,2011) offered a case study that area proposal for an ecological region in the city of Joensuu in order to attract the attention of partners. The effects of sharing information to various parties were evaluated and addressed. They came to the conclusion that professional clients are interested in sustainable construction projects if they can identify significant end-user interests and needs. Therefore, At the outset of the marketing process, end customers should have access to reliable information about the advantages of sustainable buildings.

2.9.4 Methods and techniques for evaluation

Due to the aims and techniques of green building, sustainable development has distinct needs than conventional building (Kubba, 2010). Sustainable construction standards aim to improve energy efficiency and decrease environmental damage. Furthermore, the requirements of a sustainable building are its defining characteristics (Hakkinen, 2011). The design approach should show a strong commitment to environmental and health concerns. These criteria can be formulated by regulators as quantitative regulations.

Hakkinen (2011) concluded from one case study that more building-specific assessment and evaluation methods are needed to put these regulations into effect.

Kubba (2010) mentioned, the development from the green construction process should be controlled by means of quantifiable objectives linked to a particular necessity. These objectives should be measured with unique instruments that present a challenge to the architects and builders. Throughout the design process, energy savings are analyzed and evaluated using computer-aided technologies like computer energy simulation. This allows the design team to generate alternative designs with an emphasis on reducing energy use.

Kubba (2010) mentioned, A development of the green construction Processes need to be managed. by means of quantifiable objectives linked to a particular necessity. These objectives should be measured with unique instruments that present a challenge to The designers and builders. Throughout the design process, energy savings are analyzed and evaluated using computer-aided technologies like computer energy simulation. This allows the design team to generate alternative designs with an emphasis on reducing energy use.

2.9.5 Timing

Correct design alternatives should be considered early on in sustainable building projects since they have more unique problems (such as minimizing depletion of resources, lowering carbon pollution) than conventional ones (Häkkinen & Belloni, 2011). Project managers have the responsibility of interviewing and selecting architects, engineers, estimators, land surveyors, and other consultant early on in the design process, as stated by (Arditi, 2009). Scheduling, timing, and the presence of all required players are crucial for the delivery of a successful sustainable project (Häkkinen & Belloni, 2011).

the also, customers should have a hand in defining needs. Their input is recognized as a key factor in the success of new processes (Häkkinen & Belloni, 2011). Newcastle's Bamburg clinic project included early user and designer involvement through workshop facilitation. The needs of the users, such as those pertaining to security, might be better understood through conversation and subsequent collaboration (RIBA, 2011). In addition, (Häkkinen ,2011) highlighted the

significance of project managers' roles in facilitating end-user involvement in demand definition.

A facilitator who is well-versed in the process of green construction should lead the charrette (Kibert, 2005). Even though it is not stated explicitly, this facilitator has the roles and duties of a project manager. Arditi et al. acknowledge that "establishing fundamental communication processes" is a responsibility of project managers at the predesign phase . Therefore, project managers versed in the green construction process may play the role of facilitator in leading a Charente to ensure that all parties involved in the project get the advantages of their early involvement.

2.9.6 Communication and coordination

Taking into account the larger complexity of green projects than conventional ones, (Robichaud, 2011) identify communication and coordination across a diverse team as the most essential hurdle to completing environmental achievement.

The Responsible Skyline Hub is a model of an economically, socially, and environmentally sustainable initiative. In order to foster a strong sense of community, the structure brings together user groups from the various building sections. As a result, several technical difficulties developed as a result of the construction of a mixed-use structure.

To overcome these issues, In the design process, diligently together in an integrated manner. In addition, an effective implementation of the highest standard construction was enabled by a positive working relationship with the contractor.

Additionally, it is noted that the design is innovative.In linked project teams, project managers might also serve as models. They could refrain from dishonest behaviors that weaken everyone's trust and confidence. As an integrated project team consists of a large number of professionals, project managers have a unique responsibility for coordinating them and facilitating equitable solutions to challenges that emerge (Skitmore, 2008).

2.9.7 Methods of control

The construction industry uses a variety of steering methods, including rules, incentives, and certification from rating systems, all of which are entirely optional. The ability to build sustainably might be hampered by a lack of appropriate

instruments. However, with the correct policies in place, sustainable development may be encouraged.

A regulation may be prescriptive or performance-based. Different from performance-based laws, prescriptive regulations focus on specific technologies or methods for achieving a goal. Better innovation assistance is one of the main reasons why performance-based rules are preferable, as stated by (Häkkinen ,2011). However, the challenge lies in the difficulty of determining performance for the sustainable building.

2.9.8 Economics

A further obstacle 0f sustainable building at this stage was the anxiety of customers about the greater investment costs and increased risk of unplanned costs in the process. The increased risk of unplanned expenses is attributable to unfamiliar methodologies, a lack of prior knowledge, increased construction testing and evaluation is needed due to inadequate manufacturer support and a lack of performance data. (Hakkinen, 2011).

However, the financial implications of Green construction are not yet well understood.

According to Hakkinen et al. (2011), the construction of an energy-efficient building does not considerably raise investment costs. Alternatively.

Mention that the initial cost of a sustainable structure may be higher than that of a conventional one.

However, they believe that increased costs can be recovered in the long run due to cost recovery. Reducing operation and maintenance costs. However, an investor with no long-term ties to the running of a facility may have little interest in terms of savings on repairs or operational expenses. Regardless of the expense recovery opportunities over a building's lifespan, the prevailing belief is that sustainable choices are too expensive, according to the following case studies. Interviewees in the case study by (Griffin et al.,2010) cited an increase in cost or perceived cost as the most common barrier to employing Materials for Green Construction. Although some structural elements used on conventional structures can be more expensive, the notion of various parties involved that green options are more expensive is still a

significant concern. The case study (Williams,2007) is another illustration. Development and construction stakeholders were certain that anything other than "business as usual" would be more expensive. In addition, respondents noted that the cost of supplying schemes for sustainable structures and projects is significantly more than that of methodological principles.

2.10 Sustainable building versus conventional building focuses

Project management and sustainability are seldom combined in a single research or framework, despite the fact that project management might impact the incorporation of sustainability features into projects (Zinke, T. 2014). Recent studies have recognized the importance managing projects in achieving sustainable and green construction successful ; nevertheless, the number of available researches is insufficient. In addition, the majority of significant projects require a substantial budget. Such management frameworks like PMBok, (ICB, ISO21500:2012).

Take into account environmental and sustainability concerns (De Senzi Zancul, E., 2014) Additionally, it is observed that the majority of prior research are concerned with examining sustainable management and environmental management, but just a minority discuss project management and the significant relevance. role in green and sustainable construction.

According to Wu and Low (Low, S.P. ,2010) some of the rewards for project management the grading systems (LEED2.2, Green Globes, BCA Green Mark 3.0) account for around 20% of the total cost.

In these rating systems, credit is used. Moreover, green buildings must be considered as an all-encompassing solution that incorporates sustainable principles across the whole project life cycle from project planning to design, building, and operation, rather than merely as a collection of environmentally friendly materials, technology, and other advancements (Low, S.P. ,2010)

Traditionally, green buildings are constructed in accordance with grading system requirements, which offer direction for metrics and the ability to facilitate identification and verification of the measurements degree of conformity.

Building performance evaluation systems are used all through the lifecycle of a building, from the initial design through post-occupancy analysis. All of the

evaluating system's processes, such as praise registration and documentation, stakeholder communication, team member roles and responsibilities, and resource, cost, and time management, must be coordinated through a dedicated management system. Moreover, the management systems of these projects need to be flexible enough to adjust to any changes in scope or long-term goals that may arise. Few attempts have been made to develop systems or methods for environmentally friendly projects as of yet.

However, through just recently, the majority of these endeavors have remained as research and have not been implemented to green construction projects in a substantial way.

For instance, (Marcelino-Sádaba ,2015) created a structure in their published study. Projects related to sustainability in 2015 from the perspectives of product, process, a company, and management. In 2013, the International Association for Green Project Management launched the Project Integrating Sustainable Methods (PRISM) methodology. (GPM). PRISM is a systematic methodology for sustainable— Green Project Management", which is based on a series of standards and combines its application in ISO 1500:2012 "Guidance on Project Management". However, this approach has not yet been utilized in a considerable number of applications, and research that employ it are quite rare.

In addition, the approach is not addressed at all on according to the questionnaire used in this study, the local level. It can be an independent organism that has its own characteristics, both living and negative organisms the position of the building is sick. Sick buildings and cities have three main characteristics:

- Recreation: a drain on energy and resources.
- Second: Polluting the environment with gas emissions and fumes or liquid and solid waste.

According to some estimates, the construction industries in the world consume about (10%) of the total Raw materials: This consumption is estimated at about (3 million) tons in the United States Annually, American buildings alone consume (20%) of total consumption 8 for energy of all kinds, and it causes (31%) of greenhouse emissions.

- Third: The negative impact on the health of building users as a result of the use of finishing chemicals or various other pollutants.

Where the architect James Wans (Wines James) points out in his book "Green Architecture" that The world's fresh water, a quarter of wood production, and building blocks consume one-sixth of the elderly's supply of fuel and materials manufacturer. At the same time, it produces half of the greenhouse gases.

3. RESEARCH METHODOLOGY

3.1 Introduction

The objective of the research is to add to a specialized field of topics with something unknown, unexpected, generalizable, and dependent on the primary body of information.

As described by Atkin and Wing (2007, p. 1), in order to produce this contribution in a systematic manner, it is necessary to conduct the study using methodologies that have been scientifically validated.

Robson (2002) specifies five interdependent processes for the design of research in order to conduct an adequate study:

- Objective - what is the accomplishment,
- The theory upon which the study is based, including the research design and analysis of data.
- Research questions - what is the statement of possible results and what is expected of these findings
- Methods - how to gather, evaluate, and validate findings, as well as how to demonstrate their dependability, and
- A sampling plan lays out when, where, and how the input data should be gathered to provide a representative sample.

Andersson (1998) divide the research process in a similar way, highlighting the interplay between research objectives, methodologies, data sampling, and conclusions at the study's crucial moments of design, execution, and reporting. This interplay, with its varying apexes of focus, persists throughout the duration of the performance. The research process is dynamic and ongoing, as (Wing, 2007) point out. Although research is a learning experience in and of itself, it may be improved

upon by careful planning and design, with an emphasis on research topics and technique approaches.

3.2 Plans for Research

In accordance with Robson's (2002) five phases of planning a study, the performance of this research was split into research designing, method selection, literature studies, model development, data sampling from case studies, performing analysis, and reporting the results (see Figure 3.1).

Due to their interdependence, the inputs depicted in Figure 3.1 were employed in the research process interactively and constantly until the very end of the performance; when a modest modification was made within one phase, an overhaul and adjustment of dependant concerns of the others was required.

According to Andersson and Borgbrant (1998), the phases' attention maxima have occurred at different times but have remained ongoing and interacting throughout the study performance process.

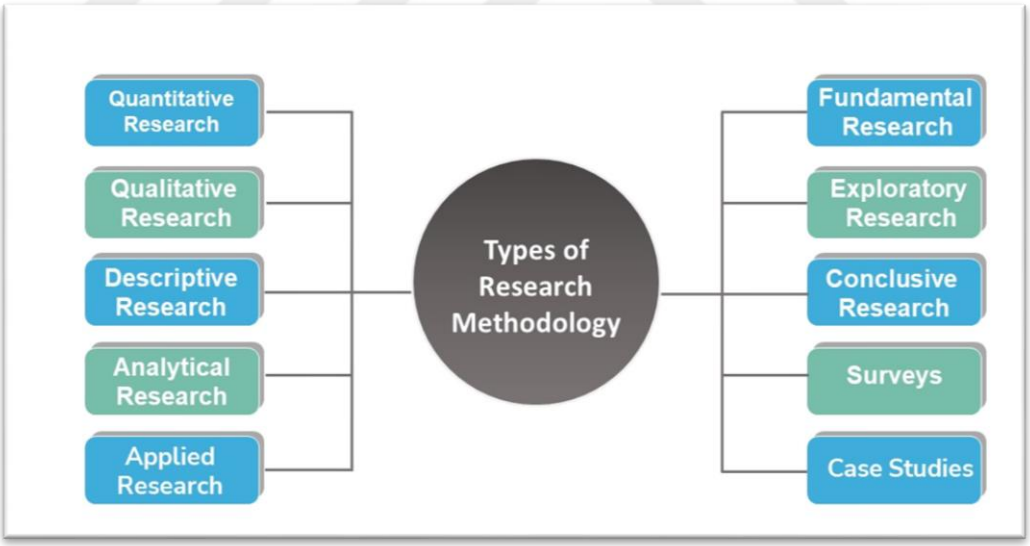

Figure 3.1: Types of Research Methodology

Source: Robson's (2002)

Figure 3.2 depicts the research development as a model for the research design based on the emphasis of the research stages by input and timing of knowledge transfer and research results.

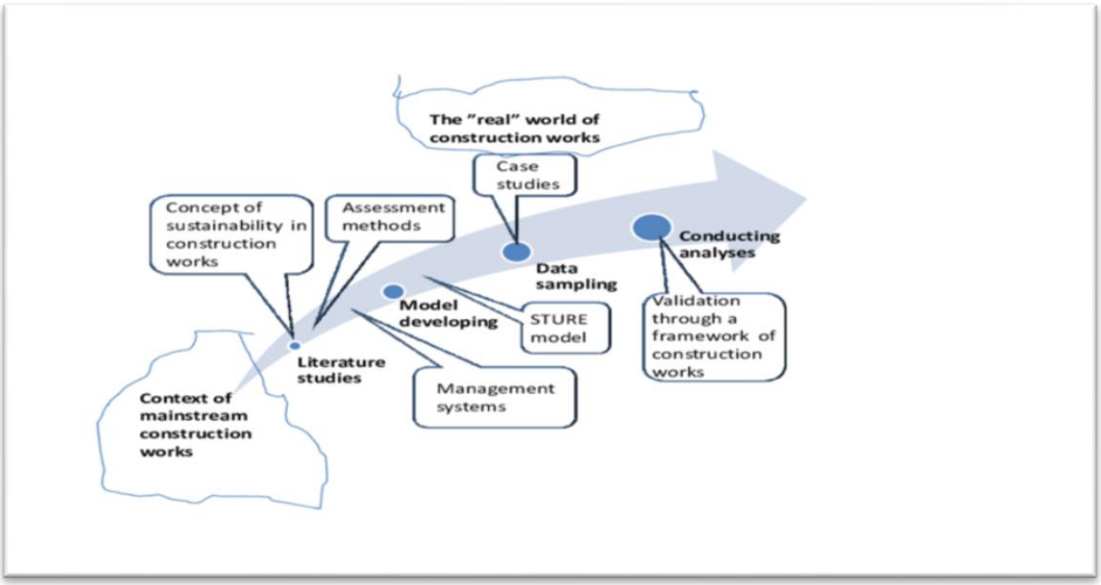

Figure 3.2: The Research Design According to Knowledge Transfer Input and Time and Research Outcomes

Source: (Salloum, 2018)

3.3 Data Collection

Ghauri et al. (1995) explain that when employing a particular approach for data collection, either primary or secondary data can be collected.

According to Bryman and Bell (2007), primary data is material that the researcher collects independently, such as through interviews, questionnaires, and exams. In contrast, secondary data refers to material acquired by other scholars and institutions, such as books, papers, and articles (Bryman and Bell, 2007). This thesis collects both primary and secondary data.

3.4 Selected Research Method

The study topics necessitate an overview of the existing state of SMEs in iraq in order to determine the external and internal issues inhibiting their growth. The questions also demand a qualitative knowledge of how Iraq SMEs are complying with these challenges and how they view these aspects to affect the growth of their businesses. As a result, the qualitative approach with a few quantitative components was chosen as the research methodology for this thesis.

3.5 Scientific Approach

In general, In regards to the relationship between theory and study, there are two schools of thought: the deductive theory and the inductive hypothesis. The essential question is whether or not data are gathered in order to test or build theories. (Bryman, 2007). The inductive theories, conclusions are obtained from empirical observations that lead the researcher to theories and hypotheses; yet, even doing hundreds of observations, researchers can never reach a conclusion with 100 percent confidence (Ghauri et al., 1995). In the deductive method, on the other hand, theory is studied in order to formulate hypotheses, which are then evaluated by data collection, therefore rejecting or accepting the hypotheses (Ghauri et al., 1995). describe the two methods as follows:

- The deductive order is theory observations/findings.
- Inductive: observations/observations theory

It is deductive reasoning that a thesis uses. Although there is a clear progression from one step to the next, Bryman and Bell (2007) detail a number of reasons why researchers' perspectives on a hypothesis may change after analyzing obtained data. New theories may be published before the researcher has formulated conclusions, the significance of some data may not become clear until after the data has been collected, or the data itself may not be sufficient to test the hypotheses.

3.6 Case Study

According to Bryman (2007), the case study design entails a comprehensive and in-depth investigation of a single or a small number of examples in which the complexity of the case's nature is thoroughly examined. Numerous renowned studies in the world of business and management research have employed the case study methodology. However, there are limits to the case study design; the external validity of this technique is questioned because one or a small number of instances cannot represent an entire set of businesses.

The objective of the purpose of the case study is not to extrapolate the results to broader groups of people. (Bryman, 2007), but rather to build a framework for discussion of the topic by focusing on the individuals and their unique situations. The

multiple-case study approach adopted for this research enables the authors to compare and contrast the data from the many examples, as well as to analyze what is shared and what is distinct among the cases.

3.7 An Interviews

It has been determined to acquire primary data using qualitative interviews. Comparing qualitative interviewing to quantitative interviewing reveals a number of significant differences. The conduct of qualitative interviews, for instance, is not always standardized. Furthermore, qualitative interviewing is typically viewed as adaptable; the interviewer adapts and responds to the interviewee, there is a strong interest in the respondent's perspective, detailed and rich answers are desired, the interviewer is permitted to deviate from any schedule being used, new questions may arise in response to the respondent's answers, and the order of questions may be revised. (Bryman, 2007).

There are several qualitative interviewing methods, including unstructured and semi structured interviewing. Throughout an open question, the researcher may initiate the conversation with a question and then hear to the responder as he or she speaks freely, whereas a semi-structured interview follows a list of topics and questions that the researcher wishes to cover during the session (Bryman, 2007). Therefore, semi-structured interviews were chosen as the methodology for this thesis. The semi-structured interview method was chosen primarily to allow respondents to communicate their true views on what they see as limiting the companies' expansion. This strategy using open-ended inquiries will allow us to tailor our queries based on the unique company's characteristics and the difficulties they confront. The semi-structured interview, according to Darmer (1995), is neither a free-flowing chat nor a highly organized questionnaire. In semi-structured interviews, the sequence of the questions may be regulated, and respondents have the option to extend their thoughts and talk in great depth about a variety of topics, as opposed to depending solely on predefined themes and questions. In other words, semi-structured interviews are more adaptable than standardized techniques such as structured interviews and surveys.

When conducting qualitative interviews with open-ended questions, one common issue is that the interview gets "colored" by interviewer interests and perspectives.

Semi-structured interviews are arranged in terms of what will be covered throughout the interview, but the follow-up questions rely on the interviewer's position.

Misunderstandings and misinterpretations of words are an additional potential issue. This might be a specific issue for this research, as interviews were done in English, which was neither the respondents' nor the interviewers' first language. All interviews were recorded, transcribed, and returned to the participants so that they could review and edit their statements based on their own experiences and those of the other participants.

3.8 The Respondents

The segment of the population picked for this study, or the sample, is based on a non-probability approach, which indicates that the sample was not selected using a random selection process; hence, certain organizations are more likely to be selected than others (Bryman and Bell, 2007).

The questionnaire utilized to measure the company expansion was also emailed to the corporations and received in response.

3.9 Methodology Selection

Examining the perspectives of Iraqi firms on social sustainability in the building sector is the focus of this thesis. This means that discovering an objective reality is a primary focus. Also, this research investigates the link between academic study and real-world application.

As shown in Figure 3.1, a deductive approach is one way to investigate the connection between theory and social research, as suggested by (Bryman, 2012). It's common practice to pair quantitative research with a logical approach. A quantitative study is a kind of research that employs numbers to describe and interpret findings. As its name implies, it is usually employed to learn about the objective world. The method may also be used to investigate the link between academic study and real-world application.

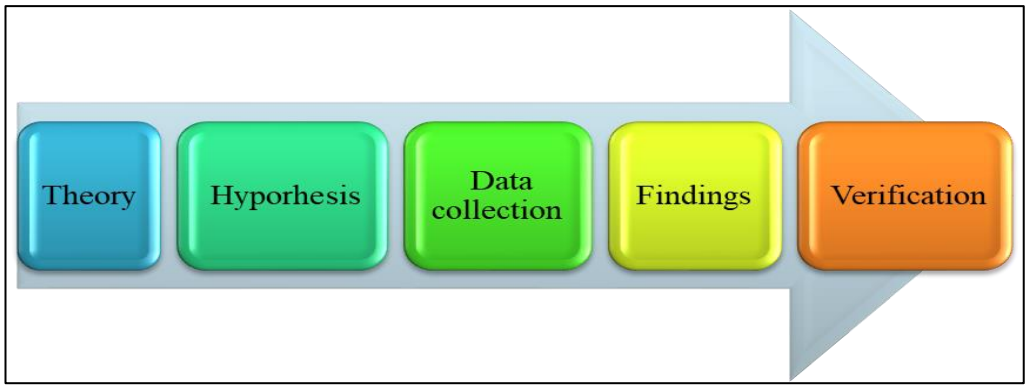

Figure 3.3: Deductive Approach

Source: Bryman (2012)

3.9.1 Creating a questionnaire for a survey

In this section, we will discuss the methodology behind the survey's development. Clarification will be provided on the indicators selected and the grading schemes used.

3.9.2 Layout of the questionnaire

A survey was used as the foundation for this thesis. The results of the literature research informed the development of a set of survey questions that were distributed to businesses in the Iraqi construction sector.

See Figure 3.2 for an overview of how this survey was organized with reference to a prior research on environmental attitudes, measurement, and impacts in the construction sector by (Glucch ,1995)There are three distinct parts to it.

Figure 3.4: The Structure of the Questionnaire

Source: (Glucch, 1995)

3.9.3 Indicia selection

Companies' commitment to social sustainability was evaluated using indicators from Section 2 (The Impact of Engineering Management in sustainable) and Section 3 (The factors effect in manager's management in sustainable projects).

The Effect of Engineering Management on Long-Term Sustainability was Evaluated Using Six Indicators.

Seven distinct groups of people were employed to gauge the impact of the elements on the manager's management of sustainable initiatives.

Twelve factors were used to evaluate whether or not your company consistently employs sustainable development practices for building projects.

The questionnaire's indications were derived from the aforementioned taxonomies and scales. Consider the gender parity index as a case in point.

Agenda 21 addressed the issue of gender parity. It's an offshoot of the main UNDSD motif.

Within (Broström's, 2012) perspective, it was also classified as a matter of equal rights. Using Labuschagne and Brent's perspective, it might also be seen as an indication that affected internal stakeholders. The UNEP theme and the Handbook for Product Social Impact Assessment both made reference to it. It also fit into subcategories in the "workers" of the stakeholders in the framework presented by (Benoît ,2010). Appendix (1) provides a comprehensive index of indicators.

3.9.4 Scale preference

While asking for comments on hindrances to creating social sustainability, stakeholder pressure, and the measure \sand actions to create social sustainability, five measures were utilized to gauge the\sextent of perception. There were "Strongly Agree," "Agree," "Don't now," and "to" options.

a modest extent", "Dis Agree ". "Strongly Disagree" when inquiring about the consequences of the initiatives. Responses were applied. In addition, "not applicable" and "not that I am aware of" alternatives are added to all questions in sections 2 and 3 of the questionnaire, as there are indicators that only apply to the elements that influence the manager's management of sustainable projects.

3.9.5 Collecting and populating data

Initial formulation of the survey was in English. It was distributed to 150 individuals employed by iraqi businesses. Real estate, construction, consulting, and architecture firms are included among these businesses. Survey questionnaires were emailed to respondents. Those with expertise of sustainability who manage human resources. The contacts, including email addresses and telephone numbers, were acquired from.

The original survey was composed in English. It was emailed to 150 individuals from Iraqi businesses. These businesses include real estate firms, construction companies, consulting organizations, and architecture firms. The questionnaires for the survey were addressed to engineers, Managers of human resources who have expertise of sustainability. The acquired information includes email addresses and phone numbers.

4. DATA ANALYSIS

The data was examined via the Spss program. We'll have tables, graphs, and charts galore to show you our findings. Chapter 5 displays the findings of the survey.

As was noted before, a quantitative analysis using a deductive methodology was employed in this investigation. The technique used in this study was appropriate for assessing the current state of social sustainability development in businesses in Iraq that are involved in building.

This research, however, does have some flaws. It was challenging to design a survey instrument due to the paucity of quantitative research on business perspectives on social sustainability.

The proportion of people who answer a survey is crucial to its success. It was critical to collect data from a sizable sample in a short time frame. A further challenge was maintaining an acceptable level of response quality.

Table 4.1: People who answer

Case Processing Summary		
	N	%
Valid	134	100.0
Excluded	0	0
Total	134	100.0

4.1 Response Rate

We administered the questionnaire to 150 respondents who worked in the Iraqi construction business between January and March 2023 to assess its validity. The questionnaires were distributed directly through or a questionnaire link (Google format) to social media numbers and email addresses; 134 completed questionnaires were returned for a response rate of 89.3 percent.

$$\text{Total response } rate = \frac{total\ responses}{total\ number\ rasponses - ineligible} \quad \textbf{(4.1)}$$

4.2 Likert Scales

The data were analyzed using descriptive statistics, and the questionnaire, which was designed to allow respondents to respond to the different variables based on their personal experiences and opinions, was scored using a Likert scale (for instance, a scale from 1 to 5, with strongly disagree = 1 and strongly agree = 5). Likert scales are applicable and widely employed in a variety of contexts. Opinion measurement on a scale with a range of values The results of the evaluated surveys will be reported in the following format:

Table 4.2: Evaluation of Likert

Evaluation	Strongly agree	5
	Agree	4
	Neither agree nor disagree	3
	Disagree	2
	Strongly disagree	1

4.3 The Reliability Test

The reliability test is used to evaluate the consistency of the chosen scale, and the alpha in Cronbach is the most used reliability test, as demonstrated by the equation:

$$\alpha = \frac{n}{(n-1)}\left[1 - \frac{\sum_{i=1}^{n} \sigma_{yi}^2}{\sigma_x^2}\right] \quad \textbf{(4.2)}$$

Where:

α = alpha Cronbach

n = refer to the number of scale items

σ_yi^2 = refer to the variance associated with the item i

σ_x^2 = refer to the variance associated with observed total scores

Table 4.3: The Cronbach's Alpha Values

Cronbach's Alpha	**Internal Reliability**
$0.9 > \alpha \geq 0.8$	Good
$\alpha \geq 0.9$	Excellent

When values greater than or equal to (0.70) are acceptable. Table (5.1) reveals that all values more than 0.70 are acceptable Cronbach's alpha values, indicating that the scales are credible for this investigation.

As show in table 4.4 shows the values of the Reliability Statistics for the part one of questionnaires.

Table 4.4: the Reliability Statistics of EM Items

Reliability Statistics	
Cronbach's Alpha	N of Items
0.829	6

As show in table 4.5 shows the values of the Reliability Statistics for the part tow of questionnaires.

Table 4.5: of the Reliability Statistics of MM Items

Reliability Statistics	
Cronbach's Alpha	N of Items
0.869	7

As show in table 4.6 shows the values of the Reliability Statistics for the part three of questionnaires:

Table 4.6: of the Reliability Statistics of SD Items

Reliability Statistics	
Cronbach's Alpha	N of Items
0.917	12

4.4 Respondents Work Experience

Observe from Table 4.7 and Figure 4.1 that the research sample according to the number of years of scientific experience was 34.3 % for the age group from 5 to 10 years, 14.2 % for the age group 10-15 years, 23.1 % for the age group 15 to 20 years, and 28.4 % for more than 20 years. 38% for age group 20-25 .

Table 4.7: Findings Regarding the Work Experience of the Participants

		Frequency	Percent
Valid	5-10	46	34.3
	10-15	19	14.2
	15-20	31	23.1
	20-25	38	28.4
	Total	134	100.0

According to Table 4.7 about years of experience the figure show below,

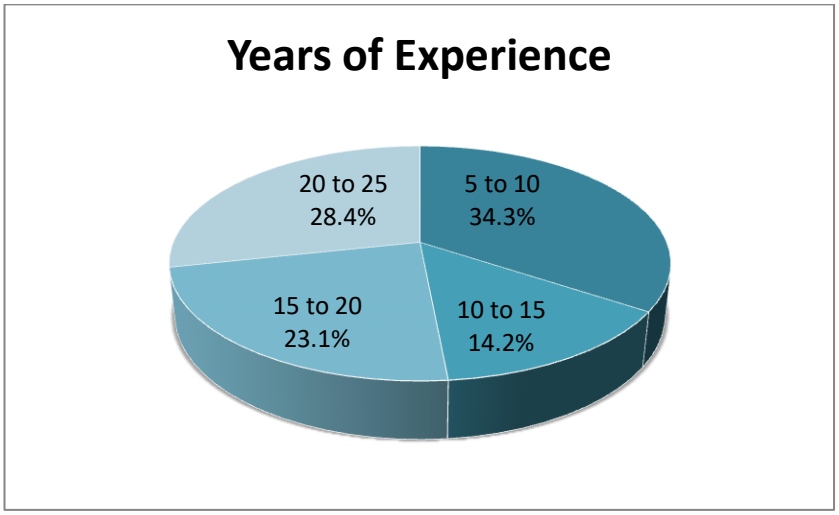

Figure 4.1: Respondents Work Experience

4.5 Academic Qualification

Table 4.8: Academic Proficiency Findings

		Frequency	Percent	Valid Percent
Valid	BSC	75	56.0	56.0
	MSC	21	15.7	15.7
	PHD	5	3.7	3.7
	High School	10	7.5	7.5
	Other	23	17.2	17.2
	Total	134	100.0	100.0

According to Table 4.8 about 75% of respondents in the BCS group and 21% in the MSC categories, had 5% of PHD in the construction business.

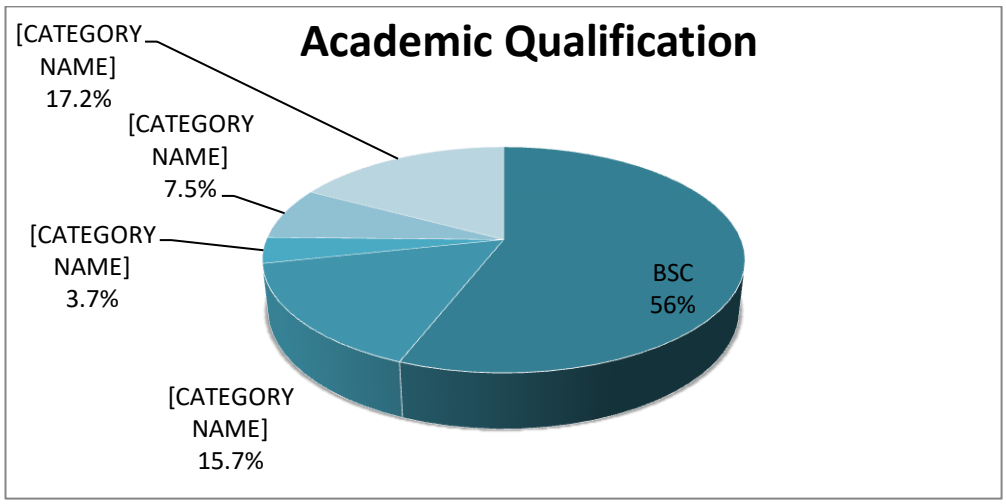

Figure 4.2: Academic Qualification

4.6 Std. Deviation

The standard deviation is a measure of dispersion in a dataset in relation to the mean, and it is computed by taking the square root of the variance. When comparing one set of data to another, it's useful to know how far each value is from the average.in the table (5.6) the std. D.

4.7 Mean value

The mean is the average value in a mathematical or statistical set. There are several different approaches to calculate the mean, the most common of which is the arithmetic mean (just add up all the numbers and divide by the total number of observations). The value of mean of items as show in table (5.9),(5.10),and (5.11).

4.8 The Rank Correlation

A rank correlation is a type of statistical measure used to examine the relationship between two or more rankings, where a ranking is the assignment of ordering labels like "first," "second," "third," etc. to observations of a variable.

4.9 The Code Items

The items were had items with (EM) represent to the (The Impact of Engineering Management in Sustainable) and the number of item as show in the table (5.9).

The items of part tow of questionnaires (MM) represent to the Factors Effect in Manager’s Management in Sustainable Projects.

The items of part three of questionnaires (SD) represent to the item elements of sustainable development does your firm consistently practice for constructions projects.

4.10 The Impact of Engineering Management on Sustainable Data Analysis

In statistics, a rank correlation is any of several statistics that measure an ordinal association between rankings of different ordinal variables or different rankings of the same variable, where a "ranking" is the assignment of the ordering labels "first", "second", "third", etc. to different observations

of a variable. The table (4.9) provides statistics performed on items. And the figure (4.3)

Table 4.9: The Impact of Engineering Management on Sustainable Data Analysis

No.	Items	Code	Mean	Std. Error of Mean	Std. Deviation
1	Increasing the owner's equity	EM1	4.22	0.070	0.808
2	Reduced overhead cost	EM2	4.40	0.062	0.715
3	Reduce in problems	EM3	4.01	0.083	0.965
4	Capability to raise rents	EM4	4.16	0.076	0.883
5	Engaging tenants	EM5	4.10	0.074	0.857
6	Enhancing a building's resale value	EM6	4.20	0.073	0.848

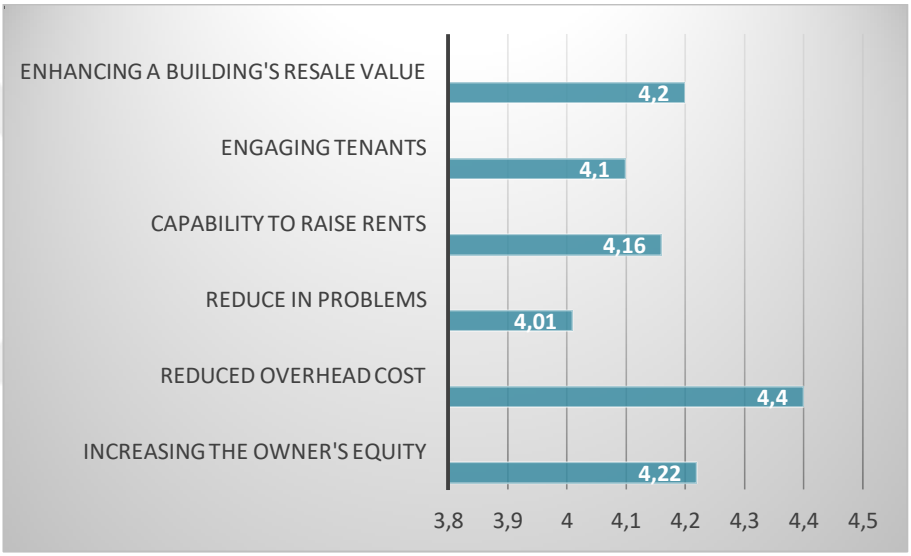

Figure 4.3: The Mean of the Impact of Engineering Management on Sustainable

Table 4.10 shows the value of (Mean Std. Error of Mean Std. Deviation, Variance, Rank) for each item and value according to the value of the rank according to the value of the mean. The first rink with a higher value of mean (4.40)was item (EM2) (Reduced overhead cost), .and the minimum value of mean (4.01)for item EM3(Reduced in problems).

Table 4.10: The Impact of Engineering Management on Sustainable Rank

Rank	Items	Code	Mean	Std. Deviation
1	Reduced overhead cost	EM2	4.40	0.715
2	Increasing the owner's equity	EM1	4.22	0.808
3	Enhancing a building's resale value	EM6	4.20	0.848
4	Capability to raise rents	EM4	4.16	0.883
5	Engaging tenants	EM5	4.10	0.857
6	Reduce in problems	EM3	4.01	0.965

4.11 The Factors Effect Manager's Management in Sustainable Projects Data Analysis

When comparing each ordinal variables or two rankings of the same variable, a rank correlation measures the ordinal association between the rankings. In statistics, a ranking is the assignment of ordering labels like "first," "second," "third," etc. to different observations of a variable. Table 4.10 displays results of item statistics. and the data in (4.4)

Table 4.11: The Factors Effect Manager's Management in Sustainable Projects

No.	Items	Code	Mean	Std. Error of Mean	Std. Deviation
1	Attitude	MM1	4.03	0.73	0.849
2	Knowledge	MM2	4.04	0.80	0.925
3	Self-initiative	MM3	4.10	0.62	0.714
4	Firm Support	MM4	4.24	0.68	.787
5	Government Support	MM5	4.16	0.66	0.764
6	Engineers' Association Support	MM6	4.13	0.70	0.808
7	Client Attribute	MM7	4.33	0.71	0.821

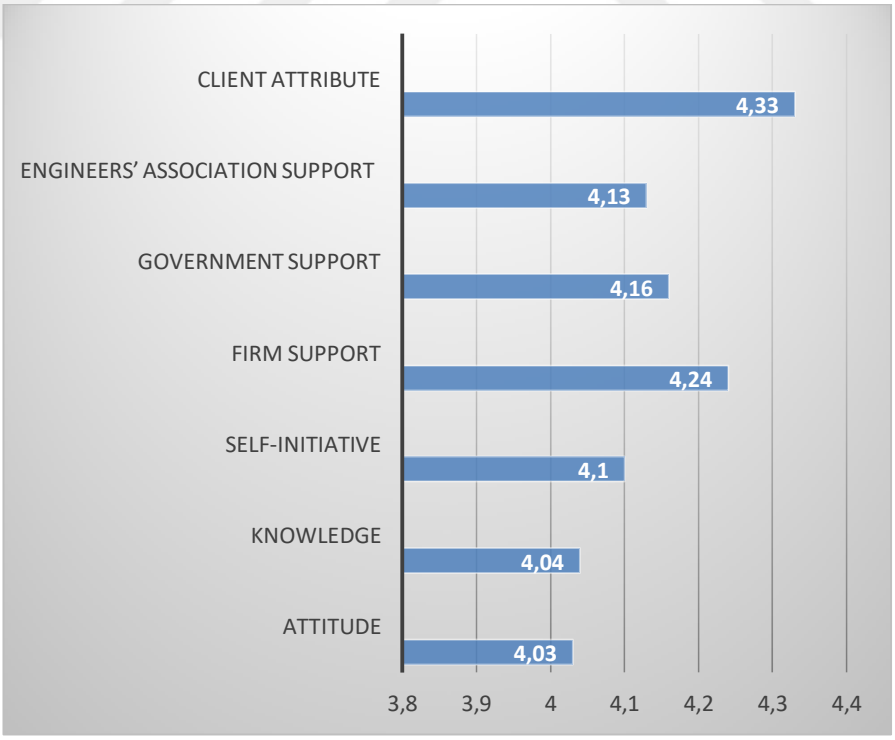

Figure 4.4: The Factors Effect Manager's Management in Sustainable Projects

Table 4.12 shows the amount of (Mean Std. Error of Mean Std. Deviation, Variance, Rank) for each item, as well as the value of the rank in relation to the mean value.

The first rink with a mean value greater than 4.33 was (MM7) (Client Attribute). and the minimal mean value (4.03) for item MM1 (Manager's Management Attitude).

Table 4.12: The Factors Effect of MM in Sustainable Projects

Rank	Items	Code	Mean	Std. Error of Mean	Std. Deviation
1	Client Attribute	MM7	4.33	0.71	0.821
2	Firm Support	MM4	4.24	0.68	0.787
3	Government Support	MM5	4.16	0.66	0.764
4	Engineers' Association Support	MM6	4.13	0.70	0.808
5	Self-initiative	MM3	4.10	0.62	0.714
6	Knowledge of Manager's Management	MM2	4.04	0.8	0.925
7	Attitude of Manager's Management	MM1	4.03	0.73	0.849

Table 4.13: The Item Elements of Sustainable Development

Which elements of sustainable development do your firm consistently practice for construction projects?					
No.	**Items**	**Code**	**Mean**	**Std. Error of Mean**	**Std. Deviation**
1	Protect Eco systemic during construction	SD1	4.16	0.076	0.883
2	Protect natural water in site	SD2	4.10	0.074	0.857
3	Recycle on site	SD3	4.20	0.073	0.848
4	Using alternative energy supply	SD4	4.03	0.073	0.849
5	Use bio- material or products	SD5	4.04	0.080	0.925
6	Minimize use of PVC (Polyvinyl chloride) products or materials	SD6	4.10	0.062	0.714
7	Install water efficient fixtures	SD7	4.24	0.068	0.787
8	Use of low or no VOC (volatile organic compounds) emitting	SD8	4.16	0.066	0.764
9	Minimize impacts to the geography	SD9	4.13	0.070	0.808
10	Restore ecosystems with native plants	SD10	4.33	0.071	0.821
11	Use products or materials with recycle content	SD11	4.25	0.078	0.907
12	Install whole house ventilation	SD12	4.16	0.071	0.824

According to table 4.13, the figure 4.5 shown the categories of SD depended on the value of mean of items in the questioners

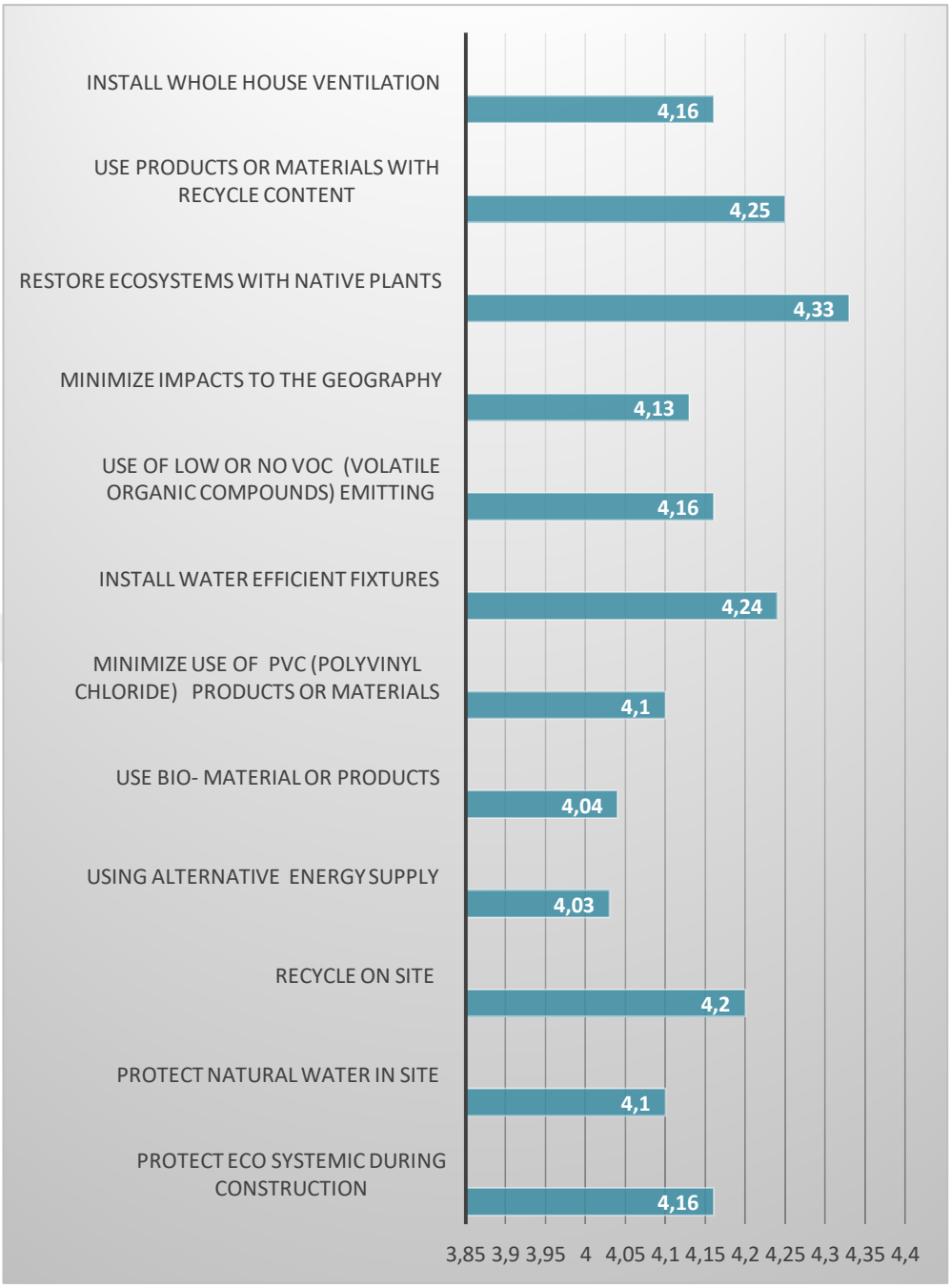

Figure 4.5: The Categories of SD

Table 4.14 shows the amount of (Mean Std. Error of Mean Std. Deviation, Variance, Rank) for each item, as well as the value of the rank in relation to the mean value. The first rink with a mean value greater than 4.33 was (SD10) (Restore ecosystems with native plants). and the minimal mean value (4.03) for item SD4 (Using alternative energy supply).

Table 4.14: The Factors Effect in SD in Sustainable Projects

Which elements of sustainable development do your firm consistently practice for construction projects?					
Rank	Items	Code	Mean	Std. Error of Mean	Std. Deviation
1	Restore ecosystems with native plants	SD10	4.33	0.071	0.821
2	Use products or materials with recycle content	SD11	4.25	0.078	0.907
3	Install water efficient fixtures	SD7	4.24	0.068	0.787
4	Recycle on site	SD3	4.20	0.073	0.848
5	Install whole house ventilation	SD12	4.16	0.071	0.824
6	Protect Eco systemic during construction	SD1	4.16	0.076	0.883
7	Minimize impacts to the geography	SD9	4.13	0.070	0.808
8	Minimize use of PVC (Polyvinyl chloride) products or materials	SD6	4.10	0.062	0.714
9	Minimize use of PVC (Polyvinyl chloride) products or materials	SD6	4.10	0.062	0.714
10	Protect natural water in site	SD2	4.10	0.074	0.857
11	Use bio- material or products	SD5	4.04	0.080	0.925
12	Using alternative energy supply	SD4	4.03	0.073	0.849

5. CONCLUSION AND RECOMMENDATION

5.1 Introduction

The purpose of this study was to identify the benefits of implementing project management System Improvement for the Iraqi Construction Industry, which can easily be included into their existing business and project quality management procedures. This goal was accomplished in the context of Iraqi production organizations by examining issues relating to the effectiveness and continuous improvement of quality management systems that were implemented within the country's construction industry. With the assistance of a strong organizational culture and the extensive collection of data, this goal was accomplished.

The research helps to fill in the problems of implementing stated and the presence of actual proof of the project management in the Iraqi construction sector. This ensures the ultimate delivery of a well-operated project management that is capable of giving customer satisfaction. This study emphasizes a lack of research purpose in the organizational culture profiles of Iraqi construction businesses to evaluate the role of organizational culture in driving effective adoption.

Another finding of this study is that there is a lack of research purpose in the organizational culture profiles of Iraqi construction organizations.

5.2 Conclusion of Study

The purpose of this thesis was to create a thorough resource to aid project managers in the sustainable initiation and completion of construction projects. The thesis has also looked at the factors that make construction projects distinct, as well as the drivers and barriers to sustainable project management adoption in the construction industry's knowledge-intensive environment.

Chapter 2 of Projects Management in Sustainable Building Construction contained a detailed literature analysis that not only examined the significant difficulties facing

the construction industry, but also covered the fundamental ideas involved. The variables that have been identified as being crucial to the success of Projects Management in Sustainable Building Construction have been established. However, the ongoing difficulties of Iraqi construction firms can be summed up by the three factors of project cost, quality, and time. The study's methods were explained in Chapter 3. Data analysis from the questionnaires and interviews was covered in Chapter 4. The study's final suggestions and findings are presented in Chapter 5.

- The majority of respondents believed that engineering management improved sustainability by decreasing operating expenses and raising owners' equity, which in turn increased the property's resale price. This demonstrates that within the organization, the phrase "Engineering Management" is commonly understood. Several inferences can be drawn from the data: The object (The Impact of Engineering Management on Sustainable)

To answer the research question and accomplish the study's goals, the authors combed through the relevant literature to determine what was already known about the connection between leadership and sustainability in the building sector. It was noted that the connection between these two ideas was disregarded despite its significance in advancing sustainability. There has been scant research connecting these two critical aspects of management. These investigations, however, have only been undertaken in individual nations. Furthermore, the literature argued that the connection between leadership and sustainability in one country could not be transferred to another because of the different cultural norms and sustainability standards in place worldwide. Consequently, there is a significant void in the literature concerning the connection between leadership and sustainability in the construction industry in two nations to compare and contrast how they influence the promotion of sustainability. None of the existing investigations on this connection expanded beyond a single setting. Therefore, these prior studies used a quantitative method to determine which type of leadership was more effective in the nations where they were done. In contrast, this study's authors adopted a qualitative methodology, exploring how variations in leadership style impact the spread of sustainability in a variety of settings.

- The results of the research make it clear that several regulating elements are essential for answering for part three (the Factors that Affect Manager's

Management of Sustainable Projects) of the question, Client Attribute, Firm Support, and Government Support.

- In response to questioner's question (Which aspects of sustainable development does your company routinely implement for building projects?), here's what we know: Utilize organic resources and/or goods and Construction firms in Iraq need to be encouraged to use more recycled products and resources in their sustainable building endeavors.

5.3 Recommendations

The following recommendations can be made to all stakeholders in order to implement the impact of engineering management on the construction sector in Iraq based on the results and conclusions: The integration of urban planning and mobility is a crucial step towards resolving critical issues.

- Engineering management is a concept that needs to be understood by everyone in the organization before it can be applied, making raising awareness of it all the more important in the early stages of a project. They need to anticipate future events for this to be possible.
- It is suggested that the government use the necessary construction bio materials to build new sustainable buildings.
- Develop comprehensive guidelines for Iraq's sustainable construction sector. Considering the diverse range of building practices in Iraq, this master specification should divide projects into three broad categories: sustainable; normal; complex; and specialized.
- Finding a way to collaborate on research projects among construction industries and academic institutions is necessary for the progression of the construction sector. Systems that are efficient in terms of costs, as well as economic and management knowledge systems, are required.
- After getting the proper training and qualification, providing employees sufficient authority to adjust and enhance their working ways is a good way to motivate them. Appreciation of their accomplishments enables them to achieve optimal utilization of the staff through teamwork, establish an

atmosphere that is suited for regulatory compliance, and provide individuals with the opportunity to express their thoughts, not to mention instill trust in the workforce as a whole.

- Putting a larger emphasis on the utilization of statistical methods technologies. They contribute to the process of locating and analyzing project management issues.

5.4 Further Research

Research studying the connection between engineering management and sustainability promotion should include studies that further mitigate the aforementioned constraints by, for example, integrating a wider range of leadership styles and examining how they affect sustainability promotion.

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APPENDICES

Appendix 1: Impact of Projects Management in Sustainable Building Construction

This survey is for ACADEMIC purpose only , data collected will be use as part of sustainable in construction projects , information will be kept privet and will not be use commercially . Please limit responses to construction projects . thanks for your presence .

❖ **Part one (personal information)**

1. Academic qualification

- Master's
- BSC
- Diploma
- High school
- PhD

2. Job Status

- Student
- Employee
- Free business
- Retired

3. The experience years

- 5- 10
- 10-15
- 15-20
- 20-25

❖ **Part Two**

The Impact of Engineering Management in sustainable

Please Mark the Appropriate Answer by (√), if you believe that the following factors influence company service quality, where

1. Strongly Agree 2. Agree 3. Don't now 4. Dis Agree 5. Strongly Disagree

No.	Item	Strongly Desagree	Desagree	Normaly	Agree	Strongly Agree
1	Increasing the owner's equity					
2	Reduced overhead cost					
3	Reduce in problems					
4	Capability to raise rents					
5	Engaging tenants					
6	Enhancing a building's resale value					

❖ **Part Three**

The factors effect in manager's management in sustainable projects

Please Mark the Appropriate Answer by (√), if you believe that the following factors influence company service quality, where

1. Strongly Agree 2. Agree 3. Don't now 4. Dis Agree 5. Strongly Disagree

No.	Item	Strongly Desagree	Desagree	Normaly	Agree	Strongly Agree
1	Attitude					
2	Knowledge,					
3	Self-initiative					
4	Firm Support					
5	Government Support					
6	Engineers' Association Support					
7	Client Attribute					

❖ **Part Four**

Which of the item elements of sustainable development does your firm consistently practice for constructions projects ?

Please Mark the Appropriate Answer by (√), if you believe that the following factors influence company service quality, where

1. Strongly Agree 2. Agree 3. Don't now 4. Dis Agree 5. Strongly Disagree

Item		Strongly Desagree	Desagree	Normaly	Agree	Strongly Agree
1	Protect Eco systemic during construction					
2	Protect natural water in site					
3	Recycle on site					
4	Using alternative energy supply					
5	Use bio- material or products					
6	Minimize use of PVC (Polyvinyl chloride) products or materials					
7	Install water efficient fixtures					
8	Use of low or no VOC (volatile organic compounds) emitting					
9	Minimize impacts to the geography					
10	Restore ecosystems with native plants					
11	Use products or materials with recycle content					
12	Install whole house ventilation					

Thank you

RELIABILITY

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Scale: ALL VARIABLES

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Reliability Statistics

Cronbach's Alpha	N of Items
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Frequencies

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	Cases Used	Statistics are based on all cases with valid data.
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Statistics						
		Acadimic Quilification	Job Status	Years of Experience	Increasing the owner's equity	Reduced overhead cost
N	Valid	134	134	134	134	134
	Missing	0	0	0	0	0
Mean		2.14	3.19	2.72	4.22	4.40
Std. Error of Mean		.135	.088	.122	.070	.062
Std. Deviation		1.562	1.015	1.416	.808	.715

Statistics					
		Reduce in problems	Capability to raise rents	Engaging tenants	Enhancing a building's resale value
N	Valid	134	134	134	134
	Missing	0	0	0	0
Mean		4.01	4.16	4.10	4.20
Std. Error of Mean		.083	.076	.074	.073
Std. Deviation		.965	.883	.857	.848

Frequency Table

Acadimic Quilification					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BSC	75	56.0	56.0	56.0
	MSC	21	15.7	15.7	71.6
	PHD	5	3.7	3.7	75.4
	High School	10	7.5	7.5	82.8
	Other	23	17.2	17.2	100.0
	Total	134	100.0	100.0	

Job Status					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	15	11.2	11.2	11.2
	Employee	50	37.3	37.3	69.4
	Free Business	69	51.5	51.5	100.0
	Total	134	100.0	100.0	
Years of Experience					
	Frequency	Percent	Valid Percent	Cumulative	

					Percent
Valid	5-10	46	34.3	34.3	34.3
	10-15	19	14.2	14.2	139.6
	15-20	31	23.1	23.1	62.7
	20-25	38	28.4	28.4	91.0
	Total	134	100.0	100.0	

Increasing the owner's equity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	.7	.7	.7
	Disagree	6	4.5	4.5	5.2
	Neutral	8	6.0	6.0	11.2
	Agree	67	50.0	50.0	61.2
	Strongly agree	52	38.8	38.8	100.0
	Total	134	100.0	100.0	

Reduced overhead cost					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	2.2	2.2	2.2
	Neutral	9	6.7	6.7	9.0
	Agree	54	40.3	40.3	49.3
	Strongly agree	68	50.7	50.7	100.0
	Total	134	100.0	100.0	

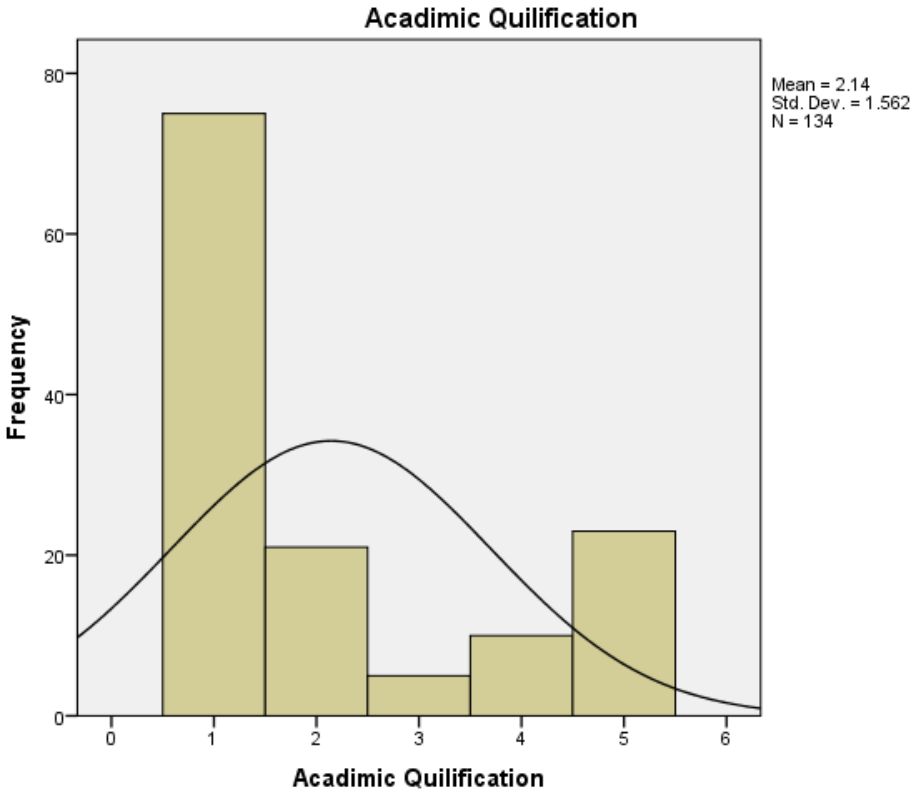
Reduce in problems					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	4	3.0	3.0	5.2
	Neutral	31	23.1	23.1	28.4
	Agree	46	34.3	34.3	62.7
	Strongly agree	50	37.3	37.3	100.0
	Total	134	100.0	100.0	

Capability to raise rents					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	3	2.2	2.2	4.5
	Neutral	16	11.9	11.9	16.4
	Agree	60	44.8	44.8	61.2
	Strongly agree	52	38.8	38.8	100.0
	Total	134	100.0	100.0	

Engaging tenants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	6	4.5	4.5	6.0
	Neutral	13	9.7	9.7	15.7
	Agree	69	51.5	51.5	67.2
	Strongly agree	44	32.8	32.8	100.0
	Total	134	100.0	100.0	

Enhancing a building's resale value					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	3	2.2	2.2	4.5
	Neutral	10	7.5	7.5	11.9
	Agree	66	49.3	49.3	61.2
	Strongly agree	52	38.8	38.8	100.0
	Total	134	100.0	100.0	

Histogram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2
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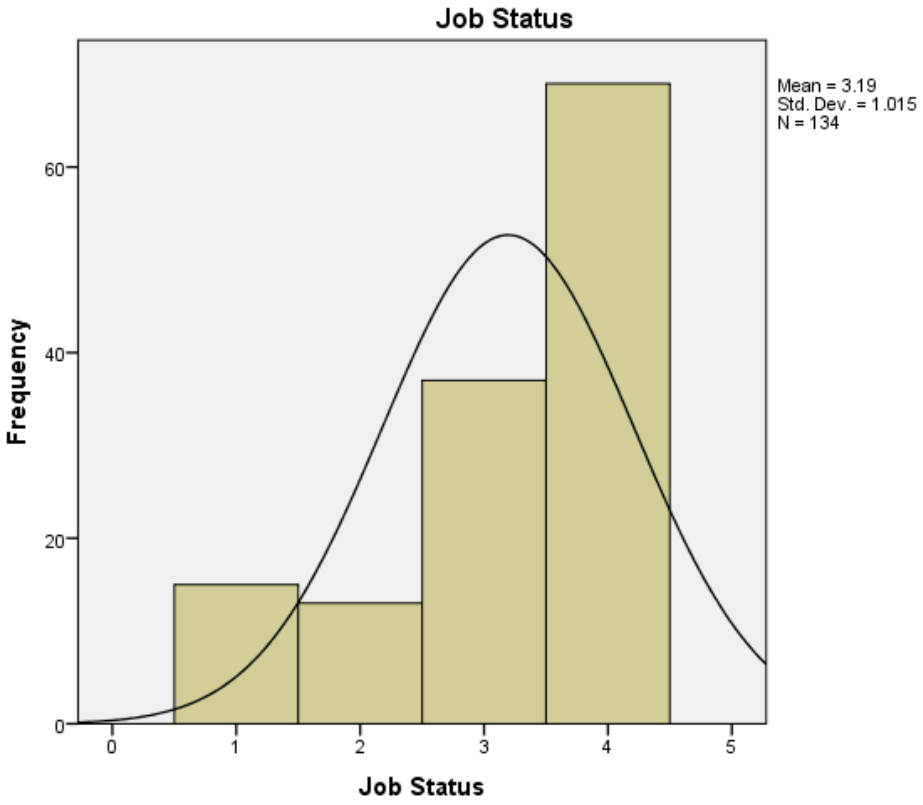
4
5
6
Acadimic Quilification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Std. Dev. = 1.015
N = 134
Frequency
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40
20
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2
3
4
5
Job Status


Years of Experience
Mean = 2.72
Std. Dev. = 1.416
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Frequency
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1
2
3
4
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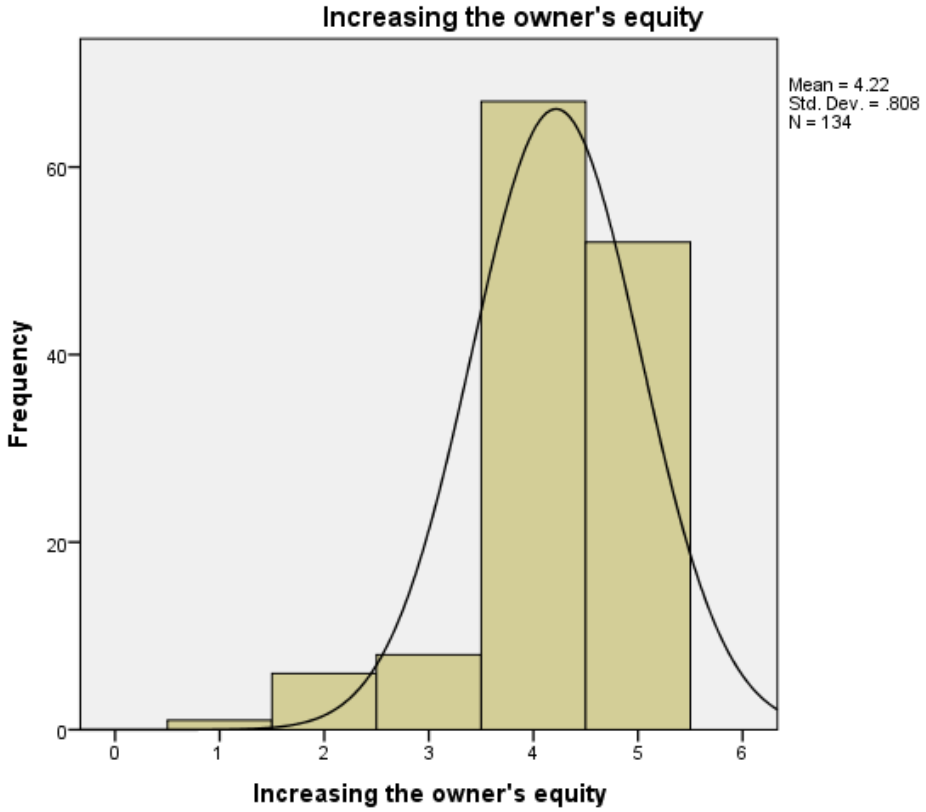
6
Years of Experience


Increasing the owner's equity
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Frequency
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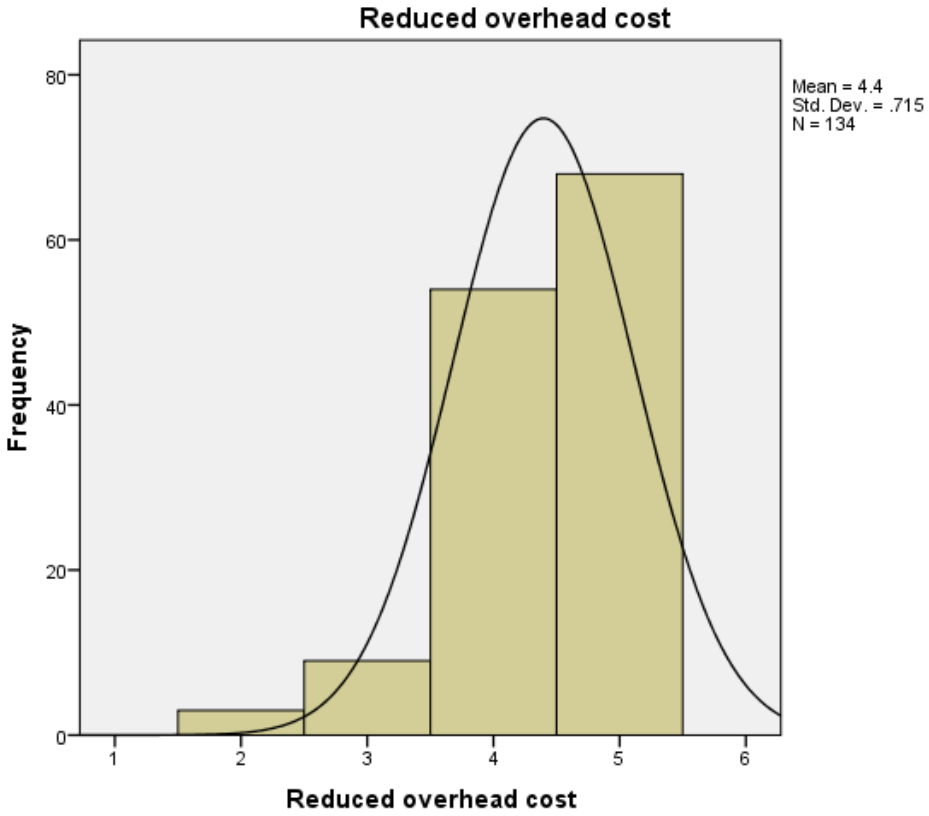
1
2
3
4
5
6
Increasing the owner's equity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Frequency
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2
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4
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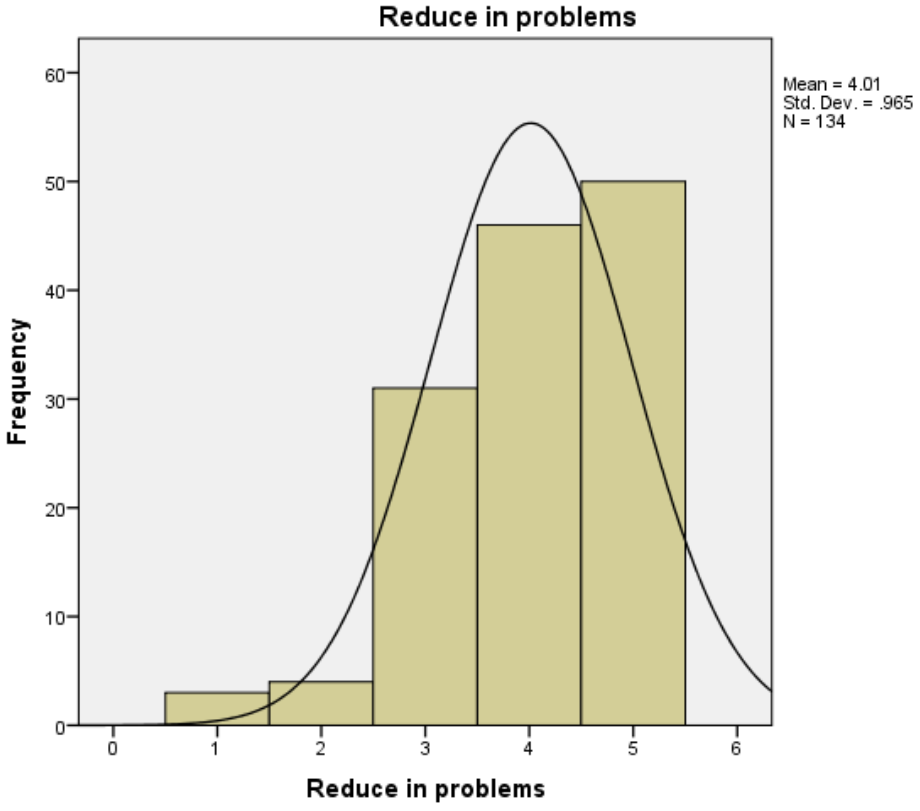
6
Reduced overhead cost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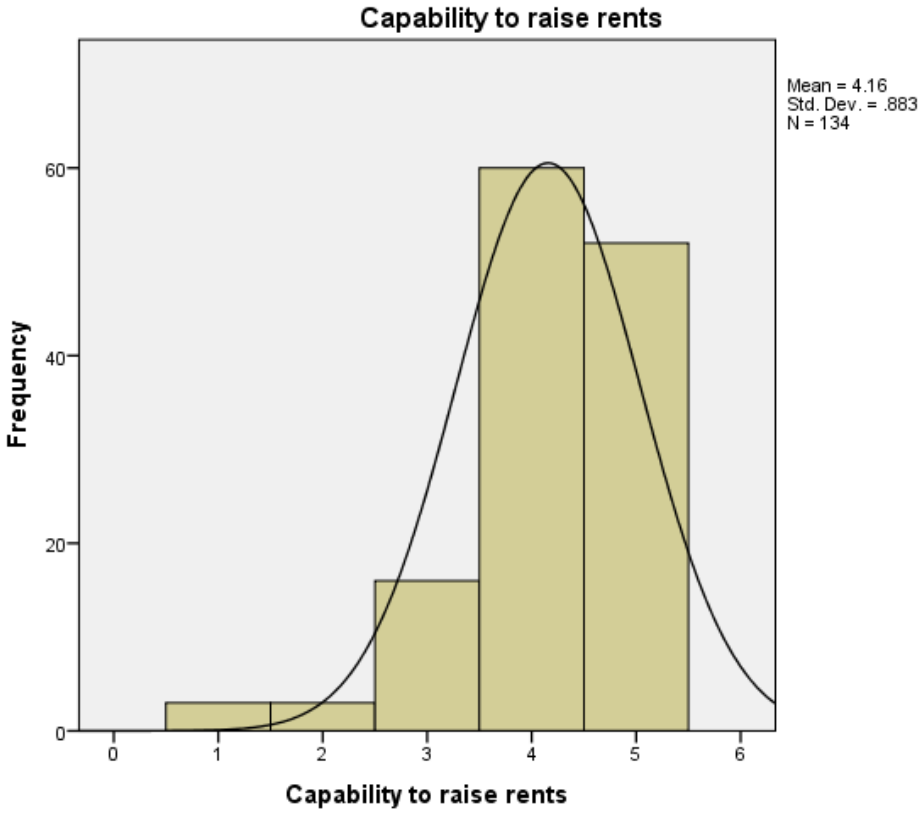
1
2
3
4
5
6
Reduce in problems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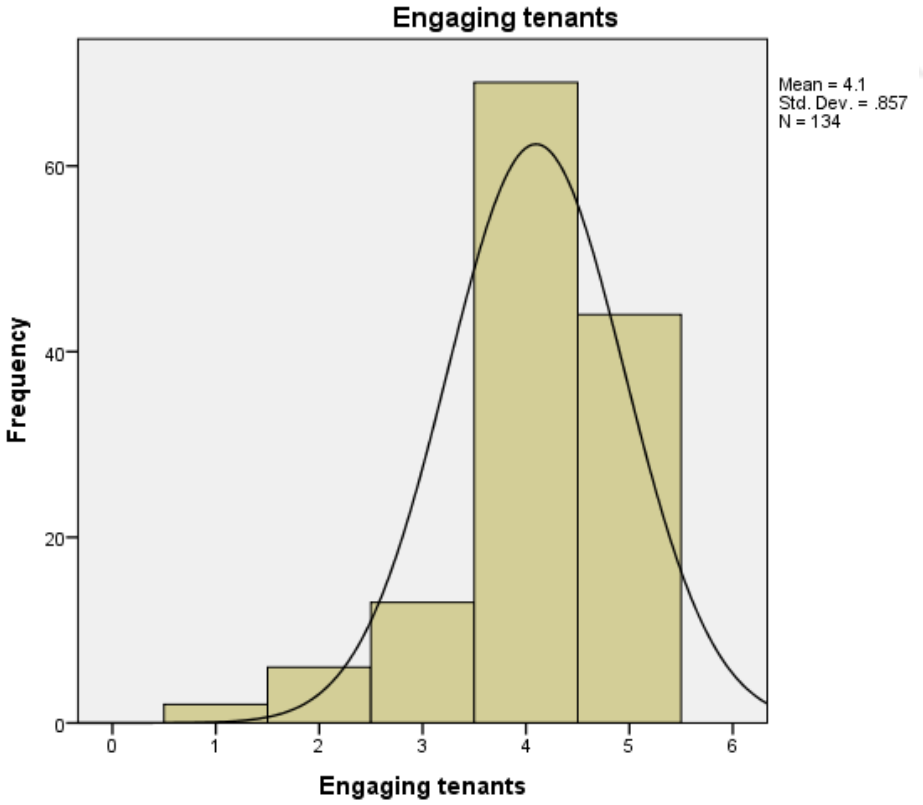
2
3
4
5
6
Capability to raise rents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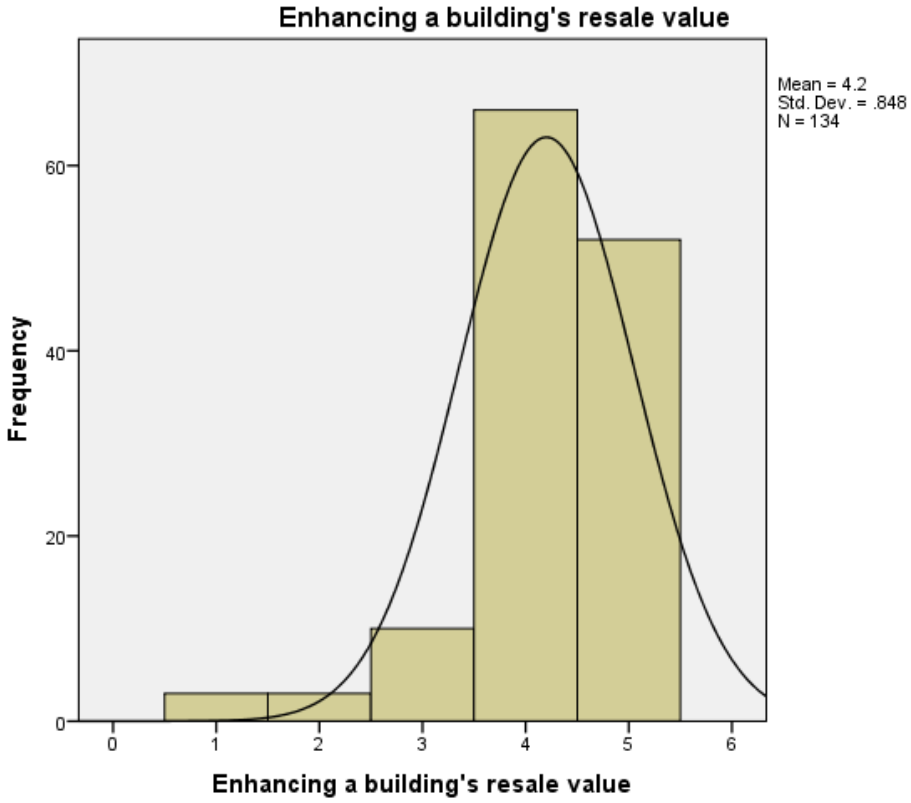
6
Engaging tenants



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N	Valid	134	134	134	134	134
	Missing	0	0	0	0	0
Mean		4.03	4.04	4.10	4.24	4.16
Std. Error of Mean		.073	.080	.062	.068	.066
Median		4.00	4.00	4.00	4.00	4.00
Std. Deviation		.849	.925	.714	.787	.764

Statistics			
		Engineers' Association Support	Client Attribute
N	Valid	134	134
	Missing	0	0
Mean		4.13	4.33
Std. Error of Mean		.070	.071
Median		4.00	4.00
Std. Deviation		.808	.821

Frequency Table

Attitude					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	.7	.7	.7
	Disagree	6	4.5	4.5	5.2
	Neutral	22	16.4	16.4	21.6
	Agree	64	47.8	47.8	69.4
	Strongly agree	41	30.6	30.6	100.0
	Total	134	100.0	100.0	

Knowledge					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	8	6.0	6.0	8.2
	Neutral	12	9.0	9.0	17.2
	Agree	68	50.7	50.7	67.9
	Strongly agree	43	32.1	32.1	100.0
	Total	134	100.0	100.0	

Self-initiative					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	3	2.2	2.2	3.7
	Neutral	7	5.2	5.2	9.0
	Agree	90	67.2	67.2	76.1
	Strongly agree	32	23.9	23.9	100.0
	Total	134	100.0	100.0	

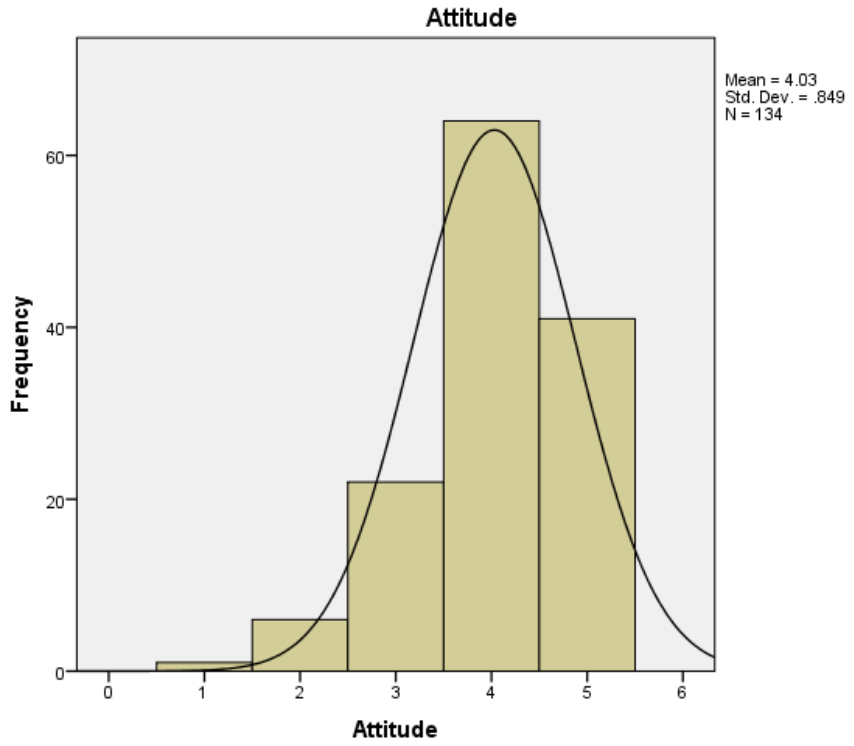
Firm Support					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	5.2	5.2	5.2
	Neutral	8	6.0	6.0	11.2
	Agree	65	48.5	48.5	59.7
	Strongly agree	54	40.3	40.3	100.0
	Total	134	100.0	100.0	

Government Support					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	2	1.5	1.5	3.0
	Neutral	12	9.0	9.0	11.9
	Agree	75	56.0	56.0	67.9
	Strongly agree	43	32.1	32.1	100.0
	Total	134	100.0	100.0	

Engineers' Association Support					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	3	2.2	2.2	3.7
	Neutral	15	11.2	11.2	14.9
	Agree	70	52.2	52.2	67.2
	Strongly agree	44	32.8	32.8	100.0
	Total	134	100.0	100.0	

Client Attribute					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	4	3.0	3.0	4.5
	Neutral	6	4.5	4.5	9.0
	Agree	58	43.3	43.3	52.2
	Strongly agree	64	47.8	47.8	100.0
	Total	134	100.0	100.0	

Histogram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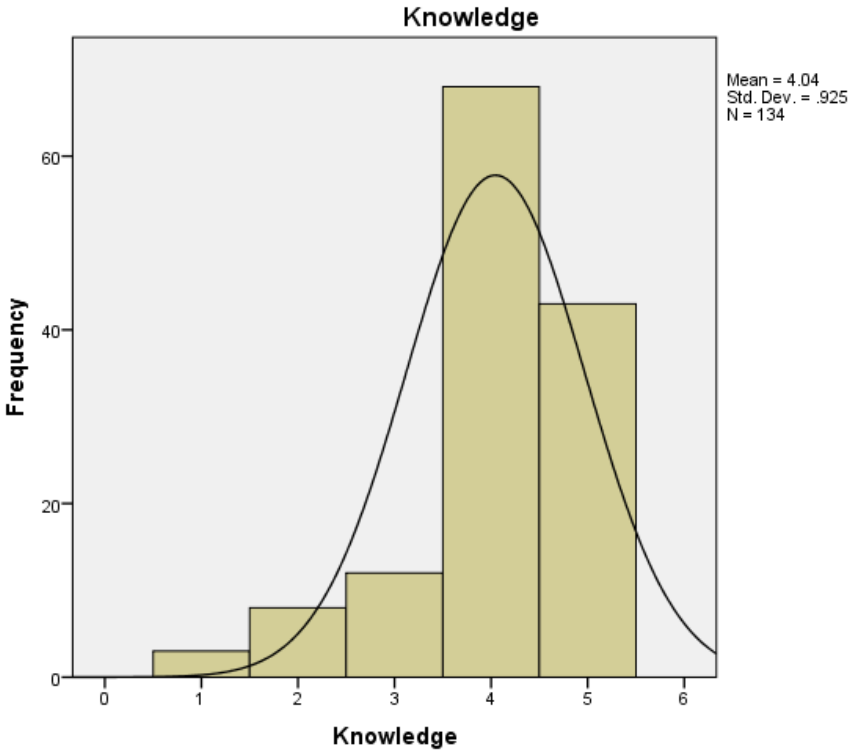
3
4
5
6
Attitude


Knowledge
Mean = 4.04
Std. Dev. = .925
N = 134
Frequency
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40
20
0
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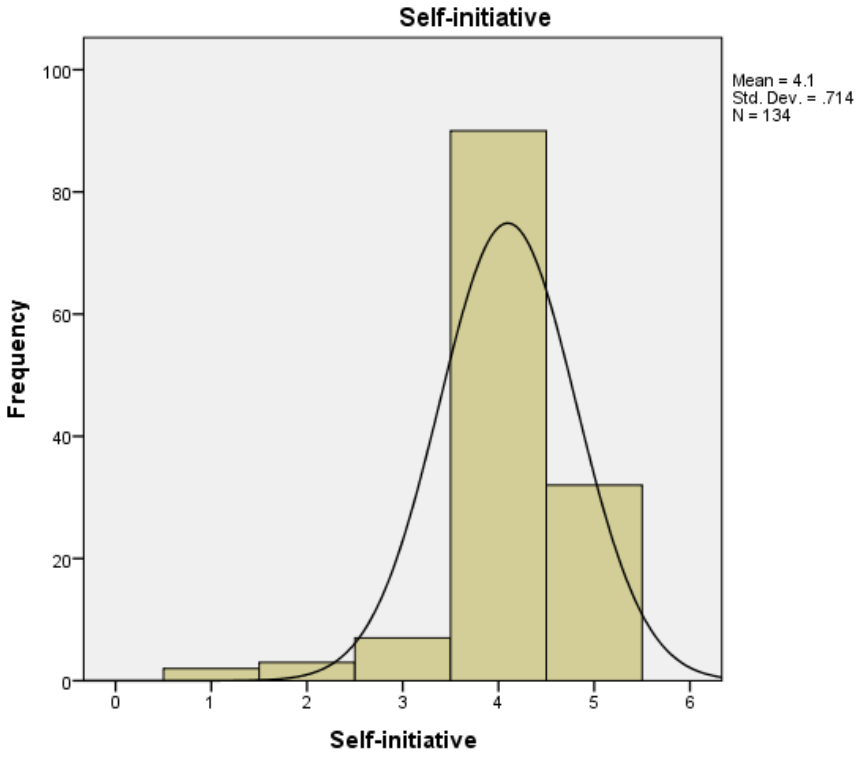
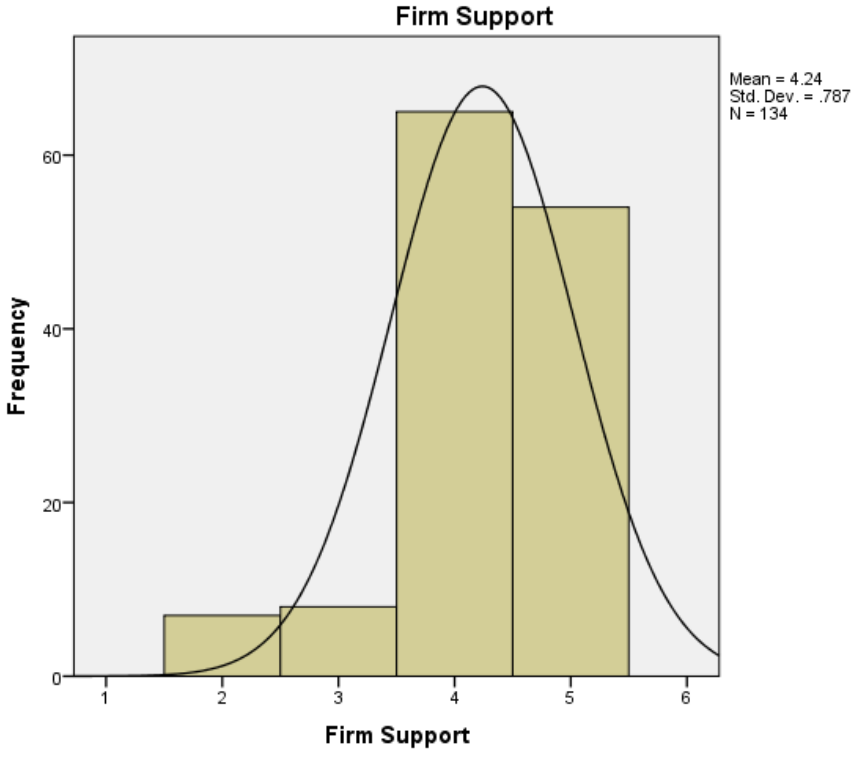
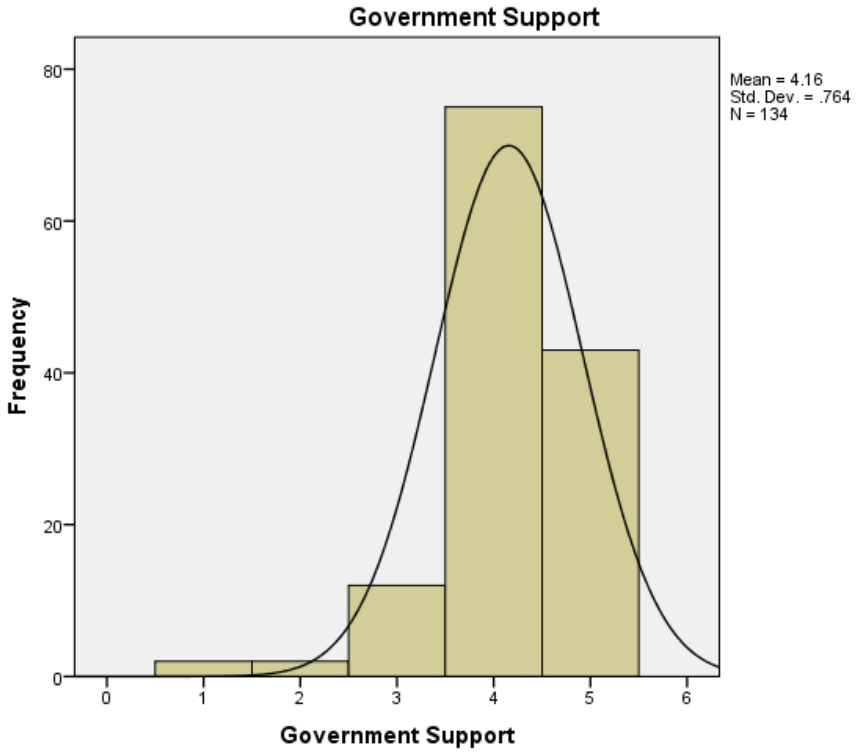
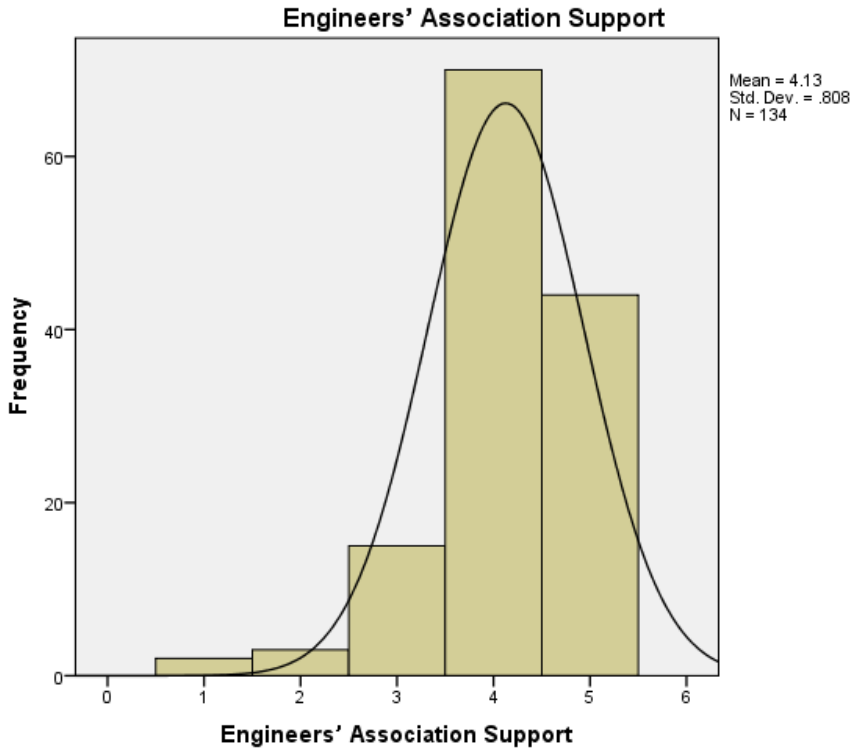
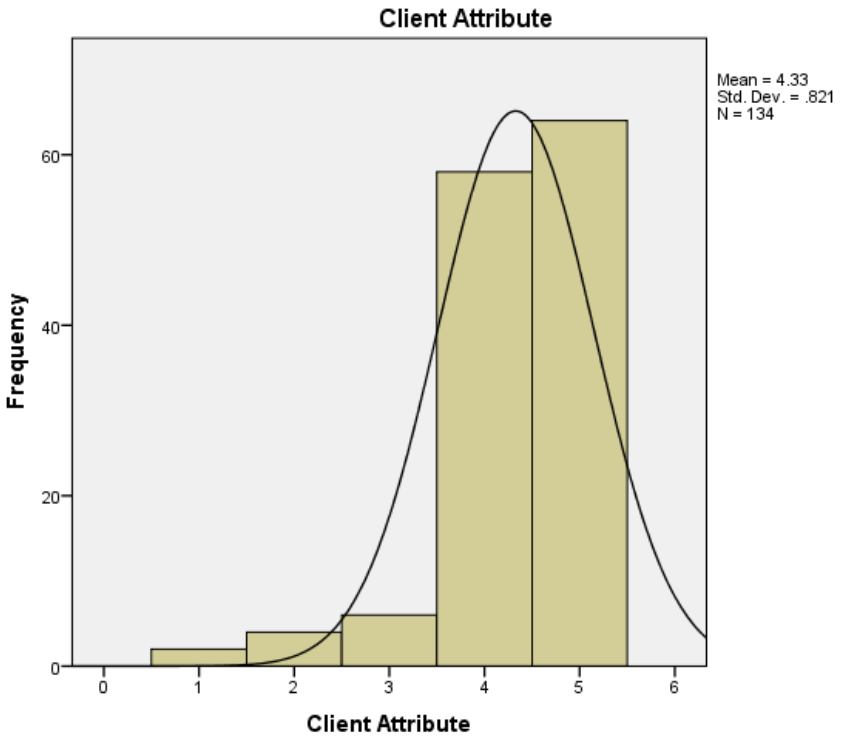
1
2
3
4
5
6
Knowledge


Self-initiative
Mean = 4.1
Std. Dev. = .714
N = 134
Frequency
Self-initiative


Firm Support
Mean = 4.24
Std. Dev. = .787
N = 134
Frequency
Firm Support


Government Support
Mean = 4.16
Std. Dev. = .764
N = 134
Frequency
Government Support


Engineers' Association Support
Mean = 4.13
Std. Dev. = .808
N = 134
Frequency
Engineers' Association Support



RELIABILITY

/VARIABLES=SD1 SD2 SD3 SD4 SD5 SD6 SD7 SD8 SD9 SD10 SD11 SD12

/SCALE('ALL VARIABLES') ALL

/MODEL=ALPHA.

Reliability

Notes		
Output Created		10-MAR-2023 10:18:36
Comments		
Input	Data	C:\Users\Toshiba\Desktop\SD\SD.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	<none>
	N of Rows in Working Data File	134
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with

		valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=SD1 SD2 SD3 SD4 SD5 SD6 SD7 SD8 SD9 SD10 SD11 SD12 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.03
	Elapsed Time	00:00:00.06

[DataSet1] C:\Users\Toshiba\Desktop\SD\SD.sav

Scale: ALL VARIABLES

Case Processing Summary			
		N	%
Cases	Valid	134	100.0
	Excluded[a]	0	.0
	Total	134	100.0

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

Reliability Statistics	
Cronbach's Alpha	N of Items
.917	12

FREQUENCIES VARIABLES=SD1 SD2 SD3 SD4 SD5 SD6 SD7 SD8 SD9 SD10 SD11 SD12

/STATISTICS=STDDEV SEMEAN MEAN

/HISTOGRAM NORMAL

/ORDER=ANALYSIS.

Frequencies

Notes		
Output Created		10-MAR-2023 10:14:09
Comments		
Input	Data	C:\Users\Toshiba\Desktop\MM\MM.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>

	Split File	<none>
	N of Rows in Working Data File	134
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data.
Syntax		FREQUENCIES VARIABLES=SD1 SD2 SD3 SD4 SD5 SD6 SD7 SD8 SD9 SD10 SD11 SD12 /STATISTICS=STDDEV SEMEAN MEAN /HISTOGRAM NORMAL /ORDER=ANALYSIS.
Resources	Processor Time	00:00:03.38
	Elapsed Time	00:00:03.31

Statistics

		Protect Eco systemic during construction	Protect natural water in site	Recycle on site	Using alternative energy supply
N	Valid	134	134	134	134
	Missing	0	0	0	0
Mean		4.16	4.10	4.20	4.03
Std. Error of Mean		.076	.074	.073	.073
Std. Deviation		.883	.857	.848	.849

Statistics

		Use bio-material or products	Minimize use of PVC (Polyvinyl chloride) products or materials	Install water efficient fixtures	Use of low or no VOC (volatile organic compounds) emitting
N	Valid	134	134	134	134
	Missing	0	0	0	0
Mean		4.04	4.10	4.24	4.16
Std. Error of Mean		.080	.062	.068	.066
Std. Deviation		.925	.714	.787	.764

Statistics					
		Minimize impacts to the geography	Restore ecosystems with native plants	Use products or materials with recycle content	Install whole house ventilation
N	Valid	134	134	134	134
	Missing	0	0	0	0
Mean		4.13	4.33	4.25	4.16
Std. Error of Mean		.070	.071	.078	.071
Std. Deviation		.808	.821	.907	.824

Frequency Table

Protect Eco systemic during construction					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	3	2.2	2.2	4.5
	Neutral	16	11.9	11.9	16.4
	Agree	60	44.8	44.8	61.2
	Strongly agree	52	38.8	38.8	100.0
	Total	134	100.0	100.0	

Protect natural water in site					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	6	4.5	4.5	6.0
	Neutral	13	9.7	9.7	15.7
	Agree	69	51.5	51.5	67.2
	Strongly agree	44	32.8	32.8	100.0
	Total	134	100.0	100.0	

Recycle on site					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	3	2.2	2.2	4.5
	Neutral	10	7.5	7.5	11.9
	Agree	66	49.3	49.3	61.2
	Strongly agree	52	38.8	38.8	100.0
	Total	134	100.0	100.0	

Using alternative energy supply					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	1	.7	.7	.7
	Disagree	6	4.5	4.5	5.2
	Neutral	22	16.4	16.4	21.6
	Agree	64	47.8	47.8	69.4
	Strongly agree	41	30.6	30.6	100.0
	Total	134	100.0	100.0	

Use bio- material or products					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	8	6.0	6.0	8.2
	Neutral	12	9.0	9.0	17.2
	Agree	68	50.7	50.7	67.9
	Strongly agree	43	32.1	32.1	100.0
	Total	134	100.0	100.0	

Minimize use of PVC (Polyvinyl chloride) products or materials					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	3	2.2	2.2	3.7
	Neutral	7	5.2	5.2	9.0
	Agree	90	67.2	67.2	76.1
	Strongly agree	32	23.9	23.9	100.0
	Total	134	100.0	100.0	

Install water efficient fixtures					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	7	5.2	5.2	5.2
	Neutral	8	6.0	6.0	11.2
	Agree	65	48.5	48.5	59.7
	Strongly agree	54	40.3	40.3	100.0
	Total	134	100.0	100.0	

Use of low or no VOC (volatile organic compounds) emitting					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	2	1.5	1.5	3.0
	Neutral	12	9.0	9.0	11.9
	Agree	75	56.0	56.0	67.9
	Strongly agree	43	32.1	32.1	100.0
	Total	134	100.0	100.0	

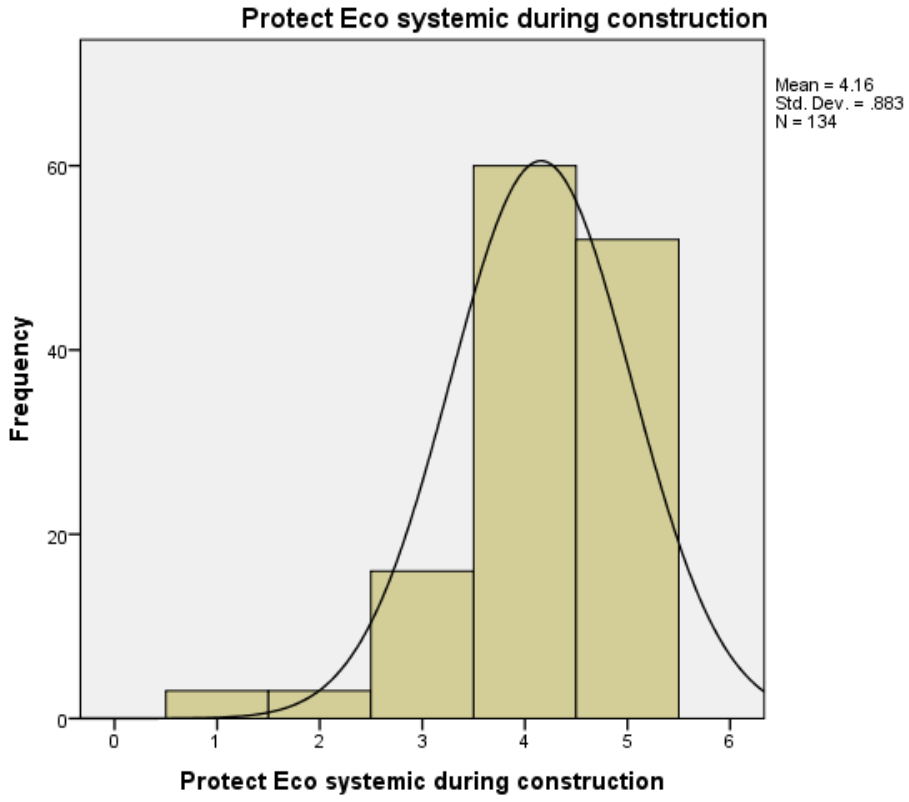
Minimize impacts to the geography					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	3	2.2	2.2	3.7
	Neutral	15	11.2	11.2	14.9
	Agree	70	52.2	52.2	67.2
	Strongly agree	44	32.8	32.8	100.0
	Total	134	100.0	100.0	

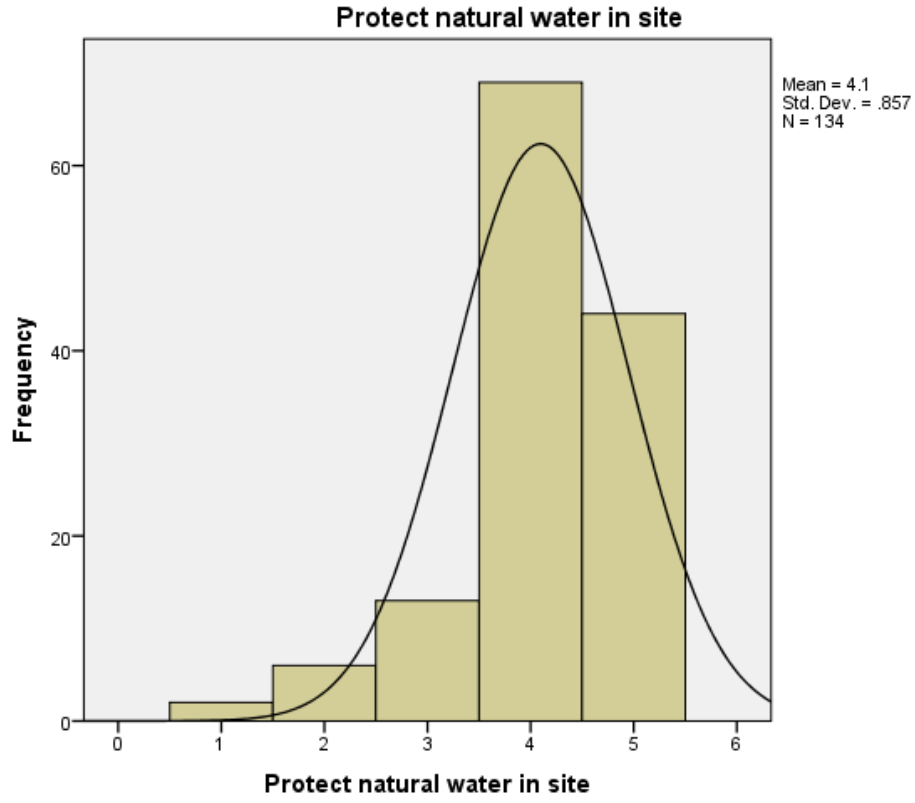
Restore ecosystems with native plants					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	4	3.0	3.0	4.5
	Neutral	6	4.5	4.5	9.0
	Agree	58	43.3	43.3	52.2
	Strongly agree	64	47.8	47.8	100.0
	Total	134	100.0	100.0	

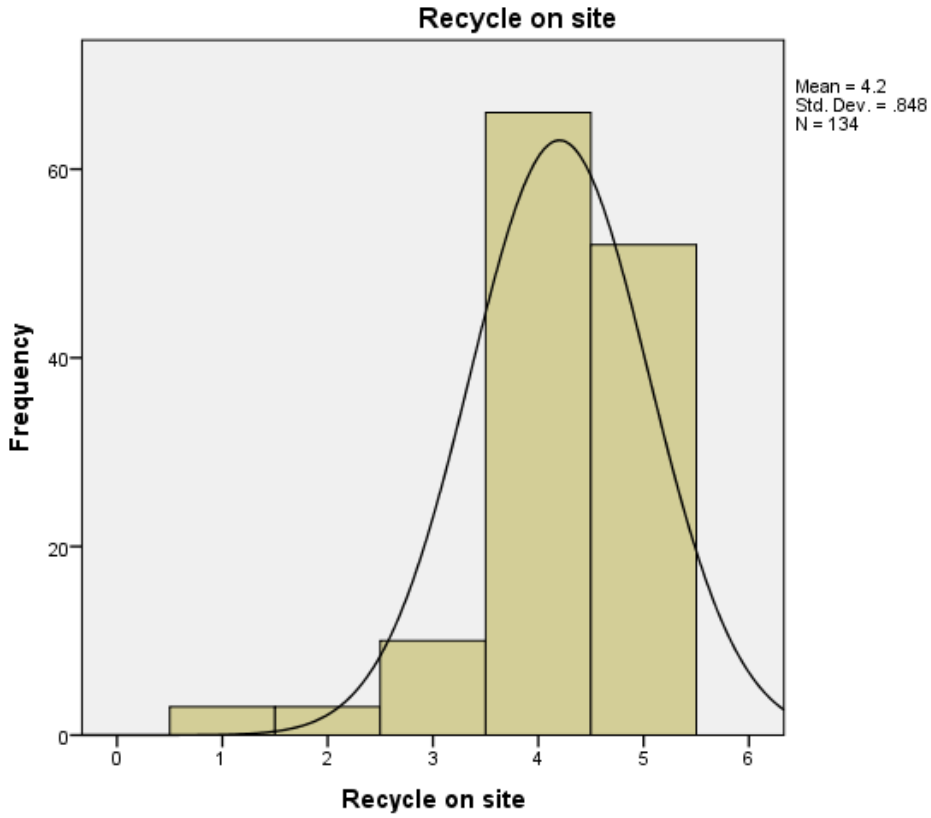
Use products or materials with recycle content					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	3	2.2	2.2	2.2
	Disagree	5	3.7	3.7	6.0
	Neutral	9	6.7	6.7	12.7
	Agree	55	41.0	41.0	53.7
	Strongly agree	62	46.3	46.3	100.0
	Total	134	100.0	100.0	

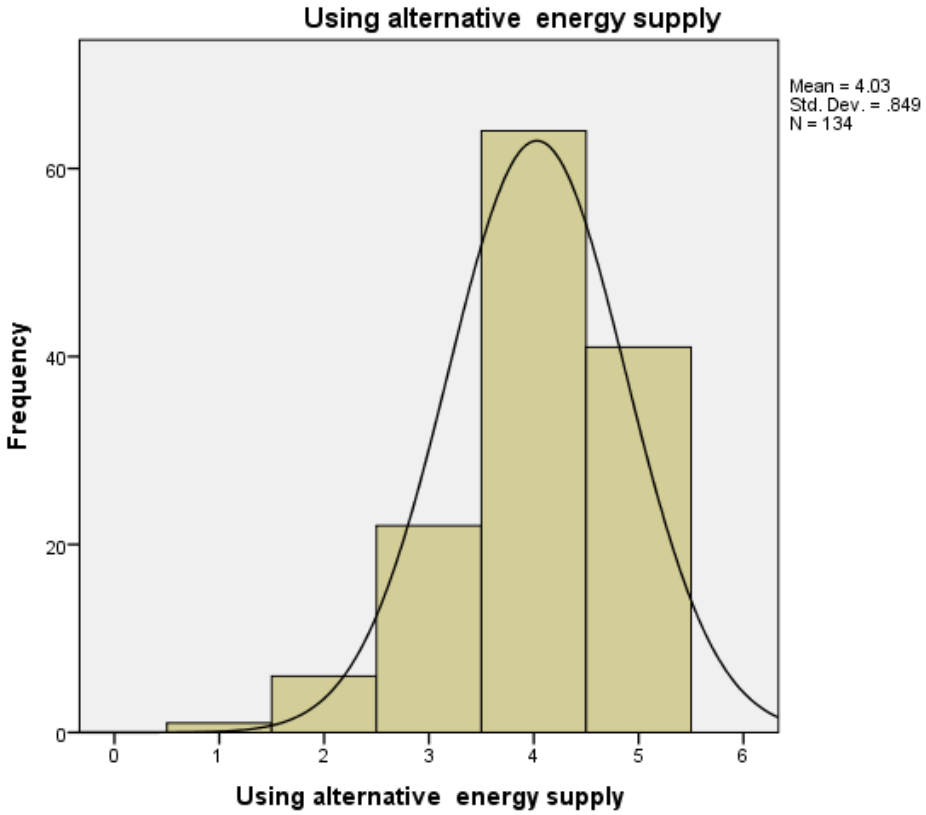
Install whole house ventilation					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	2	1.5	1.5	1.5
	Disagree	5	3.7	3.7	5.2
	Neutral	9	6.7	6.7	11.9
	Agree	71	53.0	53.0	64.9
	Strongly agree	47	35.1	35.1	100.0
	Total	134	100.0	100.0	

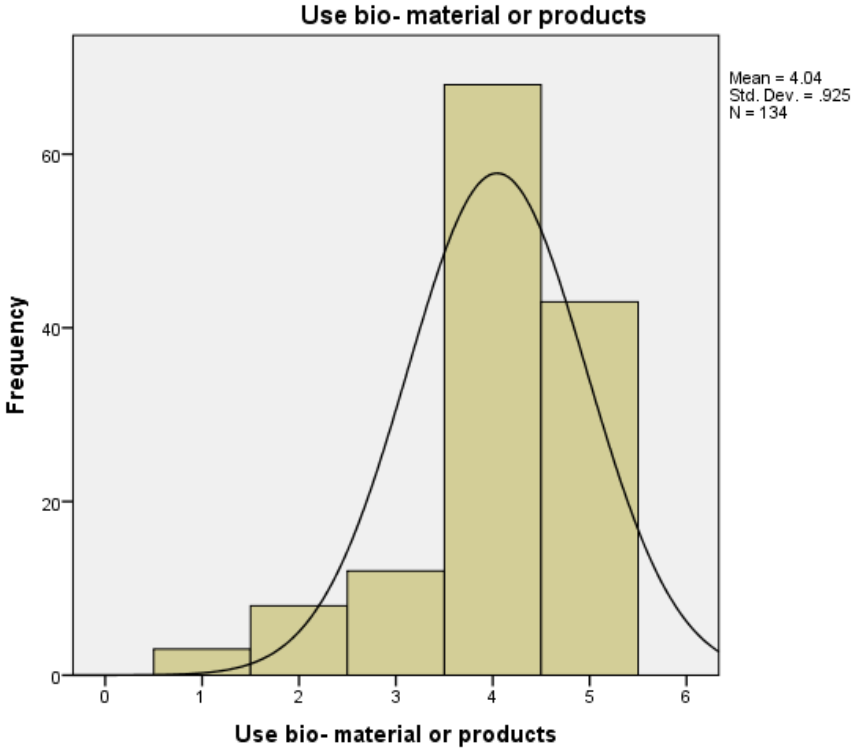
Histogram

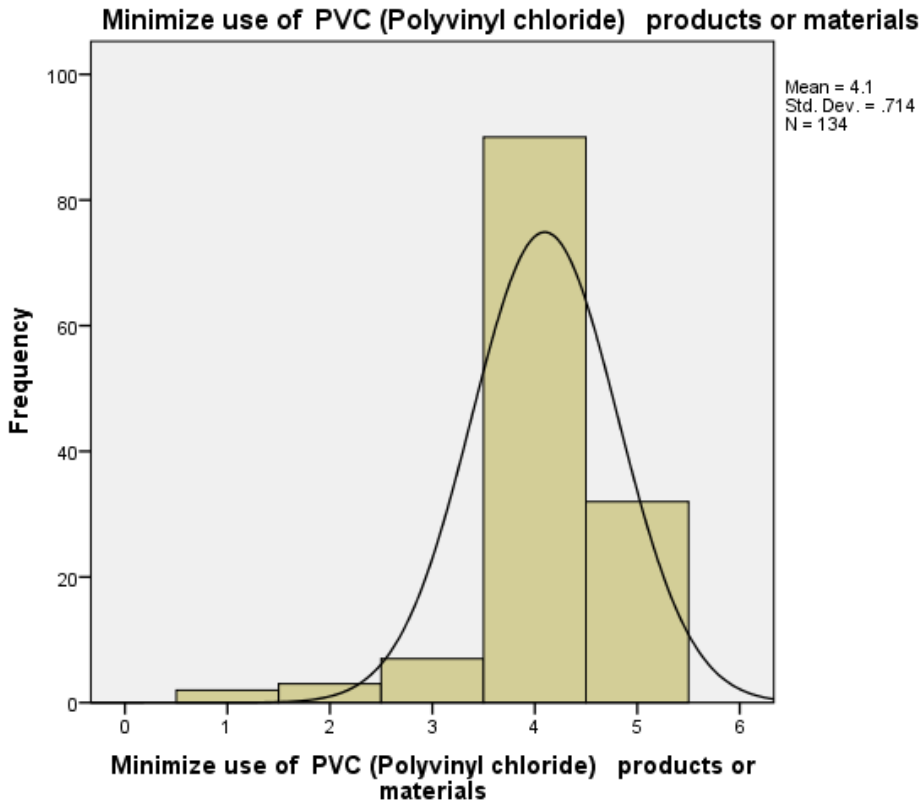


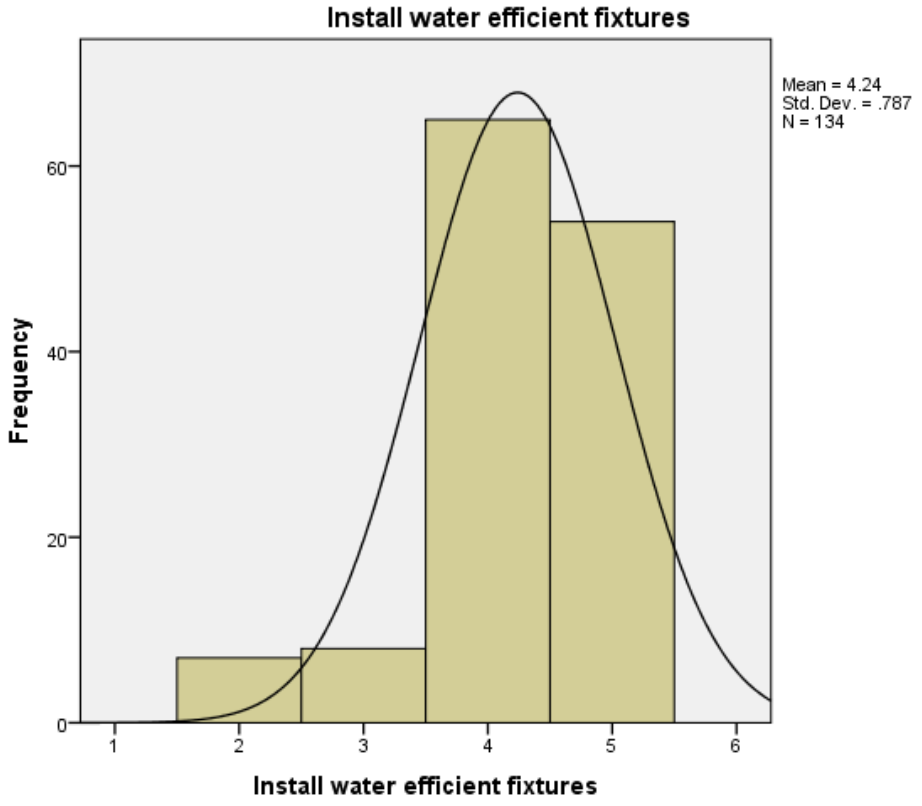

Protect natural water in site
Mean = 4.1
Std. Dev. = .857
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Protect natural water in site

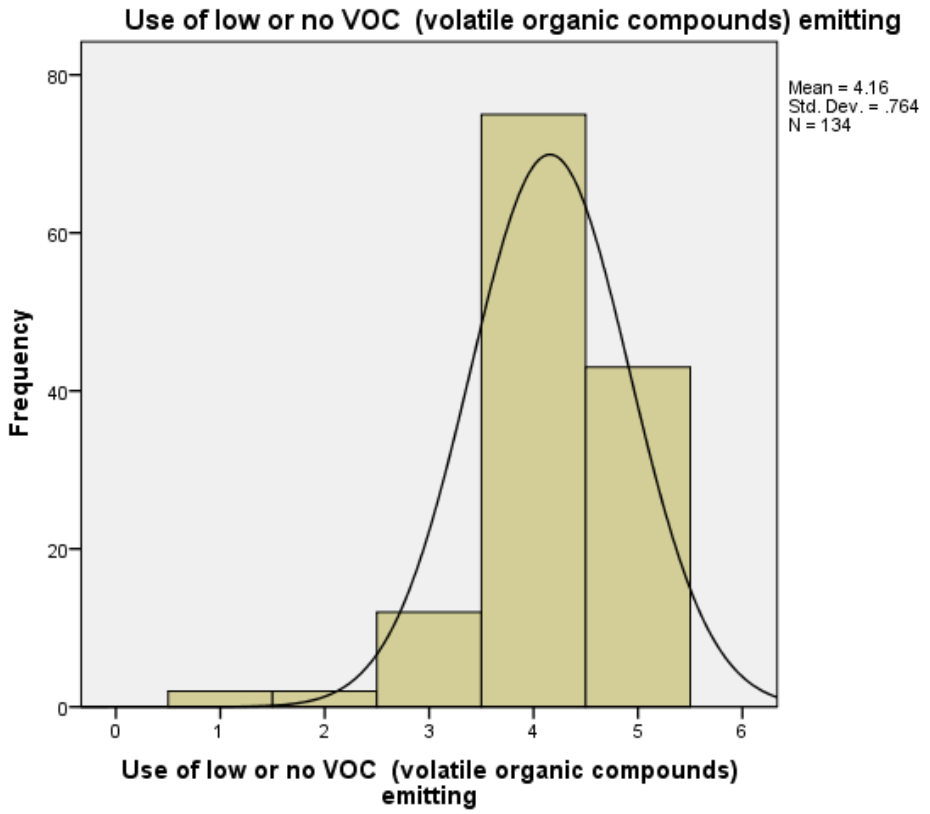

Recycle on site
Mean = 4.2
Std. Dev. = .848
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Recycle on site

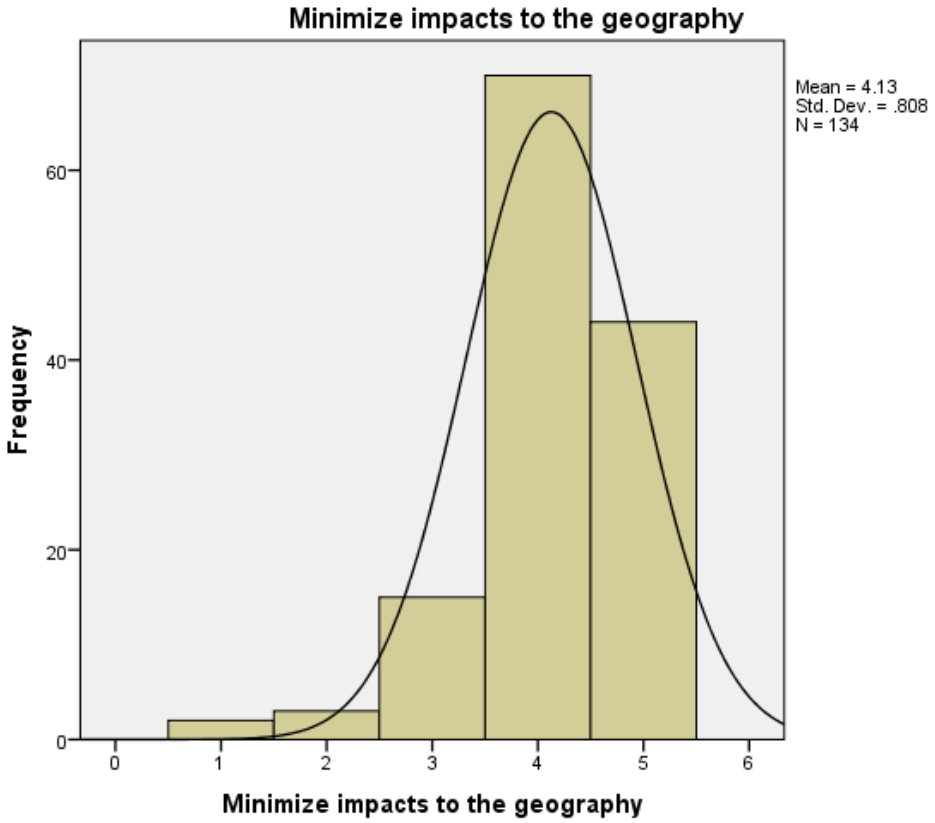

Using alternative energy supply
Mean = 4.03
Std. Dev. = .849
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Using alternative energy supply

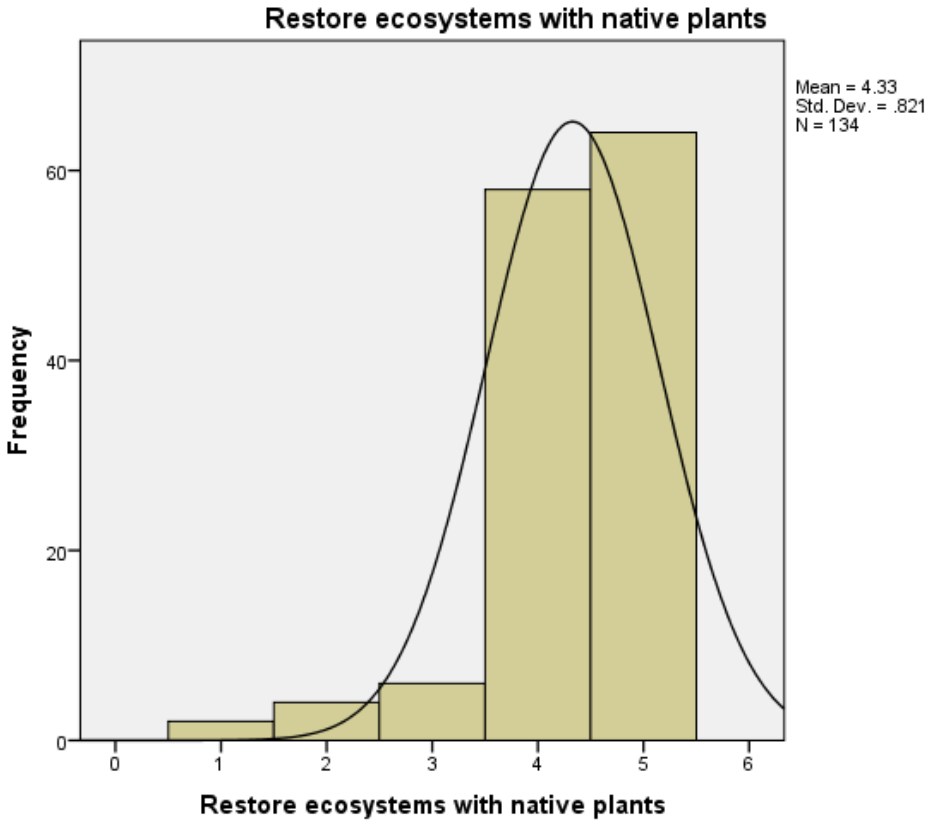

Use bio- material or products
Mean = 4.04
Std. Dev. = .925
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Use bio- material or products

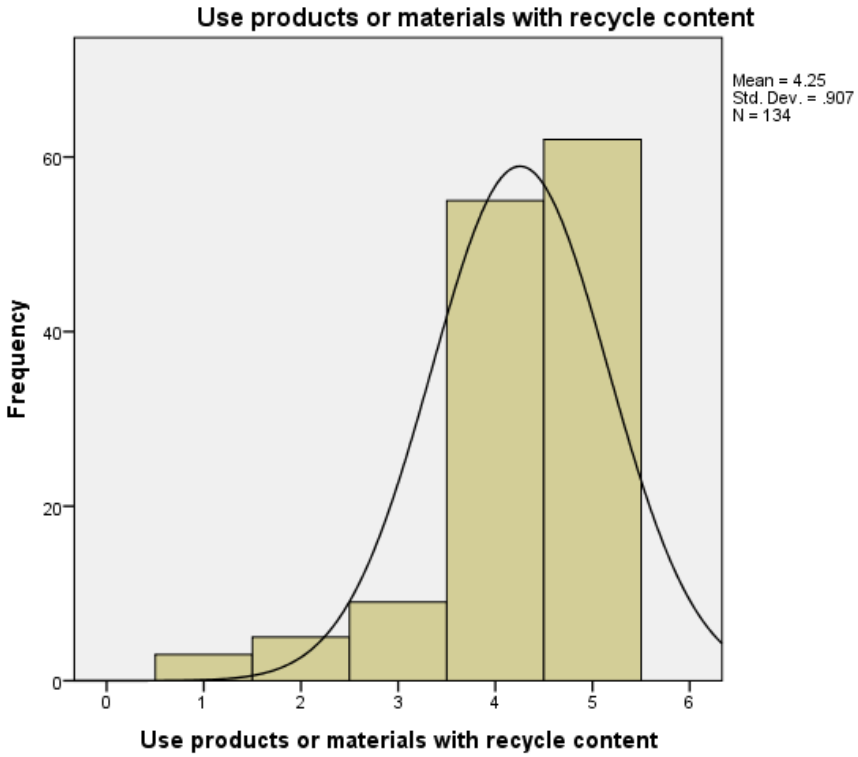

Minimize use of PVC (Polyvinyl chloride) products or materials
Mean = 4.1
Std. Dev. = .714
N = 134
Frequency
100
80
60
40
20
0
0
1
2
3
4
5
6
Minimize use of PVC (Polyvinyl chloride) products or materials

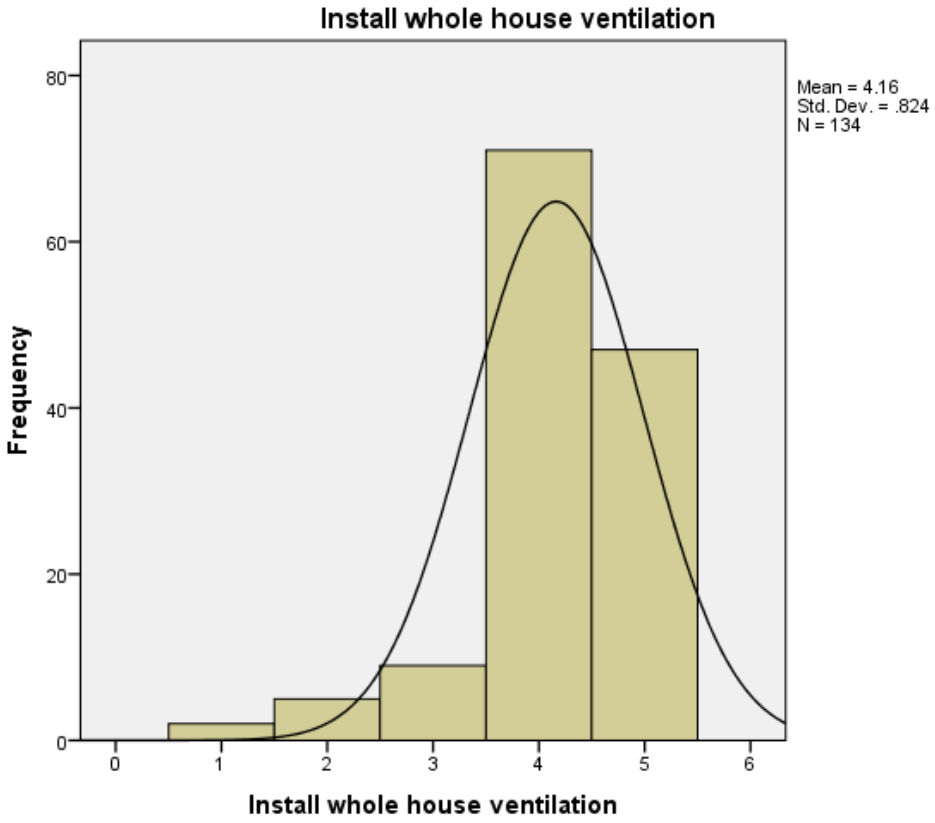

Install water efficient fixtures
Mean = 4.24
Std. Dev. = .787
N = 134
Frequency
60
40
20
0
1
2
3
4
5
6
Install water efficient fixtures


Use of low or no VOC (volatile organic compounds) emitting
Mean = 4.16
Std. Dev. = .764
N = 134
Frequency
80
60
40
20
0
0
1
2
3
4
5
6
Use of low or no VOC (volatile organic compounds) emitting


Minimize impacts to the geography
Mean = 4.13
Std. Dev. = .808
N = 134
Frequency
60
40
20
0
0
1
2
3
4
5
6
Minimize impacts to the geography


Restore ecosystems with native plants
Mean = 4.33
Std. Dev. = .821
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Restore ecosystems with native plants


Use products or materials with recycle content
Mean = 4.25
Std. Dev. = .907
N = 134
Frequency
0
20
40
60
0
1
2
3
4
5
6
Use products or materials with recycle content


Install whole house ventilation
Mean = 4.16
Std. Dev. = .824
N = 134
Frequency
80
60
40
20
0
0
1
2
3
4
5
6
Install whole house ventilation

RESUME

EDUCATION:

- 03/6/2012 Starting course of English language in British council Malaysia
- 01/10/2018 Graduated Bachelor's Degree From The Technical University of Civil Engineering of Bucharest Romania

A very experienced civil Engineer with over 5 years of invaluable experience of successfully overseeing and completing projects from conception to completion. Having a proven ability to improve efficiency by finding solutions to complex customer problems all too tight work schedules.

SKILLS:

- Self-motivated
- Able to meet deadlines
- Excellent Communication skills in Arabic and English.
- Leadership skills
- Strong knowledge of Project Management
- Ability to work under pressure.
- Contextual knowledge of Iraq.
- Strategic Planning.

TECHNICAL SKILLS:

- Microsoft Office (Word, Excel, PowerPoint, FrontPage, Project, SharePoint).
- Autodesk Revit Architecture .AutoCAD. Math CAD. ETABS
- Using survey Instrument (Level-Theodolite & Total Station and Differential Global Positioning System DGPS).