CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY, ISLAMABAD

Consideration of Sustainability in Project Management Decision Making Process Regarding Six Constraints

by

Faiza Nadeem

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I want to dedicate my work to

My Husband

For supporting and guiding me during stormy days

My Mother

A strong and loving woman who always supports me and taught me to trust in ALLAH and hard work.

My Father

For earning an honest living for us and for supporting and encouraging me to believe in myself and my work.

CERTIFICATE OF APPROVAL

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Abstract

Project plays an important role in the establishment of sustainable industry. Many researchers are investigating the methodology through which sustainability can be linked to project management. This research methodology uses the Q-methodology to explore the different aspects of project managers in relation with six constraints time, cost, risk, scope, quality, and resource. The significance of this research is to understand the different factors that are involved in the decision-making process in considering sustainability. Through these factors, one can understand the perspectives of project managers and their responses to particular problems. Research questions of this study is to identifying common factors and role of sustainability that exists among project managers while deciding in project management regarding six constraints. After the interpretation of Q-data, seven factors were revealed that are highly significant to consider.

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Chapter 1

Introduction

1.1 Background

Wisdom phrase "Panta Rhei" spoken by the Greek philosopher Herakleitos over 2500 years ago, which means "Everything flows," something will always be different [1]. This phrase has influenced much more in daily life because nothing can last forever and everything has to change with time. This saying is also true for many institutes and organizations that are continuously working to create new products or services. With the advancement of technology, new regulation, economy, inventive competitors, organization are continuously introducing new products to meet the requirements induced by the customers and competitive environment and also to improve the business values [2]. These changes handled as projects and outcomes of projects are the results of project managers and leaders who constantly apply management tools, principles, and techniques to their work [3].

To complete the project's activities resources are required. Raw materials are needed not only during the projects but their outputs (end-product) also need them to perform their basic function. These resources can be the supply of money, material, people, and other assets, that can be obtained internally from the organization or procured externally [3]. Soil is full of natural resources but in a limited amount. These resources are non-renewable and are continuously depleting. To

keep the continuous development, term sustainability has grown in recognition over the last 15 years but the concept dated back to the 17th century when population growth and consumption of natural resources became an issue [4]. World Commission (Environment and Development) defined the sustainability in 1987 as "Development that meets the needs of the present while sustaining the human and natural resources for the future" [5].

There has been much research to find out the principles or dimensions of sustainability. In recent years, sustainability concept has been linked to project management by many authors and researchers and they encourage project managers to adapt its principles to carry out the project activities and organizing them into a most effective way for the environmental stability and organization success [6]. Sustainability development is based on the concept of socio-economic development, resource re-distribution, and recycling of resources to ensure its lasting usage [7]. In 1994, World Summit identified the three pillars of sustainability, derived from the triple bottom line concept, which includes economic-development, social-development, and environmental-development. Economic sustainability includes maintaining the quality of life of people and economic activities. Social sustainability includes the preservation of human rights and their culture, race, religion, and nationality identity, while environmental sustainability includes conserving and recycling environmental resources. The concept "Triple bottom line", in term of business values, was first time mentioned by Freer Spreckly in his publication "Social Audit-A management tool for co-operative working" [8]. It was more articulated by John Elkington in his book "Cannibals with Fork; Triple Bottom Line of 21st Century business" stating that organizations should satisfy three main pillars of sustainability in their operations and maintain a balance between them to contribute sustainability. Balance is not easy to achieve and interaction between these pillars is complex and the goal of one pillar may vary with the change of the other one [9].

After laying down the foundation of sustainable development, researchers shifted their focus toward finding the r between project management and sustainability. It has recognized that project and program-managers play a significant role in

sustainable development [10]. Jennifer Russell pointed out that project managers hold a perfect frontline position within the organization to investigate the sustainability issue and can bring a change by incorporating sustainability principles into the organization's operations [11]. In 2008, PMA at 22nd World Congress stated that it is very important for the project managers to take the responsibility of sustainability for the further development of project management. This obligation is not limited to project managers only but also important for general managers, project management office (PMO), sponsors, and stakeholders [12].

With the growing consideration of sustainability in project management, associated challenges were also emerging. Some challenges are related to the operational term, i.e. introducing sustainability into the operational phase of the project [13]. To solve those issues, the researcher is trying hard to investigate how to integrate sustainability into functional and operational phases of the project to ensure overall sustainability [14].

To incorporate the sustainability within the dimensions of project management, it is very important to understand the underlying concept of project management [15]. Project management is the practice of initiation, planning, execution, controlling, and terminating of the project phases to achieve a specific goal within constraints [16]. Project management institute (PMI) defined project management as the application of knowledge, tools, and techniques to meet the project requirements [17]. Project management has emerged as a discipline of making a high-level decision by using those guidelines presented by PMI. Decisions are made throughout the project; to initiate or terminate the action, to make a certain recommendation, to keep the project aligned with the business objectives, etc. [18]. Traditionally project manager takes a decision based on the triple triangle i.e. time, cost, quality, and scope as interchangeable with quality. These constraints construct a triangle with a strong interdependent relationship. This means that if one variable changes, other variables also change. But with the development and advancement PMI renowned that more than three constraints affect the project's decision-making process and identified quality as a distinct factor along with the two other constraints i.e. risk and resource [19]. Gilbert Silvius et al. tried to find

out the influence of sustainability on the decision-making process by considering traditional triple constraints along with the risk as a control variable because risk management is an inherent component of project management [20]. This study focused on considering sustainability in project management decision-making process by taking six constraints.

1.2 Gap Identification

Gilbert Silvius et al (2017) studied the various dimensions of sustainability and their influence on project management decision making the process by considering traditional triple constraints. He used the Q methodology for his research. Traditional constraints documented by PMBOK third edition in 2004 include cost, time, and quality (scope as interchangeable with the quality). However, with the development in project management tools and techniques, PMI identified the six constraints; cost, time, resource, quality, scope, and risk, which can affect the project [19].

Gilbert Silvius provided some recommendations for further research to improve the decision-making process. He suggested using the same research question to different areas of industries to find out the differences between industrial concerns [14]. Likely, the engineering field responds differently to sustainability than others. As triple constraints were the main variables in Gilbert's research, so six constraints, defined by PMI, can be used for further study.

1.3 Research Questions

Research questions of this study are,

RQ1: Identifying preference (common factors) that exists among project managers while deciding in project management.

RQ2: Identifying the role of sustainability in project management decision making process in relation with six constraints.

1.4 Significance of the Problem

The significance of this research is to find and understand the different factors that are involved in the decision-making process in considering sustainability. Through these factors, one can comprehend the perspectives of project managers and their responses to particular problems. These perceptions are highly affected by past-experiences, values, education, and present circumstances. The most important role of a successful project manager is to solve the problem efficiently and make effective decisions that help the organization to meet its targets.

As a project manager plays a central role in an organization, so having different perspectives constructs entirely a new approach to solving problems. An organization can hire a project manager that helps to achieve its objective, creates boundaries within the decision-making process; guide the team with a positive attitude. The previous study by G. Silvius showed four factors by project managers while considering sustainability with three constraints. Whereas this study focuses on sustainability along with six constraints. This study helps the organization to determine the perspectives of their project managers and their contribution toward sustainability in organizational activities and problem-solving techniques. Besides this, research can also provide aid to mold their attitude and approach according to their goal.

1.5 Definitions of Terms

Constraints	The constraint is a limitation or obstacles that prevent the management to achieve its objective

PRINCE2TM	PRINCE2TM is a structured and certified project management practice or method.
PMBOK	PMBOK is the abbreviation of the project management body of knowledge. It provides the terminology and guidelines to the project managers for efficient project management. It is presented by project management institute (PMI).
Productivity	Productivity is the measure of the rate of output per input unit.
Profitability	Profitability is the degree to which an organization receives any financial gain or profit.
PMI	PMI is the abbreviation of project management institute and it provides guidelines for project management in the form of PMBOK.
PMO	PMO is the abbreviation of the project management office. In any organization, PMO ensures the standards for project management and the project
PQM-Software	It is a software, used for Q factor analysis
Quality	Quality is the attribute of the product or service that differentiates it from other products or services.
Risk	A risk is an uncertain condition or event that can affect the project's objectives in either optimistic or objectionable way.

Scope	It is the part of the project's planning phase, which documents the project goal and deliverables
Sustainability	Sustainability is the process of maintaining change in a balanced environment. It has many aspects in terms of resources, technological advancement, social, and environment.
Sustainability Development	Sustainability development is fulfilling the needs of the present period without negotiating the capability of the future generation.

1.6 Organization of the Study

The rest of this research organized as follows. Chapter-2 consists of a literature review, which situates historical background and previous related research studies. It also justifies how the gap is being fulfilled in the literature and this study, emphasizing recent scholarly publications and journals. Chapter-3 briefly describes Q-methodology, which has been used for this study. Besides this, chapter 3 also provides the rationale of approach, research setting, research sample, statistics source, collection method, analysis method, trustworthiness issue, limitations, and delimitations.

Chapter-4 organizes and reports the main finding of this study, which includes both quantitative data (statistical finding) as well as qualitative data (narrative findings). Chapter-5 includes conclusions and recommendations. Set of concluding statements warranted by the study's findings has been presented in this section. Furthermore, certain recommendations have, also been suggested for future research. In the end, appendices and references are presented.

Chapter 2

Literature Review

2.1 Concept of Sustainability

Term "Sustainability" has derived from the Latin word *Sustinere*-(Sub-'up' and tenere-'hold') means to maintain or support. From Latin word passed to French word Soutenir and then to English word "to sustain". It is hard to believe the world without sustainability but it was a long time ago, now the word "austainability" is becoming a part of everyday life, from agriculture to economics, even in our daily life activities like cleansing, recycling, buying, etc. It was already known that every action has an impact on the environment, and depletion of natural resources, increases in the pollution, and volume of emissions were the main threats [21]. Term "Sustainability" was the first time used in the late 1970s and 1980s, as social, environmental, and economical sustainability, but later more dimensions came to surface. During that period, many believed it to be a superficial term or buzzword that only cover environmental degradation issues [22]. Its history dated back to early phases of European enlightenment around 1700s when societies were largely dependent on agriculture. People of New Guinea and South America have maintained stable agrarian communities for more than 1000 and 3000 years by utilizing minimum resources. But it went opposite during the industrial revolution (18th and 19th century) when trees were cut down at much faster rate to provide fuel for engines and to generate electricity.

Hans Carl Van Carlowitz was the first person who raised the problem faced due to the depletion of natural resources. He wrote a treatise in 1713 to conserve the forest and use them as a sustainable resource. He suggested that cutting rate of trees must be in equilibrium with its growth rate and by following this rule, Forrest will not be on the edge of disappearance. In 1969, consideration of sustainable development was first time emphasized by the Secretary-general of United Nations, U Thant, who established the United Nations Environment Programme (1972). Commission released a report in October 1987, "Our Common Future" which popularized the term "Sustainability" and defined it as "development that meets the need of the present without compromising the ability of future generations to meet their own needs". It targeted the environmental issue on a political level. This definition identifies the inter and intra requirements of generations that not only cover geographical space between them but also the time. It implies anthropocentric and also makes sure equitability to all people [23]. Main agenda of this report revolves around re-examining the environmental problems and formulate an innovative and realistic solution to overcome them. It also raises the level of understanding of human resource development in the form of society-equality, redistribution of wealth, and gender-equality.

It has widely been used as an ecological notion- a concept that revolves around human society and economy in connection with the natural environment. According to this theory, humans must harmonize with its surrounding [24]. To promote this concept, UN World Summit (2005) presented a model consisting of three Es; Economy, Environment, and Equality. Sometimes the fourth factor "Education" is added to reflect the importance of education in society. Figure 2.1 shows the Venn-diagram of three overlapping circles of sustainability pillars. In this model, sustainability has achieved when all pillars harmonize with each other. The sustainable system will collapse if one of the pillars become imbalance. Different versions of models have different pillars names such as

- Nature capital, economic asset, and social capital [25].
- Nature, business, and society [25].
- Environment protection, economic growth and social progress [26].

- Environment, economic and social [27].

This model also states that each pillar can work independently. Many theorists argued that human capital cannot be separated from environment and this model does not have any time dimension, which was the core element of WCED 1987 definitions [28].

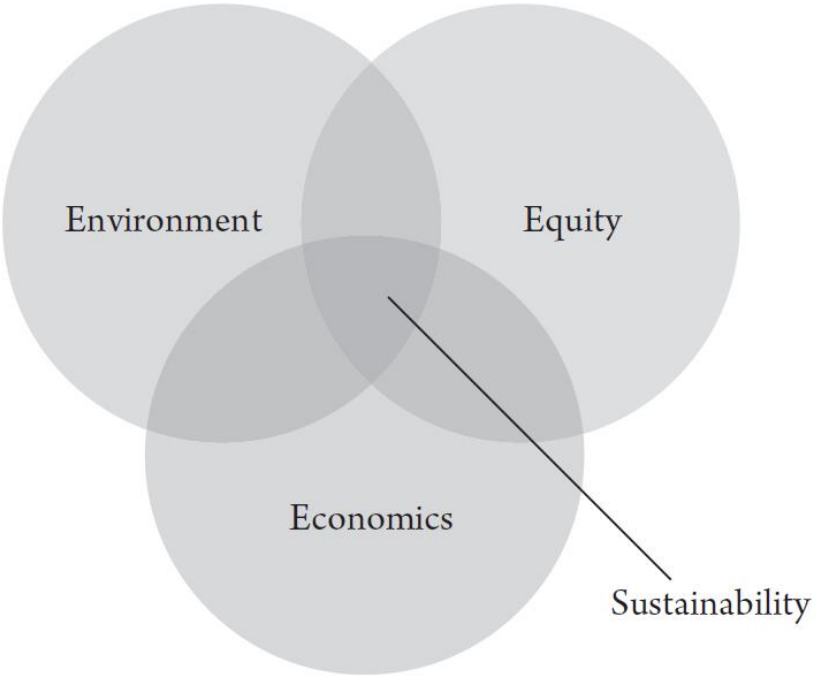


FIGURE 2.1: Three Es pillars of sustainability.

A new egg of wellbeing model was drawn from the IUCN (1991) definition of sustainable development, which represents the relationship between dimensions as concentric and encapsulating the other oval [29]. White oval represents the ecosystem, yellow oval, or yolk represents people. However, this model also faced many challenges.

A new model was presented consisted of a series of concentric circles which is similar to the egg of wellbeing model except it has more subsystem levels. In this model, the environment is the foundation and has the priority overall. This model was in accordance with the assessments of Peter Victor and Herman Daly who argued that economy and society largely supported by the environment and cannot exist without it [30].

FIGURE 2.2: Egg of wellbeing model.

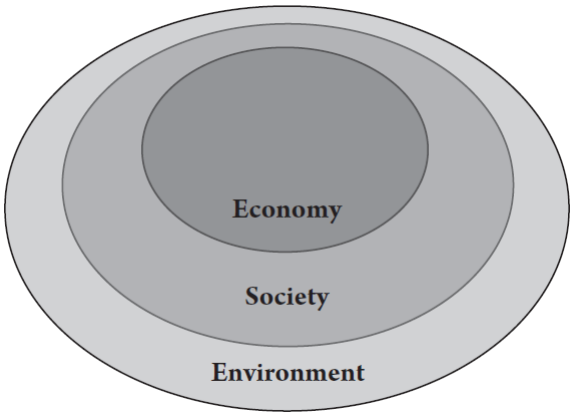


FIGURE 2.3: Concentric model of sustainability.

Recently, Lozano argues that the concentric model does not properly illustrate types of dependencies between subsystems, so he presented a two-tiered sustainability equilibrium model to solve that issue (Figure 2.4). First part of the diagram represents the linkages between economical, environmental, and social aspects while the second part is the time dimension, represented in the shape of a perfect cylinder to show the equal importance of both time-frames i.e present and future. Unequal emphasis leads to the unequal shape of the cone, widest at that point where the emphasis is higher [31].

Sustainability models, being accepted at the scientific level, has also been supported by many economists and ecologists. In 1989, Karl-Henrik endorsed sustainability by giving four conditions [32] which are as follows,

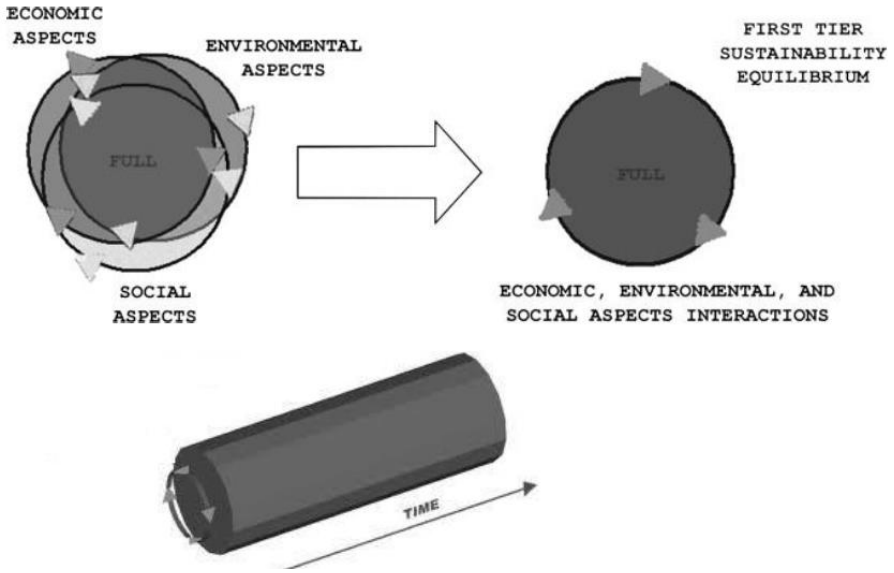


FIGURE 2.4: Two-Tiered Sustainability Equilibrium model.

1. In a sustainable society, the environment should not be exposed to the increase of earth's crust extracts.

2. Nature should not be degraded by any kind of physical means or activity.

3. Nature should not be subjected to byproducts produced by the community or society.

4. Individuals should not be exposed to such circumstances that lead to challenging their capability to meet their future needs.

Heinberg has also put together a few points for a sustainable society. According to him, any society will collapse, that continues to utilize their natural resources without maintaining and balancing. There should be an increase in the consumption of renewable-resources and a decrease in the usage of non-renewable resources. He also suggested that a sustainable society requires the minimal introduction of harmful substances [33]. However, these arguments lack the societal equivalence element.

Albert A. Bartlett has defined sustainability in a more elaborate form, that focuses on modern agriculture and risks like unchecked population increase, economic growth, and use of fossil fuels. However, his explanation emphasizes less on nature and more on population, agriculture, and economic growth [34]. Later on, many

philosophers tried to interpret the term sustainability in their way, but when it comes to the idea of three E's, it has a deep root in the science of ecology. The concept of eco-system has a great impact on sustainability's school of thought, whereas eco-system is the interacting environment in which living organisms (biotic) and non-living components (abiotic) live together through nutrient cycles and energy flows.

2.1.1 Interconnection between Sustainability Domains

Sustainability domains have been discussed at different levels over time and it had been cleared that sustainability revolves around the environment and is equally focused on social and economic sustainability as well as the interconnectedness of its domain. The environment domain includes usage of natural resources in the most efficient way, preservation of renewable resources, and the system regulating the pollution and safeguarding the biodiversity and eco-system [35]. The economic domain explains the valuable resources and its future possible significance with the help of certain indicators like assets, debts, patents, and added value. It also includes long term uses of resources like water, as well as products, consumption, and investments [36]. The social domain includes equal opportunities for safety, physical health, mental health, justice, political and social participation, and democracy [37]. It is important to have a connection between all these domains because sustainability is all about balance. Lack of equilibrium can lead to overconsumption of resources, inequality, uneven distribution, injustice, and decline in the industrial capacity. Sustainability encourages the society to use available resources without compromising its capability to meet the need of future generations and if it does not utilize sustainably, society will face consequences and will eventually collapse with the time.

2.1.2 Sustainability in Project Management

The relationship between project management and sustainability has been discussed in several studies. International Project Management Association (IPMA), mentioned the importance of sustainability within the project management in

World Congress presentation (2008) that "Now it's time to take up the responsibility for sustainability" [38]. It is being recognized that role of project managers and program managers provides many contributions toward sustainable management. Critical skills of project managers ensure the success of industrial projects and now many companies are focusing on the core competence skills of project managers to be successful in their assignment [39]. Widespread studies have been documented mentioning the various skills and knowledge which must be possessed by the project manager like decision-making skills, risk evaluation skills, social-problem handling skills, opportunities, and benefits, recognition skills, which can affect the project outcome [40]. Now with the rapidly changing industrial environment, focusing and prioritizing has been shifted toward issues like sustainability and environmental protection and to cope with that, project managers must adapt certain skills to ensure them [41].

With the growing attention toward sustainability, there are also certain challenges associated so it becomes very important to understand sustainability in the context of project management [42]. According to Savitz [43], the principle of sustainability is "Triple Bottom Line" was identified as people, planet, and profit by J. Elkington in his book "Cannibals with Forks: the triple bottom line of 21st Century Business" [43, 44]. However, triple bottom line has also, been extended to the quadruple bottom line with the addition of fourth pillar, but it is still under discussion and yet has not been accepted as its core element [20].

Several Publications have considered more dimensions of sustainability concerning project management. Gareis et al considered short-term, mid-term and long-term orientation, social and economic orientation, risk-reduction, local and global orientation; and value orientation as the principles of sustainability [45]. Elaborating the concept of sustainability dimensions Dyllick T. and Hockerts K. concluded that sustainability is consuming the income, not investment so this requires balance on both short and long term. This means that the use of renewable-resources should not surpass the frequency at which they are renewed and thus natural capital should remain intact [25]. Andersen has presented a strategy to prevent the natural resource depletion is "Circular Economy", which aims at adopting the more cleaner technologies that promote recycling of by-products and waste materials. These byproducts and recycled waste materials can be utilized as raw materials

for other products, thus minimizing the need for extraction and usage of virgin resources from the environment. Hence, it ensures a continuous cycle of production and consumption without waste and declining the number of resources [46]. International Institute for Sustainable Development mentioned that sustainability within an organization is also about adopting the business strategies and conforming to the need of its stakeholders along with the conservation of natural resources and its ability to fulfill the need of the future generation. This means that it can also fulfill the demand in short term i.e need of enterprise and its stakeholders today, and also on longer-term i.e. need of the future generation [47].

Dow Jones mentioned risk reduction as another dimension of sustainability. Godfrey et al. concluded that proactive technique to sustainability pays off. Thus, the organization can shift the risk by creating additional value for stakeholders instead of paying the damage [48]. Some dimensions of sustainability regarding project management are discussed as follows.

Sustainability is upholding a balance between social, environment, and economic

Since the recognition of sustainability, a lot of literature tried to explain the principles of sustainability and methods to adopt it in everyday life. It was already realized that sustainability is based on the Triple-Bottom Line concept or Triple P, which are people, profit, and planet [44]. Many other researchers used social, environment, and economics as an alternative to Triple P but the main principle is still the same. One cannot adopt sustainability without balancing or harmonizing between these three elements. These are interconnected and hence, influence each other in several ways. Silvius et al. studied the sustainability's impact on project management and found out that 86% of the publications are those, which has mentioned the sustainability in term of "triple P- concept." However, publications differ in their perspective in consideration of these dimensions. Many other researchers like Bell and Morse [49]; Fernandez [50]; Keeble [51]; Labuschagne [52] developed a different set of techniques to integrate sustainability into project management concerning Triple-bottom line concept. They have also mentioned that the concept should align with the strategy of the organization and scope of the project.

Sustainability is about short and long-term orientation

Brundtland commission defined the sustainability as "meeting the need of the present without compromising the ability to meet the need of future generation." It became clear that sustainability is all about preserving and utilizing the available resources and opportunities on both temporary and long-lasting mean [5]. This argument has been mentioned by many researchers like Gareis [53], Miller-Pelzer [54], Silvius [42], Labuschagne and Brent [52], Eid [55].

According to the Labuschagne and Brent study, temporary organizations focus on the lifecycle of the project, which is based on short-term orientation while neglecting the impact of end-products on users. The life cycle of the product (long-term) depends on the lifecycle of the project (short-term) thus, sustainable companies should consider both short-term orientation and long-term orientation for the success of its projects [52]. Elaborating the concept, Deloitte addressed that companies rely on the interest of its stakeholders and utilize the resources to satisfy them. This will cause declines in resource availability in the environment. A sustainable company not only conform the need of its stakeholder but also use the by-products as raw materials for other projects, which in turn create a sustainable environment and save the extraction of raw resources for the future generation [56].

Sustainability is about ethics and values

Dangayach identified ethics as the fourth most important dimension in project success. He discussed that considering ethics and values in the project not only increases the satisfaction and reliability of the customers but also results in a sustainable project. Ethics in project management is very important to integrate sustainability. Figure 2.5 shows the criteria for a successful project [57].

Ethics refers to the set of standards by which an individual can evaluate his own behavior and of others [58]. Behavior and action of project managers and leaders affect the organization's environment, thus affect the projects. Mushra et al. realized that project managers should complete the project by keeping in mind the code of ethics and values. Importance can be found in many other studies i.e. Gareis et al [53], Schieg [59], Eskerod and Huemann [60], Silvius [42]. Project

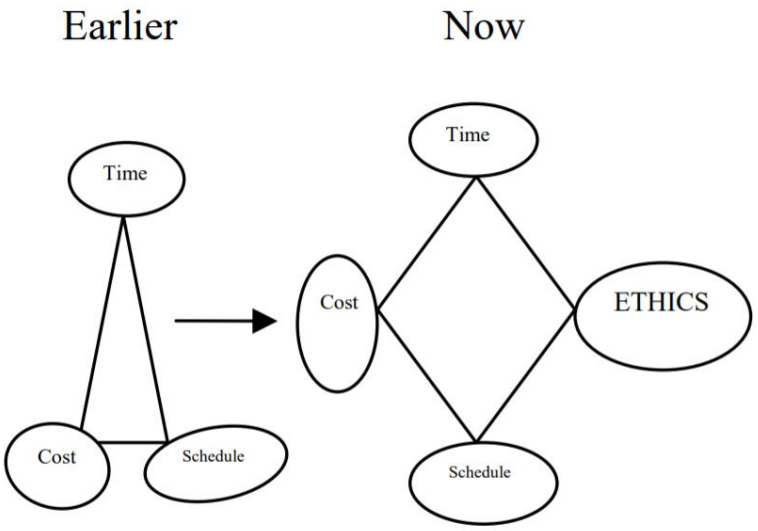


FIGURE 2.5: Criteria for successful project

Management Institute also mentioned the role of ethics and morality as a key factor in project success [19].

Sustainability is about stakeholder involvement

Project management Institute defines the stakeholder as people or groups of people who can affect or can be affected by the decision made for business. It can be employees, government, owners, suppliers, or directors [18]. Involvement of stakeholder within the decision-making process not only ensure project's scope but also the sustainability. According to ISO 26000 guidelines, involvement of stakeholders at all phases of the project is one of the elementary principles of sustainability. Stakeholder engagement ensures the participation of all stakeholders as associates, who describe the problems, give appropriate alternatives and implement them through collaboration and also, evaluate the outcome and performance [61].

According to Hanssen's study, the decision needs to be made at various levels of society, from individual to organization as well as the government level to implement sustainability within project management [62]. This can only be achieved if there is better communication between the organization and customers [63]. The administrators or government plays a significant role in setting up the guidelines to incorporate sustainability within projects [64].

Sustainability is related to both local and global orientation

International customers and stakeholders influence many organizations. Action performed by these organizations not only affects the economic, social, and environment at a local scale but also on a global scale after an increase in globalization [45]. The phrase "Think globally, act locally" has been used to describe the relationship between them. Many consider them as two separate boundaries that do not affect each other but this ideology has been falsified later. Problems faced locally also affect globally and solutions at the local scale can solve global issues [65]. The world is becoming interconnected as the result of a large amount of trade, supply, product exchange. This is all due to globalization that people, companies, and governments interact with each other [45]. There are certain challenges associated with it that can be related to the economic, social, or environment at both local and global scales. But a sustainable company not only helps to save the environment but also helps to improve the interaction with other organizations and can make a difference [66].

Sustainability is transparency and accountability

Another dimension of sustainability that needs to be considered is transparency (clearness) and accountability. Transparency in project management refers to the exposure of all processes, information, activities, and policies that may require in the decision-making process [67]. It helps project managers to perform better and for the stakeholders to estimate and address any possible issues. While accountability refers to the responsibility taken by the organization and project manager for its action, policies, and decisions. This dimension also calls for actions to prevent the negative impact on the environment and society [14]. The project manager cannot be held responsible alone for the entire project as the project is dependent on the whole project team, not only the project manager [68]. The integration of sustainability also needs a proactive approach and open discussion about the project and its activities to all stakeholders and also its impact on society and the environment. Transparency and accountability are also mentioned by ISO stating that giving the right information to the right people is very important for the organization. Sometimes information needs to remain concealed for privacy concern or it will be harmful for the organization if certain information becomes available. In such cases, the organization needs to develop certain policies to give only the necessary data.

Sustainability is about the reduction of risk

Risk refers to the possibility of damage or loss. In project management, risk management is an important aspect, and one of the 10 management knowledge areas that a project manager must fulfill [18]. Risk in PM also referred to as an opportunity or challenge [69]. Risk reduction is a process of minimizing the impact of any factor that can have a undesirable effect on the project and the environment [70]. ISO 31000 provides basic standards to the organization for the implementation of risk management [71]. If the organization fails to assess the associated risks with its project, it can cause diverse negative effects just like in the recent Deep-water Horizon oil-spill disaster [72].

Sustainability is about the elimination of waste

Waste elimination is one of the most important tasks for the organization. Waste can be non-value adding activities or hazardous material that can lead to customer or employee dissatisfaction and cause the destruction of the environment. Mostafa and Dumrak identified nine types of wastes that should be eliminated within the manufacturing process [73]. Out of 9, Toyota (motor corporation) identified 7 waste types.

- Over production
- Unnecessary conveyance
- Waiting period
- Incorrect processing
- Inventory excess
- Pointless movement
- Faults and defects

Womack identified the eighth waste as unused employee resourcefulness and creativity [74] while Khan et al recognized the environment waste as ninth type [75]. Overcoming all waste types within the manufacturing process can lead to sustainability. Mostafa et al. recommended three necessary phases to remove waste,

which are waste documentation, waste analysis, and waste removable. The capability of eliminating waste can lead to environmental gain [73]. Silvius et al. also refer unsuccessful projects as waste and recommended that companies should learn from their past mistakes, as many resources, energy, material, and time have been misused [76].

Sustainability is about consuming income, not capital

This dimension implies to environment, social, and economic perspective. According to the environmental perspective, the organization should not utilize the resources from the environment that is beyond its capacity to regenerate. This means that renewable resources must be extracted within the limitation and waste must not exceed the rate at which it can be eliminated, providing source and sink of the environment in balance [76]. On the Economic level, incorporation of sustainability can occur if the organization utilizes the income of completed projects for upcoming projects instead of utilizing the company assets. Other dimensions of sustainability concerning project management are shown in Table 2.1.

To introduce sustainability, it is very important to incorporate at every phase of project management especially when decisions are made. Through making decisions, an organization can accomplish its goals. Next section of this chapter highlights the decision-making process and the factors that affect this process.

Time-dimension	Eid [77]; Mulder and Brent [78]; Gareis et al. [53]; Muller-Pelzer [54]; Goedknegt [61]; Haugan [79]; Herazo et al. [80]; Khalfan [81]; Keeys [82]; Labuschagne and Brent [52], [83]; Morfaw [84], [85]; Eskerod and Huemann [86]; Pade et al. [87]; Pade-Khene [88]; Robichaud and Anantatmula [89]; Scanlon and Davis [90]; Schieg [59]; Silvius and Nedeski [91]; Silvius [76]; Talbot and Venkataraman [92]; Tam [93]; Taylor [94]

Values-dimension	Eid [55]; Russel [11]; Eskerod and Huemann [86]; Gareis [45]; Goedknegt and Silvius [61]; Keeble, Topiol, and Berkeley [51]; Khalfan [81]; Keeys [82]; Mishra et al. [95]; Schieg [59]; Silvius and Nedeski [91]; Silvius [76]; Talbot and Venkataraman [92]
Geographical-dimension	Badiru [96]; Edum-Fotwe [97]; Eskerod and Huemann [86]; Gareis [53]; Goedknegt [61]; Gregersen, Lundgren and White [98]; Haugan [79]; Morfaw [84], [85]; Muller-Pelzer [54]; Schieg [59]; Silvius and Nedeski [91]; Silvius [76]; Taylor [94]; Van Pelt [99]
Performance-dimension	Eid [55]; Craddock [100]; Maltzman and Shirley [101]; Silvius and Nedeski [91]; Silvius [76]
Waste-reduction dimension	Eid [77]; Khalfan [81];)
Transparency & accountability dimension	Achman [102]; Khalfan [81]; Silvius and Nedeski [91]; Silvius [76]
Cultural-dimension	Alwaer, Sibley and Lewis [103]
Risk-reduction	Gareis et al. [45]; Goedknegt and Silvius [61]; Turner [70]
Participation-dimension	Eskerod and Huemann [86]; Goedknegt and Silvius [61]; Klotz and Horman [104]
Political-dimension	Pade [87]; Pade-Khene [88]

2.2 Decision Making in Project Management

Managers are constantly making decisions to solve organizational issues and problems. The Decision-making process is a continuous process of evaluation and considering alternatives for solving problems. This entire process depends upon the right and useful information being available at the right time to the right individuals [105]. Decision-making process includes 6 main steps, which are mentioned by Peter Druker in his book "The Effective Executive" [106], are as follows

- Identify the problem
- Analysis and evaluation of the problem
- Finding all possible alternatives
- Selection of best-suited alternative
- Implementation and feedback on decision-making

Decision-making is a crucial step that can affect organizational development [106]. Some researchers like Peterson showed that the decision-making process could be affected by the organization's external and internal constraints [107]. Lacking considering constraints can lead to organizational failure as the project's success is hindered by constraints (Anderton). Traditionally decision-making in projects is dominated by Iron Triangle or Triple constraints [108, 109, 110]. The triple constraint model depicts the relationship between scope, time, and cost. If one-factor increases, other factors also change. This classical triple constraint is a tool for measuring project success [111]. Scope and Quality are often considered interchangeable. According to the classical triple constraint model, the project must be

- delivered within predetermined cost
- completed and delivered on time
- according to customer quality requirement

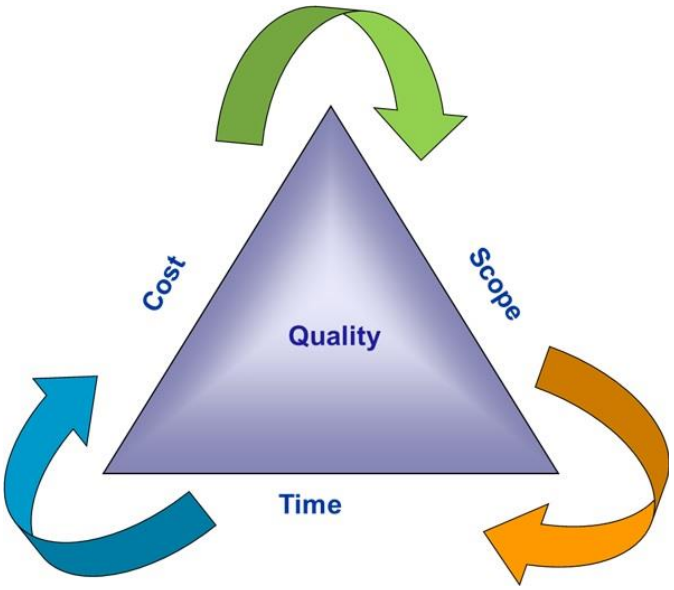


FIGURE 2.6: Classical triple constraint model

- conform scope

All projects have a predetermined budget, time, and scope. Reducing cost either reduces the scope of the deliverables or increases the timeframe. If the project timeline decreases, it will cause an increase in the project's overall cost and decrease in project quality [112]. These factors are interlinked predictably [113]. However, PMI recognized that more constraints affect the organization's success but triple constraints are often considered by most project managers for evaluation [3]. The validity of iron-triangle has been debated throughout academic and industrial literature. Baratha noted that the iron-triangle is insufficient in the evaluation of project's success, therefore needs to be re-engineered triple constraint [113]. Tsuda also highlighted the inadequacy of triple constraint [114]. He concluded that scope cannot be mix with the quality and it cannot be termed as a list of features that customers want. Shenhar and Dvir, in their book "Reinventing Project management," suggested that budget, time, and specifications are alone insufficient to evaluate project management's success [115].

Garett argues that time, cost, and scope are efficiency-based, and focus should be shifted toward customer satisfaction [116]. Steven argues that there are a soft side and hard side in measuring project success. Time and cost are on the hard side while customer satisfaction is on the soft side [117]. Similarly, Jha and Iyer

categorized the project success in objective and subjective class. Time, cost, and quality are under objective evaluation as they are tangible and measurable while customer satisfaction is under subjective class [118].

With the evolution of project management, a new model was proposed by Haughey, was the "Diamond Model" that constitutes four constraints time, cost, quality, and scope. Quality was a fundamental theme in the classical model while in diamond model, the central theme revolves around customer satisfaction [119, 120]. He argued that quality is a critical constraint that cannot be neglected and must hold equal significance for other constraints. However, this model still lacks clarity

FIGURE 2.7: Diamond model of constraints by Haughey

PMBOK 4.0 offered an evolved model for measuring project success that includes six factors instead of four. This model sometimes refers to the "Star-point model," that includes scheduling, resource, risk, scope, quality, and cost. All these constraints are weighed equally while end-user satisfaction must be the primary goal of any project]109].

In project management, resources are required to complete the project's activities. They can be funding, instruments, people, or services. An organization can utilize its available resources or can acquire externally from other organizations. While risk is the uncertain series of events that can happen during the project and can affect its outcome positively or negatively.

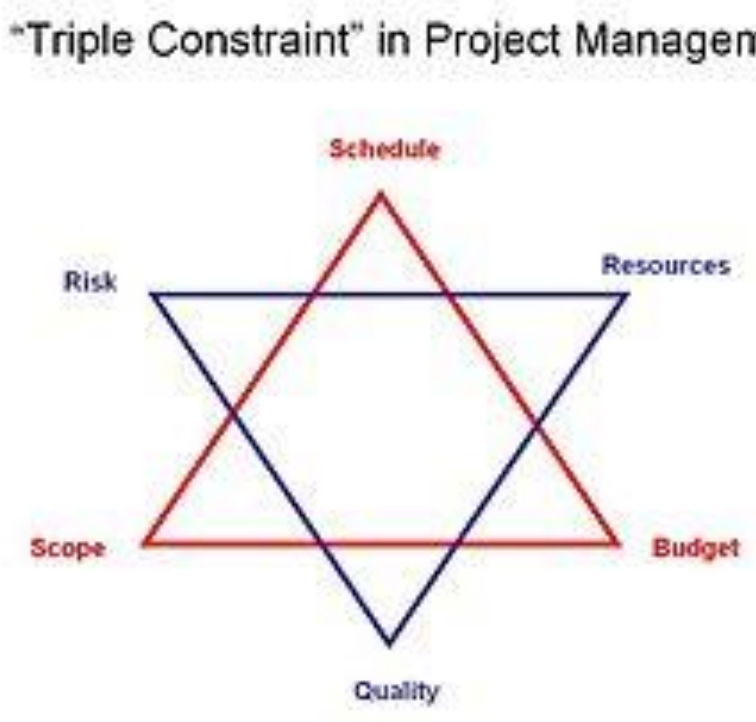


FIGURE 2.8: Star-point model of constraints by PMBOK

2.2.1 Integration of Sustainability in the Decision Making Process

The previous section showed the dependency of the decision-making process on project management's constraints like risk, time, quality, scope, quality, and cost. Zainul-Abidin cited that sustainability should be considered throughout the decision-making process and it should ensure that decisions must be according to the customer interest without any harm to the society and environment in which they are living [121]. Aaltonen concerned about the consideration of social and environmental factors in the project's success [122, 123]. He also highlighted the importance of the stakeholder role in integrating sustainability within the decision-making process. Jorsi Cabot defined sustainability as a soft goal as a sustainable solution cannot be fully attainable [124]. He proposed a framework to consider sustainability within the decision-making process to define each activity regarding sustainability. He also states that defining sustainability should be a new goal that the organization must accomplish and specify each alternative contribution attaining that goal [124]

Simonovic states that technical description alone is not sufficient to measure sustainability. It requires more intensive discussion and also the willingness to go beyond the scope of what is measurable [125]. He concluded that focus should be on two things in measuring sustainability. First, the focus should be on the development of measuring sustainability criteria. Indicators are the conditions that are strictly related to sustainable development so that their existence can be seen. It can be qualitative or quantitative that cannot be directly used in the decision-making process but provide coordination in considering sustainability [125].

Chapter 3

Research Methodology

3.1 Introduction

In this chapter, the research methodology is briefly explained which has been adopted to investigate the research question. Reasons and justification, data collection technique, population and sample, data analysis technique are also presented below.

3.2 Research Strategy

A research methodology is a technique used to identify, select, analyze, and evaluate the data. Experiments, surveys, and questionnaires are examples of research methodology. Each technique serves differently. Research can be qualitative or quantitative, depending on the nature of study but using the combination of both types is preferred to have better results [126]. According to Rogers, research conducted through questionnaires or surveys are effective yet less appropriate for the identification of subjective perspectives [127]. For this purpose, Q-methodology (mixed research technique) has been used for this research.

Q-methodology is a research methodology, used to investigate and examine the participant's point of view by ranking and sorting a series of statements [128, 129]. This methodology is a combination of both quantitative and qualitative

methods. It is qualitative as it allows the participants to e their subjective opinions and quantitative, as it uses the factor analysis to detect different patterns. Measuring subjectivity has been proven most important because of the involvement of the human factor in scientific examinations. Also, subjectivity is difficult to identify and quantify [130, 131]. Q-methodology typically uses small sample sizes as compared to R-methodology [132, 133]. There are five phases involved in Q-methodology [134, 20], discussed below.

3.3 Phase of Q-Study

Q-methodology involves five phases, which are as follows

- Collecting of concourse and Q-sample for Q-study
- Selection of P-sample for Q-sorting
- Q-sorting process
- Q-factor analysis
- Interpretation of results

3.3.1 Collecting of Concourse and Q-Sample for Q-Study

The concourse is an ordinary conversation or discourse about a specific topic [20, 130, 135]. It can be obtained from both primary sources i.e. group discussion, talk shows, interviews, as well as from secondary sources i.e. published papers, literature, newspaper, editorials, etc [133, 136]. Concourse can be any opinion, artwork, music, behavior description, or personality traits [130, 132]. This depends on the type of Q-sample, either it can be structured or unstructured and naturalistic or readymade Q-samples. In readymade Q sample, statements are collected from literature or radio shows while in naturalistic Q-sample, statements are obtained directly from discussion with participants who are involved in Q-sorting [133, 137]. Another type of Q-sample also exists, Quasi-naturalistic, which involves the collection of statements from an interview (discussion) on a particular topic, without

the direct involvement of participants in the study. Naturalistic and readymade Q-samples can be combined to form hybrid Q-sample [138]. In this study, concourse has been derived from the literature review while Q-sample has been made through structured and ready-made methods.

There are different opinions among researchers on the number of Q-statements. Mckeown et al suggested that Q-statements can vary from 30 to 100, the most preferable range is 50 to 70 [136, 139]. Kerlinger suggested the number of Q-statements around 60 for stable and reliable results [139]. While Schlinger suggested that 55 to 75 statements are ideal and it should not be time-consuming and overburden for the participants [20, 140, 141].

Besides this, Donner suggested that there is no standard number for statements to address the topic, however, statements must be clear and easily understandable for the participants. Statements should be presented to a few participants before performing the final Q-sorting to ensure comparability and clarity [142]. He also suggested that statements should be written in the same nature (either positively styled or negatively styles). Extreme and double negative statements should be avoided. Approximately 50 same styled statements have been selected for this study. .

3.3.2 Selection of P-Set

The second phase involves the selection of the participant for Q-sorting. In Q-methodology, variables are the people who perform Q-sort instead of items they are sorting [132, 143]. People are associated with the given factor, are assumed to have a common perspective [138]. According to Dennis, participants are selected theoretically (non-probability sampling) in Q-methodology as they are involved in qualitative research [144]. A small number of participants are preferred in Q-methodology as compared to traditional R-methodology [145]. Brown argued that enough participants are required for the establishment and comparison of factors with each other [146]. Watt and Stenner [143] noted that large numbers of participants in Q-methodology could be problematic. The goal of Q-methodology is to find the pattern of thoughts instead of finding the number of people having

similar thoughts [147]. Stephenson argued that p-sample could consist of one participant [130]. As Q-methodology uses a non-probability sampling technique for the selection of the participants, it can either be theoretical or random with intensive or extensive considerations [138]. The theoretical perspective includes the selection of individuals who has knowledge and experience in the particular field the same as of R study. While random sampling is a convenient selection in which sampling involves the individuals who are selected randomly and willing to participate in the study.

In intensive person-sample, participants are required to sort the Q-card under different conditions of instructions. If only one person participates in Q-sorting then it will be referred to as a case study. Examining the participant's point of view on a specific topic under different instructions at different times helps to determine whether the perception has changed over time or remained the same [145, 146]. While in extensive person-sample, many participants are required to do Q-sorting under the same condition of instruction. Being a pioneer in developing Q methodology, Brown suggests that around 40-60 participants are enough to carry out extensive person-sample Q-sorting while in intensive person-sample, a small number of participants or even only one person can be examined in depth [135, 138]. This study comprises of theoretical and extensive person sampling. Almost 30 participants were invited to take part in the study. All participants had a background. Only 20 participants completed the online sorting procedure. Table 3.1 shows the age distribution of this study.

Table 3.1: Age distribution for Q-sorting.

	Minimum	Maximum	Mean
Age	25	40	30.1

3.3.3 Sorting Process

Q sorting is a process of sorting the selected statements about the topic in the order of participant's preference. It is a technical means through which data is obtained for factoring [20, 135, 145]. Participants are provided with a set of instructions before sorting out the cards [144]. Research can choose forced-choice or free choice

condition of instructions for Q-sorting [138, 14]. In both types, participants are asked to sort the Q-cards into a column having a rating scale from most agree to most disagree. It can vary from +3 to -3 or +5 to -5, depending on the number of statements selected in the study [14, 144]. In forced-choice conditions, the researcher predetermines the number of piles to be used in Q-sorting. Distribution in this type is symmetrical. Participants select the specific number of statements to place them in each pile. Ranking of statements under marker is not important because all statements beneath the particular marker will receive the same score [20, 138]. Figure 3.1 shows the force-sort condition of instructions.

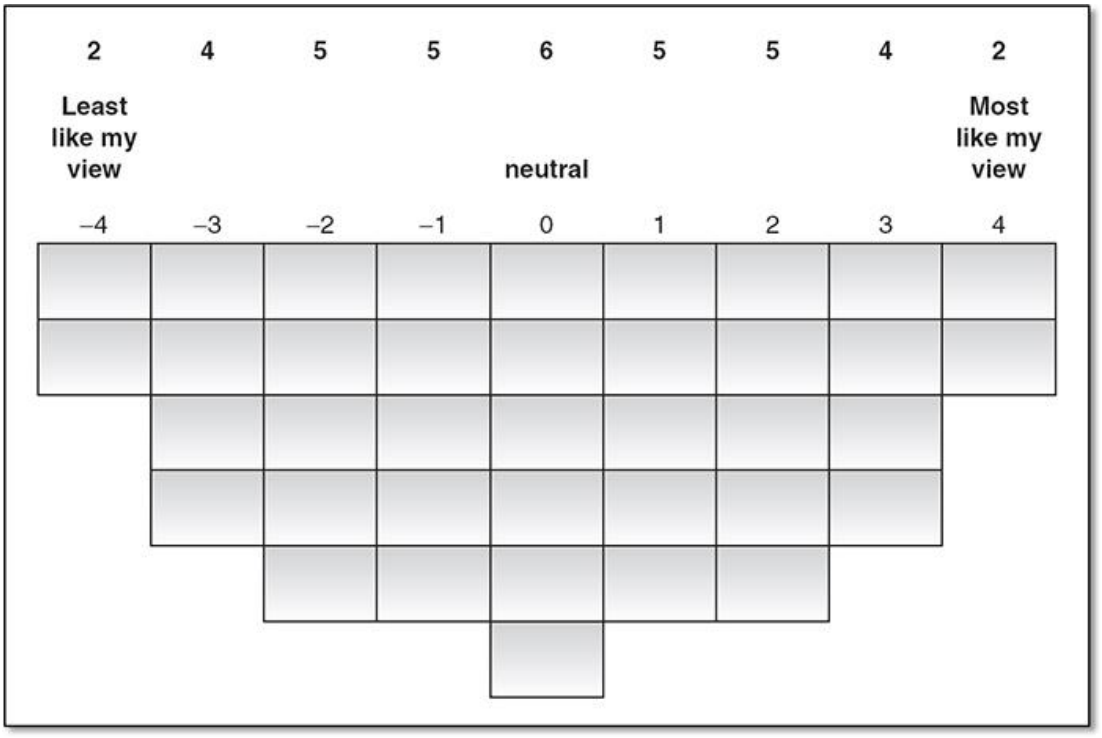


FIGURE 3.1: Example of Force-sort condition of instructions.

While in free-sort conditions, participants are no longer in a restriction to sort the statements in a pre-determined arrangement. They are free to place statements in as many piles needed. Participants determine the number of piles needed for factoring. In the free-sort condition, statements sorting are less stable as compared to force-sort conditions. When comparing with the forced-sort condition, statements sorting are less stable in free-sort condition as they are forced to put on specific distribution markers. Figure 3.2 shows an example of the free-choice condition of instructions.

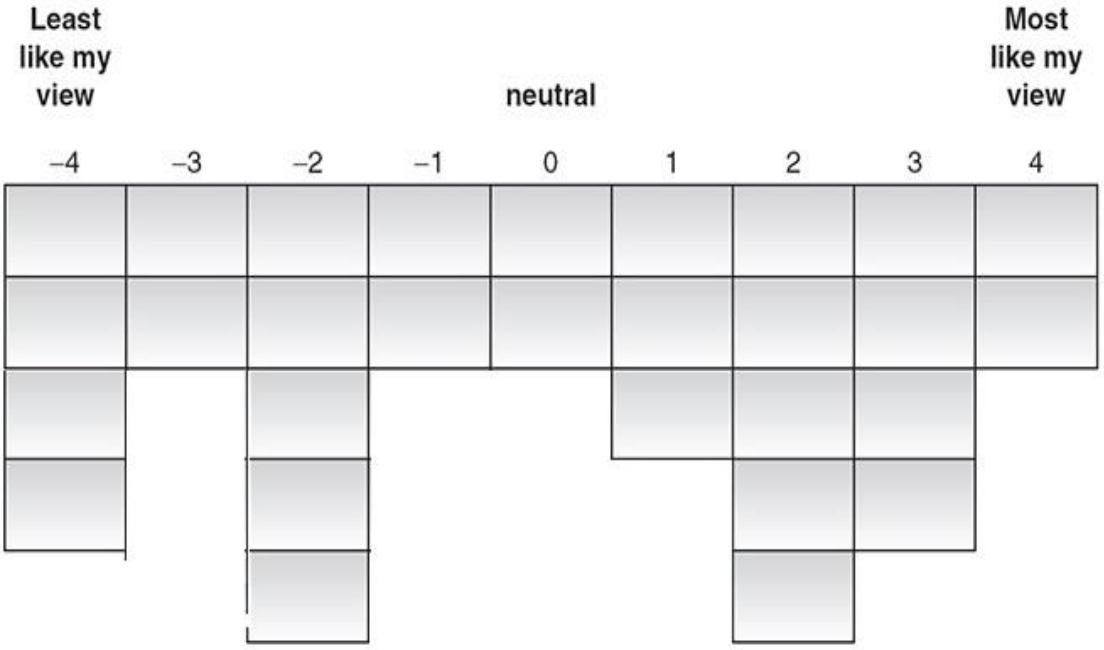


FIGURE 3.2: Example of Free-sort condition of instructions.

Table 3.2 shows the difference between free-sort and force-sort condition of instructions.

TABLE 3.2: Difference between forced-sort and free-sort condition of instruction.

Free-sort condition of instruction	**Forced-sort condition of instruction**
In the free sort condition, participants have permission to arrange the statements in many piles of their choice	In forced condition of instruction, participants are provided with a set of predetermined piles for arranging the statements
Sorting is less stable and discerning.	Sorting is more stable and more discriminating
The frustration level of participants is low as participants can place statements anywhere under the scale	The frustration level is usually high as participants are forced to place the statements under a specific set of piles and arrangements
Participant does not give much attention to the sorting process	Participants are required to pay close attention to decide for sorting out the statements

3.3.4 Sampling and Procedure

Q-methodology requires face-to-face or in-person interviews. But, with the advancement of technology, certain q-applications also work the same, providing the participants with the same environment as of face-to-face interviews. In-person interviews are difficult and expensive to conduct, and q-applications provide the easiest platform to carry out the q-sort. Different online softwares for q-sorting are available. Some of them are Html (open source; MIT), Flash-Q (open source; Web: Adobe Flash), Q-sort touch (by Alessio Pruneddu; Free but closed source), and Q-Assessor (by Epimetric Group LLC; Proprietary). Flash Q (online version) has been used for this study as it has a user-friendly interface and can handle all kinds of distributions. The online version of this program requires the internet, any browser, and server along with the database [148]. All the necessary files (statements.xml, configuration.xml, map.xml, language.xml) were downloaded and edited before uploading to free web-server "000webhost.com. In file "configuration.xml" all settings are stored, while in the "map.xml" layout of the distribution table can be modified. All statements can be inserted into the file "statement.xml". instructions of proceeding each step can be amended in the "language.xml" file. Appendix A shows the configuration of all files. Q sorting proceeds in two stages. First, the participants were asked to group the statements into three piles, positive, negative, and neutral. These files also supported drag and drop interface, creating a comfortable topography of the sorting grid.

In the first sort, each statement was displayed on the screen, and participants were requested to group them into three categories whether they agreed, disagreed, or were uncertain. This action could be done by drag and drop option or by clicking the numerical buttons "1,2 and 3" for "disagree, neutral and agree" respectively. Participants could reallocate any statements at any time. This software updated the number of remaining statements and stages of the survey so that participants can easily monitor the progress. Once participants had grouped all the statements, they were able to move toward the next stage by clicking the "Continue" button.

In the second level of the sort, participants sequentially moved the statement from three piles to ranking distribution table (ranging from – 6 to +6). After q-sorting, participants were asked to revise their choices, if not, they continued

toward the next stage, where reasons were asked for selecting the most agree and most disagree. In the final stage, participants were asked about their age, gender, and comments toward the study. Participants could answer as many questions as they desired and on completion of questions, participants were given two options, either they can submit directly to webpage-database or email the researcher. The email address was previously configured in the configured.xml file. Appendix A shows the stages involved in the online survey while Appendix B shows the coding of Html files.

3.3.5 Q-Factor Analysis

Factor analysis is the statistical technique, which is used to simplify the complicated data to uncover a certain set of variables. In other words, it reduces a large number of variables to a small number of factors. When certain variables has something in mutual, the factor exists [149]. According to kline, a factor is a construct that shows a strong relationship between the set of variables. Two common forms of factor analysis exist, explanatory factor analysis, and confirmatory factor analysis. The most common is the explanatory factor analysis. The main aim of explanatory factor analysis is to reveal the arrangement of a large set of variables without having any hypothesis while confirmatory factor analysis is used to regulate those factors which are associated with certain indicator variables, based on pre-established hypothesis. Confirmatory factor analysis is used to validate questionnaires [150].

The Q-factor analysis sometimes, referred to as "Inverse factor analysis" because it finds the variance between the participants, not the variables [151]. For the factor analysis, PQM-software was used. It extracts the factors either by centroid factor analysis or by principle-component factor analysis. Centroid factor analysis was proposed by Brown and since then it has been used by many researchers [135]. It defined by linear combination in which all weights are either +1 or -1. It is a way of defining the center of gravity between correlated matrixes and this method also extracts the largest sum of absolute loading of each factor. A centroid is represented by the correlated coefficients. Correlation-coefficient is a numerical measure between +1 to -1 to represent the degree of agreement. +1 indicates full

agreement, -1 indicates complete disagreement while 0 indicates no relationship at all. Thus correlation co-efficient represents relationship strength between two variables [20, 135, 152].

While the principal component analysis is a statistical tool that uses an orthogonal transformation to convert a set of correlated variables into a set of linearly uncorrelated variables. It provides a roadmap to reduce highly complicated data into an understandable form. Principle-component factor analysis is now the backbone of modern data analysis and has been used by many softwares like SSPS. Brown suggested that the seven is the magic number to extract factors; however, this software can extract factors up to eight factors [20, 135, 153]. The significance of a factor is related to its strength, which is the eigenvalue in this case. In PCA number of factors can be determined by calculating their eigenvalues. According to Brown, factors having eigenvalue more than 1.00 are only extracted while those having eigenvalues less than 1.00 are of little interest and are regarded as insignificant [135]. The eigenvalue is the measure of the variance of variables observed. Greater the eigenvalue, more variance can be explained by the factor.

The centroid method had been widely used before computer-age for its friendly and understandable computational solution than PCA, but today it is considered as outdated [154]. Many other researchers found the similarities among these two extraction methods [155] while Tucker and MacCallum [156] found different answers. However, PCA offers a one-best solution as compared to the centroid method. Important discrimination is the number of factor extraction in both methods. PCA provides a statistical way to determine the number of factors, which need to be extracted, and this can be done through eigenvalues while Centroid-factor extraction is more theoretical and judgemental-based [157].

3.3.6 Factor Loading

Factor loadings are the values that show the relationship of each Q-sort with the centroid. It is worth considering in Q-methodology for interpretation. According to Schmolck, those participants who do not load significantly have a distinctive point of view and cannot hold any position in result analysis [158].

3.3.7 Rotating Factors

Manipulation of the reference axis is called rotation. In Q-methodology, factors can be rotated to minimize the undesired number of factors. The significant level is usually set equal to or greater than the value of two standard deviations away from mean and it is directly related to the number of items included in Q-sample. As the standard number in the Q-sample increases, the theoretical significant level decreases. Unrotated factors tend to be complicated as they can overlap with many variables. While rotated factors are often more useful and hold mathematical equivalency to the unrotated factor matrix [134]. In Q-methodology, factor rotation uses varimax, rotation followed by a judgmental rotation. Extracted factors are arranged in tabular form, called the matrix of unrotated loadings. These unrotated factors are highly complicated and often correlated with many of the variables instead of a few. These un-rotated factors are then, rotated to form a rotated-loading matrix. PQM-software provides two ways of rotating the factors, one can be done manually and second through the varimax rotation.

Varimax rotated is used to simplify the expression. In this method, factors are rotated in such a way that factors always remain at a right angle to each other. It maximizes the sum of variances of the squared loadings while judgmental rotation is used to reveal the relationship previously unrecognized by maximizing the individual Q-sort. However, interpretation cannot be changed through rotation. Once the rotation is done, the next step involves flagging, which associates particular Q-sort with factors.

In the end, Q-analysis provides a written report of the following data

- A correlation coefficient matrix all the participants
- Table of un-rotated factors and rotated factors
- Correlations between factors
- Sets of z-score differences between factors
- A list of consensus statements for each factor
- A list of distinguishing statements

3.4 Research Approach and Statements

In this research, an extensive person sample is used which requires many participants to carry out the Q-sorting under the same set of instructions. Force-sort conditions are preferred in this study in which participants are obliged to drag each statement to specific distribution markers. Instructions were provided before proceeding toward each step.

Q-set involved seven categories of statements, which are sustainability, time, quality, cost, risk, resource, and scope. The total number of statements is 50. Category "sustainability" contains 14 statements while other categories have six statements each. These statements were selected from the literature review.

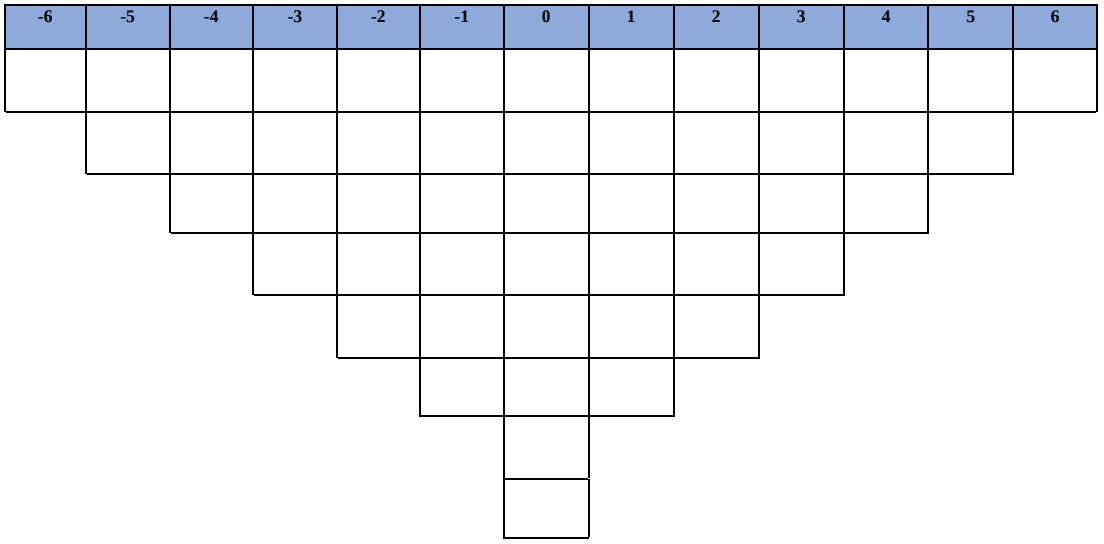
S. No.	Category	Statements	Source
1.	Sustainability	The ecological footprint (Human demand on nature) should be considered.	[20], [52], [159], [160]
2.	Sustainability	A proportion of project's budget and time should spend on safety and health practices.	[20], [161]
3.	Sustainability	Sustainable resources should be used.	[20], [76], [162]
4.	Sustainability	People's point of views are listened to understand them.	[18], [20], [52], [53], [76], [163], [164], [53]
5.	Sustainability	The social, environmental and economical consequences are critical.	[20], [52], [53], [76], [164]
6.	Sustainability	The amount of energy used in the project is very important to consider.	[18], [20]
7.	Sustainability	Stakeholder commitment and engagement is important.	[20], [162]; [163]

8.	Sustainability	We need to be aware of the community's opinions and views.	[20], [162]
9.	Sustainability	Health and Safety measurements should be checked.	[18], [20]
10.	Sustainability	It's very crucial to take carbon footprint into account.	[20], [52], [159], [160]
11.	Sustainability	The sustainability of the project life cycle is very important.	[20], [161]
12.	Sustainability	There should be sustainable procurement.	[20], [67]
13.	Sustainability	Renewable resources are important.	[20], [165]
14.	Sustainability	The waste produced as a result of project life-cycle is significant.	[20], [165], [166]
15.	Time	Time is a very important factor.	[167], [168]
16.	Time	Checking the schedule must be prioritize.	[167], [180], [185], [186]
17.	Time	Time to market is a critical phase.	[185]
18.	Time	Being on schedule is very important.	[70], [167], [180]
19.	Time	Project's success can be measured in term of accomplishing the schedule.	[180], [186]
20.	Time	Short-range time management planning is more effective than long-range planning.	[169]
21.	Quality	Quality is very important factor	[167], [168], [180]

22.	Quality	Following the quality management (QM) plan is essential.	[176], [180]
23.	Quality	A quality review session is a must.	[176]
24.	Quality	First time right (FTR) is a very important approach.	[160], [185], [186]
25.	Quality	Success can be measured in terms of customer satisfaction and conformance to functional and technical specifications.	[180]
26.	Quality	Customer or stakeholder engagement is essential.	[171], [172]
27.	Cost	The project delivery within the estimated cost should be prioritized.	[180]
28.	Cost	A technique such as earned-value method (EV) should be used to analyze the project's progress.	[185]
29.	Cost	A cost/benefit analysis is considered.	[176], [180]
30.	Cost	Cost is a very important factor to take into consideration.	[167], [168], [180]
31.	Cost	Success can be measured in term of meeting the budget.	[173], [174]
32.	Cost	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time.	[175]

33.	Risk	Risk Management is essential.	[167]; [176], [180], [185]
34.	Risk	Risk management must be according to the goals of the organization.	[176]
35.	Risk	Risk Appetite should be compared with the risk capacity.	[176]
36.	Risk	Proactive risk management can ensure project success.	[180]
37.	Risk	Advance risk assessment provide aid to decision making.	[177]
38.	Risk	A consistent approach, re-assessment, communication, and handling of risks should be prioritized.	[178]
39.	Resource	Efficient resource management plays a vital role in the decision-making process.	[167], [180]
40.	Resource	Available resources are the most important factor.	[179], [180]
41.	Resource	Estimating resource activity may directly affect other constraints.	[180]
42.	Resource	Effective resource allocation and management can improve organizational effectiveness and capability.	[170], [180]
43.	Resource	There should be long-term resource allocation should be prioritized.	[187]

44.	Resource	Resource availability may determine the duration of the project.	[170], [180]
45.	Scope	Project scope hold a critical position.	[19], [180]
46.	Scope	The scope is the baseline for managing other constraints.	[180]
47.	Scope	Being along scope ensure project success.	[19], [180]
48.	Scope	The well-defined scope can help to avoid other common problems.	[19], [180]
49.	Scope	Efficient scope management can establish a control-factor that helps to control other constraints.	[19]
50.	Scope	Project's scope statement is very important.	[19], [180])



Chapter 4

Results

4.1 Introduction

This chapter provides results and discussions into the following sections.

1) Mean and Standard deviation of Q-sort distribution	2) Correlation Matrix	3) Factor scores
4) Composite Reliability	5) Factor interpretation	6) Conclusion

Data obtained from Q-sorting was entered and analyzed by using PQM-software (Appendix-C) This software was developed by J. Atkinson in 1992, which uses the Q-sort data to compute the correlation factors and factor analysis through the centroid and PCA method. Factor rotation can also be done through this software [153].

4.2 Mean and Standard Deviation of Q-sorts Distribution

The scoring in this study ranges from +6 (most agreed) to -6 (most disagree) and is the same for all Q-sorts. When all Q-sorts have the same distribution range, their mean, standard deviation, and variance will also be the same for all Q-sorts. It

helps for better understanding and also used for the computation of the correlation matrix [146, 133]. Table 4.1 shows the calculation of mean (x), standard deviation (s^2), and variance (s) of the distribution table.

TABLE 4.1: Mean (x), standard deviation (s^2)and variance (s) of distribution table.

	X	**f**	**fx**	$\mathbf{x^2}$	$\mathbf{fx^2}$
	6	1	6	36	36
	5	2	10	25	50
	4	3	12	16	48
	3	4	12	9	36
	2	5	10	4	20
	1	6	6	1	6
	0	8	0	0	20
	-1	6	-6	1	6
	-2	5	-10	4	20
	-3	4	-12	9	36
	-4	3	-12	16	48
	-5	2	-10	25	50
	-6	1	-6	36	36
SUM	0	50	0	182	392

$$\text{Mean (x)} = \frac{\sum fx}{N} = \frac{0}{50} = 0$$

Where N is the total number of items

$$\text{Standard deviation } (s^2) = \frac{\sum fx2}{N} = \frac{392}{50} = 7.84$$

$$\text{Variance (s)} = 2.8$$

4.3 Correlation Matrix

The correlation matrix is a table that shows the relationship between different variables. It reveals the extent to which different participants sorts are similar or dissimilar. This relationship is represented by a correlation coefficient that runs from +1 to -1. Value +1 shows full agreement or strong relationship while -1 shows full disagreement or weak relationship between variables. Value 0 shows no relationship at all. Table 4.2 shows the correlation matrix (correlation coefficient) of variables (P-set).

Table 4.2: Correlation coefficient.

S. No.	Pset	1	2	3	4	5	6	7	8	9	10
1	P1		-10	-20	-49	48	6	-27	9	-24	3
2	P2	-10		-8	21	-15	10	-10	10	-26	25
3	P3	-20	-8		-13	-7	29	12	-11	9	-8
4	P4	-49	21	-13		-37	10	10	-10	7	2
5	P5	48	-15	-7	-37		10	-24	11	5	19
6	P6	6	10	29	10	10		2	13	-3	-6
7	P7	-27	-10	12	10	-24	2		0	13	-10
8	P8	9	10	-11	-10	11	13	0		-1	36
9	P9	-24	-26	9	7	5	-3	13	-1		23
10	P10	3	25	-8	2	19	-6	-10	36	23	
11	P11	6	1	-5	-10	8	0	-9	32	1	37
12	P12	-9	9	-3	0	7	22	-5	40	14	33
13	P13	-23	1	-12	33	-1	23	9	17	21	14
14	P14	7	10	-18	8	9	2	-9	34	12	25
15	P15	-26	6	9	-5	5	-19	24	22	30	36
16	P16	-2	32	-5	-6	-7	-25	-6	40	-6	31
17	P17	-6	-10	21	-6	11	10	-14	-1	-3	6
18	P18	-19	-1	-2	9	-13	-3	11	20	20	-3
19	P19	11	-6	-7	-25	21	5	-5	8	35	16
20	P20	-7	13	-8	16	-7	8	17	33	-5	8
	$\sum$r	-132	0.52	-0.47	-0.45	0.43	0.94	-0.21	3.02	1.22	2.87

	Pset	11	12	13	14	15	16	17	18	19	20	∑r
1	P1	6	-9	-23	7	-26	-2	-6	-19	11	-7	-1.32
2	P2	1	9	1	10	6	32	-10	-1	-6	13	0.52
3	P3	-5	-3	-12	-18	9	-5	21	-2	-7	-8	-0.47
4	P4	-10	0	33	8	-5	-6	-6	9	-25	16	-0.45
5	P5	8	7	-1	9	5	-7	11	-13	21	-7	0.43
6	P6	0	22	23	2	-19	-25	10	-3	5	8	0.94
7	P7	-9	-5	9	-9	24	-6	-14	11	-5	17	-0.21
8	P8	32	40	17	34	22	40	-1	20	8	33	3.02
9	P9	1	14	21	12	30	-6	-3	20	35	-5	1.22
10	P10	37	33	14	25	36	31	6	-3	16	8	2.87
11	P11		34	15	19	24	51	-20	31	10	20	2.45
12	P12	34		47	31	9	18	-7	15	12	27	2.94
13	P13	15	47		39	17	-8	-10	11	17	13	2.23
14	P14	19	31	39		21	22	-10	12	27	22	2.63
15	P15	24	9	17	21		40	-19	29	10	18	2.31
16	P16	51	18	-8	22	40		-19	19	-4	21	1.86
17	P17	-20	-7	-10	-10	-19	-19		-5	4	-10	-0.88
18	P18	31	15	11	12	29	19	-5		5	42	1.78
19	P19	10	12	17	27	10	-4	4	5		-14	1.2
20	P20	20	27	13	22	18	21	-10	42	-14		2.07
	∑r	2.45	2.94	2.23	2.63	2.31	1.86	-0.88	1.78	1.2	2.07	25.14

∑r shows the sum of each column while some are left blank because they are equal to 1.0 as a correlation to any variable to itself is equal to 1.0. Values of correlation in upper diagonal is same as the values in lower diagonal ($r_{1,2} = r_{2,1}$= -10). According to Brown, if the value of the correlation coefficient exceeds ±0.45, then it is considered as significant. The following formula is used to calculate the correlation coefficients [146, 181].

$$r = 1 - \frac{\sum d^2}{2Ns^2}$$

Where symbolic "r" represents the correlation coefficient, "N" is the size of P-set, $\sum d^2$ is the sum of the squared difference in two Q-sorts item scores, s^2 is the standard deviation. The value of N and s^2 will be the same for everyone.

4.4 Factor Scores

Principle component analysis (PCA) has been used for factor extraction Appendix-C shows the step involved in PCA through PQM-software. The number of factors was determined by analyzing the eigenvalues. Seven factors were selected (eigenvalues more than 1.00) for the further extraction process and the unrotated factor matrix was obtained as a result. Table 4.3 shows the factors along with their eigenvalues, As percentages, and cumulative percentages. A cumulative percentage is a running total of percentage across responses and it shows how much data has been accounted for.

TABLE 4.3: Eigenvalues, percentages, and cumulative percentages of factors by PCA.

S. No.	Eigenvalues	Percentages	Cumulative percentages
1	4.7233	17.4199	17.4199
2	2.4234	12.1172	29.5371
3	1.9143	9.5714	39.1085
4	1.6999	8.4995	47.6080
5	1.4231	7.1153	54.7233
6	1.3053	6.5265	61.2498
7	1.0129	5.0644	66.3142
8	0.9273	4.6365	70.9507
9	0.8590	4.2950	75.2457
10	0.7592	3.7959	79.0416
11	0.7005	3.5025	82.5441
12	0.5881	2.9403	85.4844
13	0.5821	2.9107	88.3951
14	0.5173	2.5863	90.9814
15	0.4081	2.0404	93.0218
16	0.3847	1.9237	94.9455

17	0.3196	1.5979	96.5434
18	0.3003	1.5016	98.0450
19	0.2394	1.1969	99.2420
20	0.1516	0.7580	100.0000

PQM-software can extract up to eight factors which have been shown in Table 4.4. Factor 1 is the most important as it accounts for 17% of the total variance and highest eigenvalue as compared to other factors. Brown [135] suggested seven as a magical number for factor extraction thus no need to extract factors less than seven unless eigenvalues say so. Table 4.5 also recommended deducting seven factors for rotation.

TABLE 4.4: Unrotated factor matrix

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S. No.	**SORTS**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	P1	-0.1391	0.7880	-0.1404	0.1176	-0.0055	-0.2984	-0.1290	0.0912
2	P2	0.2423	-0.1214	-0.4347	0.3759	-0.0665	0.4555	-0.1528	0.1458
3	P3	-0.1581	-0.1628	0.2371	-0.1794	0.6950	0.3171	-0.2083	-0.1358
4	P4	0.1032	-0.6886	0.0138	0.3740	-0.2940	0.1357	0.1509	0.0037
5	P5	0.0447	0.7096	0.2377	-0.0057	0.0503	-0.0623	-0.0282	0.2114
6	P6	0.0231	-0.0086	0.3946	0.5626	0.4705	-0.0042	-0.2777	-0.0423
7	P7	0.0523	-0.4936	0.1253	-0.2826	0.1499	-0.2537	-0.4058	0.3995
8	P8	0.6401	0.2236	-0.0853	0.1529	0.2444	-0.0575	0.0605	0.2486
9	P9	0.2607	-0.1346	0.6172	-0.4408	-0.1594	0.0920	0.0881	-0.0600
10	P10	0.5831	0.2537	0.0215	-0.0517	-0.0755	0.5175	0.0119	0.1532
11	P11	0.6218	0.2039	-0.1883	-0.1066	0.1657	-0.0653	-0.0218	-0.5099
12	P12	0.6227	0.0658	0.2425	0.3302	0.1247	-0.0074	-0.0705	-0.2268
13	P13	0.4772	-0.2286	0.4878	0.3555	-0.2473	-0.0831	-0.1181	-0.0856
14	P14	0.5800	0.1441	0.1549	0.1956	-0.2852	-0.0737	0.0527	0.1844
15	P15	0.5617	-0.1448	0.0069	-0.5478	0.0231	0.1451	-0.1782	0.2352
16	P16	0.5872	0.0818	-0.5556	-0.2217	0.0714	0.2005	-0.0357	-0.1111
17	P17	-0.2387	0.1141	0.2624	0.0931	0.3627	0.3672	0.6209	0.2346
18	P18	0.4490	-0.2753	-0.0207	-0.2125	0.2403	-0.3950	0.4207	-0.1415
19	P19	0.2196	0.3470	0.5091	-0.1966	-0.2252	0.0390	0.0137	-0.0343
20	P20	0.4916	-0.2273	-0.1978	0.1706	0.2843	-0.4144	0.1864	0.2963
	Eigenvalues	**3.484**	**2.4234**	**1.9143**	**1.6999**	**1.4231**	**1.3053**	**1.0129**	**0.9273**
	Expl.Var. %	**17**	**12**	**10**	**8**	**7**	**7**	**5**	**5**

For factor-rotation, the varimax rotation method has been used as it provides the best-fit answer as compared to the judgemental rotation. Table 4.5 shows the factor loadings with mark X depicting particular Q-sorts used to calculate the factor scores. Brown (1980) explained that if pure loading contains a single person only, it should be retained as it can be of theoretical importance. If Q-sort theoretically loads high on one factor than others, it should be examined and interpreted. P-3 is the only factor that loads significantly high on factor 5 as compared to other factors.

TABLE 4.5: Factor Loadings with flaggings (through varimax rotation method).

S. No.	QSORT	1	2	3	4	5	6	7
1	**P1**	-0.0947	0.8160X	-0.2268	0.0048	-0.2236	-0.0568	0.0106
2	**P2**	-0.2481	-0.3155	-0.4575	0.178	-0.0718	0.4785	0.0525
3	**P3**	-0.0463	-0.0363	0.0541	-0.0233	0.8698X	0.0133	0.0567
4	**P4**	0.0032	-0.7934X	-0.0926	0.2455	-0.2057	-0.1052	0.028
5	**P5**	-0.1079	0.6848X	0.1715	0.1588	-0.0463	0.0395	0.174
6	**P6**	-0.0371	0.0893	-0.2013	0.6744X	0.4619	-0.2238	0.0561
7	**P7**	0.171	-0.2392	0.1543	-0.0098	0.33	-0.1196	-0.5999X
8	**P8**	0.3729	0.2025	-0.063	0.383	-0.0225	0.4699	0.0706
9	**P9**	0.0353	-0.1378	0.8178X	0.0846	0.0708	0.032	-0.025
10	**P10**	-0.1513	0.0217	0.2313	0.2361	-0.0512	0.7086X	0.2093
11	**P11**	0.3473	0.2082	0.0203	0.1604	-0.0388	0.5539X	-0.0944
12	**P12**	0.1979	0.0381	0.0772	0.6720X	0.006	0.2861	0.0192
13	**P13**	0.0392	-0.2544	0.2854	0.7253X	-0.1814	-0.0278	-0.1374
14	**P14**	0.1215	0.0408	0.2016	0.473	-0.3934	0.271	-0.0044
15	**P15**	0.1641	-0.1184	0.4312	-0.0681	0.1414	0.5775	-0.3239
16	**P16**	0.2064	-0.005	-0.1462	-0.1277	-0.0779	0.8110X	-0.1088
17	**P17**	0.0462	-0.0236	0.0963	-0.0627	0.2915	-0.137	0.8245X
18	**P18**	0.8056X	-0.1484	0.1804	-0.0091	-0.0209	0.0978	0.0003
19	**P19**	-0.1256	0.2852	0.5956X	0.2074	-0.1261	0.059	0.0686
20	**P20**	0.7091X	-0.1033	-0.2071	0.248	-0.0473	0.1395	-0.0963

Table 4.6 shows the correlation coefficient matrix between factors. None of the factors show a strong relationship with other factors. This is very important to analyze if any factor closely resembles one another or not.

TABLE 4.6: Correlation coefficient matrix between factors scores

	1	**2**	**3**	**4**	**5**	**6**	**7**
1	1	-0.1838	0.0936	0.1763	-0.0466	0.2284	-0.1241
2	-0.1838	1	-0.0516	-0.1447	-0.0626	0.0424	0.1077
3	0.0936	-0.0516	1	0.1848	0.0571	0.0629	-0.0374
4	0.1763	-0.1447	0.1848	1	0.0447	0.0766	-0.0493
5	-0.0466	-0.0626	0.0571	0.0447	1	-0.0762	0.1547
6	0.2284	0.0424	0.0629	0.0766	-0.0762	1	-0.0996
7	-0.1241	0.1077	-0.0374	-0.0493	0.1547	-0.0996	1

4.5 Composite Reliability

Composite reliability is the measure of internal consistency in the scale. A large number of defining participants contribute to the high value of composite reliability. The following formula has been used to determine factor reliability [135, 182].

$$Rxx = 0.80p/[1 + (p - 1), 0.80]$$

Where,

0.80= assumed average reliability

p = number of Q-sorts

Rxx= test-retest reliability coefficient

Table 4.7 shows the composite reliability of all factors. Two participants load significantly on factors 1, 3, and 7, while three participants load on factors 2, 4, and 6. Only one participant loads high on factor 5.

TABLE 4.7: Composite reliability of factors

Factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No. of Defining Variables	2	3	2	3	1	3	2
Average Rel. Coefficient	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Composite Reliability	0.889	0.923	0.889	0.923	0.8	0.923	0.889
S.E. of Factor Z-Scores	0.333	0.277	0.333	0.277	0.447	0.277	0.333

4.6 RQ1: Identification of Perspective

Perspective means a particular approach to complete a task. No specific perspective is the best one; instead different perspectives might be beneficial to one case than another. Furthermore, a person's perception is self-fulfilling [46]. This research helps to determine how many perspectives exist among project managers and their preference for sustainability in the decision-making process. The same technique has been used for interpretation of all factors, which were adopted by Silvius [20]. Q-factor analysis also yields a list of distinguishing statements for each factor (Appendix-D). Strongly correlated factors result in few distinguishing statements. Table 4.8 shows defining statements of all factors. Some statements define more than just one factor.

TABLE 4.8: Differentiating statements of all factors

Statements	Fact 1	Fact 2	Fact 3	Fact 4	Fact 5	Fact 6	Fact 7
9	5	0	-1	1	-3	2	-4
22	5	0	-4	2	-2	1	0
7	4	-5	1	-1	0	1	-3
19	-5	-1	-2	0	6	-3	3
29	-4	5	1	1	-5	0	-2
37	-3	5	0	0	-1	2	-4
35	0	4	0	-4	0	-1	2
18	-3	4	-2	-2	-5	-1	-3
1	-1	-4	4	4	3	-2	5
5	-2	-5	0	-2	1	0	-1
2	2	2	6	-3	0	2	1
32	3	2	-4	0	2	6	-1
4	0	0	-3	6	-3	0	0
13	1	-4	2	5	-3	-3	1
36	0	-1	-1	-5	5	5	4
10	-2	2	0	-5	-1	0	1
46	-1	1	5	0	3	-4	1
49	-2	-2	0	2	1	-6	3
33	3	-1	-1	0	-4	4	6
39	1	2	1	2	5	4	-2
3	1	1	5	-1	0	1	-5

These factors have been discussed separately below.

Factor 1: People and Quality Composite reliability and variance percentage of factor 1 are 0.889 and 17% respectively. According to Table 4.9, defining statements 7, 9, and 11 contribute to the "People and Quality" perspective, which states that health and safety should be checked, the quality management plan should be followed and stakeholders' involvement is important. This factor score more than other factors thus most project managers prioritize safety and their stakeholder involvement without compromising the quality element. Table 4.9 shows the statement ranking along with their z-scores.

Table 4.9: Statement ranking and z-scores of Factor 1

S. No.	Statements	Z-Scores
21	Quality is very important factor	1.693
9	Health and Safety measurements should be checked	1.658
22	Following the quality management (QM) plan is essential	1.596
7	Stakeholder commitment and engagement is important	1.561
16	Checking the schedule must be prioritize	1.561
26	Customer or stakeholder engagement is essential	1.499
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	1.402
33	Risk Management is essential	1.182
50	The project scope statement is very important	0.926
23	A quality review session is a must	0.829
30	Cost is a very important factor to take into consideration	0.829
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697
43	There should be long-term resource allocation should be prioritized	0.643
2	A proportion of project's budget and time should spend on safety and health practices.	0.573
12	There should be sustainable procurement	0.511
3	Sustainable resources should be used.	0.476

41	Estimating resource activity may directly affect other constraints	0.476
31	Success can be measured in term of meeting the budget	0.415
13	Renewable resources are important	0.415
8	We need to be aware of the community's opinions and point of view	0.38
39	Efficient resource management plays a vital role in the decision-making process	0.353
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256
15	Time is a very important factor	0.194
40	Available resources are the most important factor	0.159
4	People's point of views are listened to understand them	0.062
35	Risk Appetite and risk capacity should be compared with each other	0
6	The amount of energy used in the project is very important to consider	-0.035
36	Proactive risk management can ensure project success	-0.221
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256
1	The ecological footprint (Human demand on nature) should be	-0.318
44	Resource availability may determine the duration of the project	-0.38
11	The sustainability of the project life cycle is very important	-0.415
46	The scope is the baseline for managing other constraints	-0.415
45	Project scope hold a critical position	-0.476
14	The waste produced as a result of project life-cycle is significant.	-0.476
5	The social, environmental and economical consequences are critical	-0.511

49	Efficient scope management can establish a control-factor that helps to control other constraints	-0.67
17	Time to market is a critical phase	-0.767
34	Risk management must be according to the goals of the organization	-0.767
10	It's very crucial to take carbon footprint into account	-0.794
37	Advance risk assessment provide aid to decision making	-0.829
24	First time right (FTR) is a very important approach	-0.926
18	Being on schedule is very important	-0.988
48	The well-defined scope can help to avoid other common problems	-1.023
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085
20	Short-range time management planning is more effective than long-range planning	-1.34
29	A cost/benefit analysis is considered	-1.437
47	Being along scope ensure project success	-1.658
19	Project's success can be measured in term of accomplishing the schedule	-2.231
27	The project delivery within the estimated cost should be prioritized	-2.328

PMBO states that quality achieved when a product or service conforms to predefined specifications. These specifications are usually defined by product-users (customers and stakeholders). Conformance to specifications achieved through efficient quality management techniques. It is the responsibility of a project manager to ensure stakeholder's and customer's participation and their safety throughout the project.

Factor 2: Cost, Risk and Time

Factor 2 represents three constraints; cost, risk, and time. Statements 18, 29, 35, and 37 defined this factor (Table 11), stating that cost/benefit analysis must be considered, being along with schedule plan and advance risk assessment provide

aid to the decision-making process. Detailed analysis of cost helps the project managers in profit analysis, investment, and marketing decisions. Failure in controlling cost and time may result in wrong production costs and over-estimated activities. This factor also prioritizes the risk factor as a proactive risk management approach can overcome many hurdles and make success certain. Decision-makers should be fully aware of all the associated risks and opportunities to the project

Table 4.10 shows the statements ranked along with their z-scores. Least prioritizing has been given to people's point of view and their involvement.

TABLE 4.10: Statement ranking and z-scores of Factor 2

S. No.	**Statements**	**Z-Scores**
48	A well-defined scope can help to avoid other common problems	1.752
29	A cost/benefit analysis is considered	1.709
37	Advance risk assessment provide aid to decision making	1.668
35	Risk Appetite should be compared with the risk capacity	1.634
42	Effective resource allocation and management can improve organizational effectiveness and capability	1.603
18	Being on schedule is very important	1.433
17	Time to market is a critical phase	1.419
44	Resource availability may determine the duration of the project	1.196
16	Checking the schedule must be prioritize	0.77
50	The projects scope statement is very important	0.768
10	It's very crucial to take carbon footprint into account	0.696
31	Success can be measured in term of meeting the budget	0.675
2	A proportion of project's budget and time should spend on safety and health practices.	0.663
39	Efficient resource management plays a vital role in the decision-making process	0.661
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629
45	Project scope hold a critical position	0.624
24	First time right (FTR) is a very important approach	0.448

3	Sustainable resources should be used.	0.33
34	Risk management must be according to the goals of the organization	0.278
46	The scope is the baseline for managing other constraints	0.256
23	A quality review session is a must	0.127
26	Customer or stakeholder engagement is essential	0.108
30	Cost is a very important factor to take into consideration	0.086
20	Short-range time management planning is more effective than long-range planning	0.064
27	The project delivery within the estimated cost should be prioritized	0.045
9	Health and Safety measurements should be checked	0.022
22	Following the quality management (QM) plan is essential	0
47	Being along scope ensure project success	0
4	People's point of views are listened to understand	-0.082
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149
11	The sustainability of the project life cycle is very important	-0.158
33	Risk Management is essential	-0.277
19	Project's success can be measured in term of accomplishing the schedule	-0.301
36	Proactive risk management can ensure project success	-0.409
43	There should be long-term resource allocation should be prioritized	-0.589
49	Efficient scope management can establish a control-factor that helps to control other constraints	-0.694
8	We need to be aware of community opinions and point of view	-0.802

15	Time is a very important factor	-0.815
12	There should be sustainable procurement	-0.835
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972
40	Available resources are the most important factor	-1.079
21	Quality is very important Factor	-1.155
6	The amount of energy used in the project is very important to consider	-1.228
13	Renewable resources are important	-1.263
1	The ecological footprint (Human demand on nature) should be	-1.572
41	Estimating resource activity may directly affect other constraints	-1.73
7	Stakeholder commitment and engagement is important	-1.804
5	The social, environmental and economical consequences are critical	-1.816
14	The waste produced as a result of project life-cycle is significant	-1.849

Factor 3: People, Scope and Resources

Factor 3 shows the prioritization of people, scope, and resources in the decision-making process. Defining statements 2, 46, and 3 states that sustainable resources should be used and scope can help to overcome other constraints. Importance has been given to people's health and safety.

Table 4.11 shows the z-scores of statements. Three defining statements are also top-ranked. Besides this, statements prioritizing people and resources are well repeated in agreement scale (positive).

Table 4.11: Statement ranking and z-scores of Factor 3

S. No.	**Statement**	**Z-Scores**
2	A proportion of project's budget and time should spend on safety and health practices.	2.347

46	The scope is the baseline for managing other constraints	1.937
3	Sustainable resources should be used.	1.862
1	The ecological footprint (Human demand on nature) should be	1.603
15	Time is a very important factor	1.452
26	Customer or stakeholder engagement is essential	1.193
11	The sustainability of the project life cycle is very important	1.118
43	There should be long-term resource allocation should be prioritized	1.118
44	Resource availability may determine the duration of the project	1.006
47	Being along scope ensure project success	0.97
12	There should be sustainable procurement	0.708
30	Cost is a very important factor to take into consideration	0.633
50	Project's scope statement is very important	0.521
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.485
13	Renewable resources are important	0.485
29	A cost/benefit analysis is considered	0.334
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.298
39	Efficient resource management plays a vital role in the decision-making process	0.298
7	Stakeholder commitment and engagement is important	0.262
41	Estimating resource activity may directly affect other constraints	0.151
37	Advance risk assessment provide aid to decision making	0.148
49	Efficient scope management can establish a control-factor that helps to control other constraints	0.148
48	The well-defined scope can help to avoid other common problems	0.111

5	The social, environmental and economical consequences are critical	0.111
40	Available resources are the most important factor	0.075
14	The waste produced as a result of project life-cycle is significant	0
10	It's very crucial to take carbon footprint into account	0
23	A quality review session is a must	-0.036
35	Risk Appetite should be compared with the risk capacity	-0.223
33	Risk Management is essential	-0.262
45	Project scope hold a critical position	-0.374
36	Proactive risk management can ensure project success	-0.41
9	Health and Safety measurements should be checked	-0.446
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.446
21	Quality is very important Factor	-0.521
18	Being on schedule is very important	-0.597
17	Time to market is a critical phase	-0.597
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.633
19	Project's success can be measured in term of accomplishing the schedule	-0.708
34	Risk management must be according to the goals of the organization	-0.783
4	People's point of views are listened to understand them	-0.856
16	Checking the schedule must be prioritize	-0.859
27	The project delivery within the estimated cost should be prioritized	-0.895
6	The amount of energy used in the project is very important to consider	-1.006
22	Following the quality management (QM) plan is essential	-1.006
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-1.269

24	First time right (FTR) is a very important approach	-1.528
20	Short-range time management planning is more effective than long-range planning	-1.714
8	We need to be aware of the community's opinions and point of view	-1.751
31	Success can be measured in term of meeting the budget	-2.459

Factor 4: People and Resource

This factor represents a set of those project managers who prioritized people and resources in the decision-making process. Composite reliability is 0.923 and three variables defined this factor. Top-ranked statements along with their z-scores have been presented in Table 4.12. This factor is mostly people-oriented. Listening to the customers' point of view, their satisfaction, and the use of renewable resources has been highlighted. While short-range time management and proactive risk management have been discouraged in this factor.

Table 4.12: Statement ranking and z-scores of Factor 4.

S. No.	Statements	Z-Scores
4	People's point of views are listened to understand	1.917
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specifications	1.913
13	Renewable resources are important	1.695
1	The ecological footprint (Human demand on nature) should be considered	1.365
15	Time is a very important factor	1.209
30	Cost is a very important factor to take into consideration	1.143
48	The well-defined scope can help to avoid other common problems	1.137
21	Quality is very important Factor	0.957
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritizing of risks should be prioritized	0.954

45	Project scope hold a critical position	0.927
44	Resource availability may determine the duration of the project	0.776
27	The project delivery within the estimated cost should be prioritized	0.736
49	Efficient scope management can establish a control-factor that helps to control other constraints	0.629
39	Efficient resource management plays a vital role in the decision-making process	0.517
22	Following the quality management (QM) plan is essential	0.516
41	Estimating resource activity may directly affect other constraints	0.48
11	The sustainability of the project life cycle is very important	0.445
29	A cost/benefit analysis is considered	0.442
9	Health and Safety measurements should be checked	0.44
12	There should be sustainable procurement	0.406
16	Checking the schedule must be prioritize	0.337
33	Risk Management is essential	0.251
37	Advance risk assessment provide aid to decision making	0.224
46	The scope is the baseline for managing other constraints	0.18
50	Project's scope statement is very important	0.147
19	Project's success can be measured in term of accomplishing the schedule	0.081
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-0.037
42	Effective resource allocation and management can improve organizational effectiveness and capability	-0.037
8	We need to be aware of the community's opinions and point of view	-0.07
7	Stakeholder commitment and engagement is important	-0.109
3	Sustainable resources should be used.	-0.294

23	A quality review session is a must	-0.301
6	fo consider	-0.333
14	The waste produced as a result of project life-cycle is significant	-0.337
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.37
18	Being on schedule is very important	-0.373
34	Risk management must be according to the goals of the organization	-0.479
43	There should be long-term resource allocation should be prioritized	-0.699
5	The social, environmental and economical consequences are critical	-0.886
26	Customer or stakeholder engagement is essential	-0.919
24	First time right (FTR) is a very important approach	-0.955
2	A proportion of project's budget and time should spend on safety and health practices.	-0.996
17	Time to market is a critical phase	-1.028
40	Available resources are the most important factor	-1.037
31	Success can be measured in term of meeting the budget	-1.286
35	Risk Appetite should be compared with the risk capacity	-1.325
47	Being along scope ensure project success	-1.507
36	Proactive risk management can ensure project success	-1.768
10	It's very crucial to take carbon footprint into account	-2.248
20	Short-range time management planning is more effective than long-range planning long-range planning	-2.429

Factor 5: Time, Risk and Resource

This perspective considers time, risk, and resources as the most important element in the decision-making process. Table 4.13 shows that statements 19, 36, and 39 defined factor 5. Statement 19 states that meeting the project schedule plays an important role in project success. Being aware of project status throughout

project lifecycles is one of the key responsibilities of the project manager. Besides this, efficient resource management and proactive risk management also play an important role in the decision-making process.

TABLE 4.13: Statement ranking and z-scores of Factor 5

S. No.	Statements	Z-Scores
19	Project's success can be measured in term of accomplishing the schedule	2.121
36	Proactive risk management can ensure project success	1.768
39	Efficient resource management plays a vital role in the decision-making process	1.768
8	We need to be aware of the community's opinions and point of view	1.414
24	First time right (FTR) is a very important approach	1.414
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	1.414
17	Time to market is a critical phase	1.061
1	The ecological footprint (Human demand on nature) should be	1.061
41	Estimating resource activity may directly affect other constraints	1.061
46	The scope is the baseline for managing other constraints	1.061
16	Checking the schedule must be prioritize	0.707
23	A quality review session is a must	0.707
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.707
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.707
45	Project scope hold a critical position	0.707
21	Quality is very important Factor	0.354
5	The social, environmental and economical consequences are critical	0.354

25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.354
44	Resource availability may determine the duration of the project	0.354
47	Being along scope ensure project success	0.354
49	Efficient scope management can establish a control-factor that helps to control other constraints	0.354
12	There should be sustainable procurement	0
7	Stakeholder commitment and engagement is important	0
26	Customer or stakeholder engagement is essential	0
27	The project delivery within the estimated cost should be prioritized	0
35	Risk Appetite should be compared with the risk capacity	0
2	A proportion of project's budget and time should spend on safety and health practices.	0
3	Sustainable resources should be used.	0
43	There should be long-term resource allocation should be prioritized	0
30	Cost is a very important factor to take into consideration	-0.354
37	Advance risk assessment provide aid to decision making	-0.354
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.354
15	Time is a very important factor	-0.354
10	It's very crucial to take carbon footprint into account	-0.354
48	A well-defined scope can help to avoid other common problems	-0.354
31	Success can be measured in term of meeting the budget	-0.707
40	Available resources are the most important factor	-0.707
34	Risk management must be according to the goals of the organization	-0.707
22	Following the quality management (QM) plan is essential	-0.707

50	Project's scope statement is very important	-0.707
9	Health and Safety measurements should be checked	-1.061
4	People's point of views are listened to understand	-1.061
13	Renewable resources are important	-1.061
11	The sustainability of the project life cycle is very important	-1.061
33	Risk Management is essential	-1.414
6	The amount of energy used in the project is very important to consider	-1.414
14	The waste produced as a result of project life-cycle is significant	-1.414
29	A cost/benefit analysis is considered	-1.768
18	Being on schedule is very important	-1.768
20	Short-range time management planning is more effective than long-range planning	-2.121

Factor 6: Cost and Risk

The composite reliability of factor 6 is 0.923 (92%). Statement numbers 32 and 36, representing cost and risk states that efficient cost management and advance risk assessment helps in the decision-making process. Factor 6 has some similarities with factor 2 in prioritizing cost and risk

Table 4.14: Statement ranking and z-scores of Factor 6

S. No.	**Statements**	**Z-Scores**
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	2.133
47	Being along scope ensure project success	1.527
36	Proactive risk management can ensure project success	1.434
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	1.391
39	Efficient resource management plays a vital role in the decision-making process	1.359

33	Risk Management is essential	1.174
21	Quality is very important Factor	1.084
23	A quality review session is a must	0.942
15	Time is a very important factor	0.743
34	Risk management must be according to the goals of the organization	0.74
9	Health and Safety measurements should be checked	0.728
48	A well-defined scope can help to avoid other common problems	0.728
2	A proportion of project's budget and time should spend on safety and health practices.	0.726
37	Advance risk assessment provide aid to decision making	0.662
8	We need to be aware of the community's opinions and point of view	0.616
12	There should be sustainable procurement	0.558
3	Sustainable resources should be used.	0.54
40	Available resources are the most important factor	0.535
22	Following the quality management (QM) plan is essential	0.482
30	Cost is a very important factor to take into consideration	0.324
7	Stakeholder commitment and engagement is important	0.265
11	The sustainability of the project life cycle is very important	0.263
45	Project scope hold a critical position	0.248
29	A cost/benefit analysis is considered	0.232
4	People's point of views are listened to understand	0.229
20	Short-range time management planning is more effective than long-range planning	0.155
6	The amount of energy used in the project is very important to consider	0.136
10	It's very crucial to take carbon footprint into account	0.061
5	The social, environmental and economical consequences are critical	0.061

44	Resource availability may determine the duration of the project	-0.014
18	Being on schedule is very important	-0.044
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.061
42	Effective resource allocation and management can improve organizational effectiveness and capability	-0.324
35	Risk Appetite should be compared with the risk capacity	-0.417
50	Project's scope statement is very important	-0.434
41	Estimating resource activity may directly affect other constraints	-0.57
1	The ecological footprint (Human demand on nature) should be	-0.604
27	The project delivery within the estimated cost should be prioritized	-0.694
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.696
26	Customer or stakeholder engagement is essential	-1.003
14	The waste produced as a result of project life-cycle is significant	-1.144
19	Project's success can be measured in term of accomplishing the schedule	-1.173
13	Renewable resources are important	-1.174
16	Checking the schedule must be prioritize	-1.266
43	There should be long-term resource allocation should be prioritized	-1.374
17	Time to market is a critical phase	-1.405
46	The scope is the baseline for managing other constraints	-1.593
31	Success can be measured in term of meeting the budget	-1.671
24	First time right (FTR) is a very important approach	-2.162
49	Efficient scope management can establish a control-factor that helps to control other constraints	-2.255

Factor 7: Risk and People

Factor 7 represents the prioritizing of risk and people by project managers in the decision-making process. Defining statements for factor 7 states that proactive risk management helps in addressing both challenges and opportunities, ensure efficient use of resources, provides greater confidence in stakeholder, and improved decision through awareness. Second prioritization has been given to people and customers who are involved in the project directly or indirectly. Table 4.15 shows statements ranking along with their z-scores for factor 7.

TABLE 4.15: Statement ranking and z-scores of Factor 7

S. No.	Statement	Z-Scores
33	Risk Management is essential	2.144
1	The ecological footprint (Human demand on nature) should be	1.593
26	Customer or stakeholder engagement is essential	1.361
27	The project delivery within the estimated cost should be prioritized	1.304
36	Proactive risk management can ensure project success	1.275
20	Short-range time management planning is more effective than long-range planning	1.159
30	Cost is a very important factor to take into consideration	1.101
19	Project's success can be measured in term of accomplishing the schedule	1.072
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	0.84
49	Efficient scope management can establish a control-factor that helps to control other constraints	0.811
35	Risk Appetite should be compared with the risk capacity	0.783
16	Checking the schedule must be prioritize	0.753
17	Time to market is a critical phase	0.753
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	0.667
44	Resource availability may determine the duration of the project	0.637

46	The scope is the baseline for managing other constraints	0.608
2	A percentage of project's time and budget should spend on health and safety practices.	0.58
12	There should be sustainable procurement	0.551
13	Renewable resources are important	0.435
10	It's very crucial to take carbon footprint into account	0.348
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.289
4	People's point of views are listened to understand	0.232
45	Project scope hold a critical position	0.232
47	Being along scope ensure project success	0.232
22	Following the quality management (QM) plan is essential	0.145
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.087
23	A quality review session is a must	0.087
34	Risk management must be according to the goals of the organization	0.029
50	Project's scope statement is very important	0
6	The amount of energy used in the project is very important to consider	-0.057
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-0.116
31	Success can be measured in term of meeting the budget	-0.319
40	Available resources are the most important factor	-0.319
5	The social, environmental and economical consequences are critical	-0.348
24	First time right (FTR) is a very important approach	-0.521
48	A well-defined scope can help to avoid other common problems	-0.579
11	The sustainability of the project life cycle is very important	-0.637
21	Quality is very important Factor	-0.753

39	Efficient resource management plays a vital role in the decision-making process	-0.869
29	A cost/benefit analysis is considered	-0.899
8	We need to be aware of the community's opinions and point of view	-1.015
43	There should be long-term resource allocation should be prioritized	-1.072
7	Stakeholder commitment and engagement is important	-1.072
18	Being on schedule is very important	-1.159
15	Time is a very important factor	-1.188
37	Advance risk assessment provide aid to decision making	-1.275
9	Health and Safety measurements should be checked	-1.42
3	Sustainable resources should be used.	-1.941
41	Estimating resource activity may directly affect other constraints	-2.057
14	The waste produced as a result of project life-cycle is significant	-2.492

The result of Q-factor analysis also provides a test of distinguishing statements. When more factors correlated with one another, few distinguishing statements will be present.

4.7 RQ2: Role of Sustainability in the Decision Making Process

To find the role of sustainability in the decision-making process, the same technique has been adopted, which was used by Silvius. Top 10 statements of all factors have been taken into account for analysis.

Factor 1: People and Quality

Table 4.16 shows the factor array for factor 1. Sustainability statements are highlighted. Top-ranked and bottom-ranked statements are listed in table 20. In this

table, grey statements mark sustainability statements, while the constraints are with white background. Only two statements are in top-ranked, depicting 20% sustainability element in factor 1. Most prioritization has given to quality as it represents 40% of factor 1, while time, cost, risk, and scope represent 10% each. Therefore, factor 1 contributes much toward Quality. In contrast to this, sustainability has not represented in bottom-ranked statements. However, the whole idea of sustainability revolves around the agreement segment.

TABLE 4.16: Factor Array for factor 1: People and quality

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
27(C)	47(SC)	38(RI)	37(RI)	5(S)	1(S)	42(RE)	3(S)	30(C)	32(C)	7(S)	9(S)	21(Q)
	19(T)	20(T)	24(Q)	49(SC)	44(RE)	15(T)	41(RE)	25(Q)	33(RI)	16(T)	22(Q)	
		29(C)	18(T)	17(T)	11(S)	40(SC)	31(C)	43(RE)	50(SC)	26(Q)		
			48(SC)	34(RI)	46(SC)	4(S)	13(S)	2(S)	23(Q)			
				10(S)	45(SC)	35(RI)	8(S)	12(S)				
					14(S)	6(S)	39(RE)					
						36(RI)						
						28(C)						

TABLE 4.17: Top-ranked and bottom-ranked statements for factor 1

Top-ranked statements	**Bottom-ranked statements**
Quality is very important Factor	The project delivery within the estimated cost should be prioritized
Health and Safety measurements should be checked	Project's success can be measured in term of accomplishing the schedule
Following the quality management (QM) plan is essential	Being along scope ensure project success
Stakeholder commitment and engagement is important	A cost/benefit analysis is considered
Checking the schedule must be prioritize	Short-range time management planning is more effective than long-range planning
Customer or stakeholder engagement is essential	A consistent approach, re-assessment, communication, and handling of risks should be prioritized
Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	A well-defined scope can help to avoid other common problems
Risk Management is essential	Being on schedule is very important

The project scope statement is very important	First time right (FTR) is a very important approach
A quality review session is a must	Advance risk assessment provide aid to decision making

Factor 2: Cost, Risk and Time

Factor 2 holds the importance of cost, risk, and time in the decision-making process. Table 4.18 provides an overview of factor 2, showing that the sustainability element is more toward the left side of the distribution table. Sustainability accounts 0%, while it is overrepresented in disagreement part (bottom-ranked). In bottom-ranked it represents 60% of the total. Time signifies 30%, while scope, risk, and resource cover 20%. Cost signifies only 10% of factor 2.

Table 4.18: Factor Array for factor 2: Cost, Risk, and Time

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
14(S)	7(S)	13(S)	38(RI)	43(RE)	28(C)	26(Q)	45(SC)	10(S)	17(T)	35(RI)	29(C)	48(SC)
	5(S)	1(S)	40(RE)	49(SC)	25(Q)	30(C)	24(Q)	31(C)	44(RE)	42(RE)	37(RI)	
		41(RE)	21(Q)	8(S)	11(S)	20(T)	3(S)	2(S)	16(T)	18(T)		
			6(S)	15(T)	33(RI)	27(C)	34(RI)	39(RE)	50(SC)			
				12(S)	19(T)	9(S)	46(SC)	32(C)				
					36(RI)	22(Q)	23(Q)					
						47(SC)						
						4(S)						

Table 4.19: Top-ranked and bottom-ranked statements of factor 2

Top-ranked statements	**Bottom-ranked statements**
A well-defined scope can help to avoid other common problems	The waste produced as a result of project life-cycle is significant
A cost/benefit analysis is considered	The social, environmental and economical consequences are critical
Advance risk assessment provide aid to decision making	Stakeholder commitment and engagement is important
Risk Appetite should be compared with the risk capacity	Estimating resource activity may directly affect other constraints
Effective resource allocation and management can improve organizational effectiveness and capability	The ecological footprint (Human demand on nature) should be

Being on schedule is very important	Renewable resources are important
Time to market is a critical phase	The amount of energy used in the project is very important to consider
Resource availability may determine the duration of the project	Quality is very important Factor
Checking the schedule must be prioritize	Available resources are the most important factor
The projects scope statement is very important	A consistent approach, re-assessment, communication, and handling of risks should be prioritized

Factor 3: People, Scope and Resources

Factor 3 represents people, scope, and resources. Table 4.20 shows a list of top-ranked and bottom-ranked statements for factor 3. Sustainability accounts for 40% of the results while cost and risk do not show any importance in this regard. Scope and Resource account 20% each in the decision-making process.

TABLE 4.20: Factor Array for factor 3: People, scope and resources

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
31(C)	8(S)	22(Q)	4(S)	18(T)	33(RI)	49(SC)	29(C)	12(S)	11(S)	1(S)	46(SC)	2(S)
	20(T)	32(C)	16(T)	17(T)	45(SC)	48(SC)	25(Q)	30(C)	43(RE)	15(T)	3(S)	
		24(Q)	27(C)	38(RI)	36(RI)	5(S)	39(RE)	50(SC)	44(RE)	26(Q)		
			6(S)	19(T)	9(S)	40(RE)	7(S)	42(RE)	47(SC)			
				34(RI)	28(C)	14(S)	41(RE)	13(S)				
					21(Q)	10(S)	37(RI)					
						23(Q)						
						35(RI)						

TABLE 4.21: Top-ranked and bottom-ranked statements of factor 3

Top-ranked statements	**Bottom-ranked statements**
A percentage of project's time and budget should spend on health and safety practices.	Success can be measured in term of meeting the budget
The scope is the baseline for managing other constraints	We need to be aware of the community's opinions and point of view
Sustainable resources should be used.	Short-range time management planning is more effective than long-range planning

The ecological footprint (Human demand on nature) should be considered	First time right (FTR) is a very important approach
Time is a very important factor	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time
Customer or stakeholder engagement is essential	Following the quality management (QM) plan is essential
The sustainability of the project life cycle is very important	The amount of energy used in the project is very important to consider
There should be long-term resource allocation should be prioritized	The project delivery within the estimated cost should be prioritized
Resource availability may determine the duration of the project	Checking the schedule must be prioritize
Being along scope ensure project success	People's point of views are listened to understand

Factor 4: People and Resource

Table 4.22 shows the factor array of factor 4. The sustainability element, being equally distributed across the distribution table, represents only 30 % of the total while quality represents 20%. Sustainability's statement states that people's point of view should be listening, ecological footprint and use of renewable resources must be considered. Other than sustainability, time, cost, and risk represented equally in the top-ranked category as 10.

TABLE 4.22: Factor array of factor 4: People and Resource.

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
20(T)	36(RI)	31(C)	24(Q)	18(T)	7(S)	33(RI)	41(RE)	44(RE)	48(SC)	1(S)	25(Q)	4(S)
	10(S)	35(RI)	2(S)	34(RI)	3(S)	37(RI)	11(S)	27(C)	21(Q)	15(T)	13(S)	
		47(SC)	17(T)	43(RE)	23(Q)	46(SC)	29(C)	49(SC)	38(RI)	30(C)		
			40(RE)	5(S)	6(S)	50(SC)	9(S)	39(RE)	45(SC)			
				26(Q)	14(S)	19(T)	12(S)	22(Q)				
					28(C)	32(C)	16(T)					
						42(RE)						
						8(S)						

TABLE 4.23: Top-ranked and bottom-ranked statements of factor 4

Top-ranked statements	**Bottom-ranked statements**
People's point of views are listened to understand	Short-range time management planning is more effective than long-range planning long-range planning
Success can be measured in terms of customer satisfaction and conformance to functional and technical specifications	It's very crucial to take carbon footprint into account
Renewable resources are important	Proactive risk management can ensure project success
The ecological footprint (Human demand on nature) should be considered	Being along scope ensure project success
Time is a very important factor	Risk Appetite should be compared with the risk capacity
Cost is a very important factor to take into consideration	Success can be measured in term of meeting the budget
A well-defined scope can help to avoid other common problems	Available resources are the most important factor
Quality is very important Factor	Time to market is a critical phase
A consistent approach, re-assessment, communication, and handling of risks should be prioritized	A percentage of project's time and budget should spend on health and safety practices.
Project scope hold a critical position	First time right (FTR) is a very important approach

Factor 5: Time, Risk and Resource

Sustainability accounts for 20% in top-ranked statements while 60% in bottom-ranked (Tables 4.24-4.25). Overall sustainability is over-represented in bottom-ranked. On the other hand, time, risk, and resource has shown equal importance which is 20% each. This means that project managers having this perspective

prioritize time, risk, and resource constraints in the decision-making process and are not interested to have a sustainable project.

TABLE 4.24: Factor array of factor 5: Time, Risk, and Resource

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
20(T)	29(C)	33(RI)	9(S)	31(C)	30(C)	12(S)	21(Q)	16(T)	17(T)	8(S)	36(RI)	19(T)
	18(T)	6(S)	4(S)	40(RE)	37(RI)	7(S)	5(S)	23(Q)	1(S)	24(Q)	39(RE)	
		14(S)	13(S)	34(RI)	28(C)	26(Q)	25(Q)	32(C)	41(RE)	38(RI)		
			11(S)	22(Q)	15(S)	27(C)	44(RE)	42(RE)	46(SC)			
				50(SC)	10(S)	35(RI)	47(SC)	45(SC)				
					48(SC)	2(S)	49(SC)					
						3(S)						
						43(RE)						

TABLE 4.25: Top-ranked and bottom-ranked statements of factor 5

Top-ranked statements	**Bottom-ranked statements**
Project's success can be measured in term of accomplishing the schedule	Short-range time management planning is more effective than long-range planning
Proactive risk management can ensure project success	Being on schedule is very important
Efficient resource management plays a vital role in the decision-making process	A cost/benefit analysis is considered
We need to be aware of the community's opinions and point of view	The waste produced as a result of project life-cycle is significant
First time right (FTR) is a very important approach	The amount of energy used in the project is very important to consider
A consistent approach, re-assessment, communication, and handling of risks should be prioritized	Risk Management is essential
Time to market is a critical phase	The sustainability of the project life cycle is very important

The ecological footprint (Human demand on nature) should be considered	Renewable resources are important
Estimating resource activity may directly affect other constraints	People's point of views are listened to understand
The scope is the baseline for managing other constraints	Health and Safety measurements should be checked

Factor 6: Cost and Risk

Factor 6 prioritizes risk and cost, while sustainability is more toward low-agreement (column 1 and 2) and neutral response (0% in top-ranked statement list). Risk and quality represent 30% each while cost represents 10% only but much importance has been given to cost. Efficient cost management can ensure an adequate supply of funds from the right source at the right time. When it comes to bottom-ranked, sustainability represents 20%.

TABLE 4.26: Factor array of factor 6: Cost and Risk

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
49(SC)	31(C)	43(RE)	14(S)	41(RE)	44(RE)	11(S)	12(S)	9(S)	21(Q)	25(Q)	47(SC)	32(C)
	24(Q)	17(T)	19(T)	1(S)	18(T)	45(SC)	3(S)	48(SC)	23(Q)	39(RE)	36(RI)	
		46(SC)	13(S)	27(C)	38(RI)	29(C)	40(RE)	2(S)	15(T)	33(RI)		
			16(T)	28(C)	42(RE)	4(S)	22(Q)	37(RI)	34(RI)			
				26(Q)	35(RI)	20(T)	30(C)	8(S)				
					50(SC)	6(S)	7(S)					
						10(S)						
						5(S)						

TABLE 4.27: Top-ranked and bottom-ranked statements of factor 6.

Top-ranked statements	**Bottom-ranked statements**
Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	Efficient scope management can establish a controlling factor that helps to control other constraints
Being along scope ensure project success	First time right (FTR) is a very important approach
Proactive risk management can ensure project success	Success can be measured in term of meeting the budget

Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	The scope is the baseline for managing other constraints
Efficient resource management plays a vital role in the decision-making process	Time to market is a critical phase
Risk Management is essential	There should be long-term resource allocation should be prioritized
Quality is very important Factor	Checking the schedule must be prioritize
A quality review session is a must	Renewable resources are important
Time is a very important factor	Project's success can be measured in term of accomplishing the schedule
Risk management must be according to the goals of the organization	The waste produced as a result of project life-cycle is significant

Factor 7: Risk and People

In factor 7, sustainability element is only 10% while risk and cost represent 20% and 30% respectively. It is quite opposite in bottom-ranked statements where sustainability represent 50%.

TABLE 4.28: Factor array of factor 7: Risk and People

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
14(S)	3(S)	15(T)	8(S)	48(SC)	6(S)	4(S)	46(SC)	35(RI)	30(C)	27(C)	1(S)	33(RI)
	41(RE)	37(RI)	43(RE)	11(S)	32(C)	45(SC)	2V(S)	16(T)	19(T)	36(RI)	26(Q)	
		9(S)	7(S)	21(Q)	31(C)	47(SC)	12(S)	17(T)	28(C)	20(T)		
			18(T)	39(RE)	40(RE)	22(Q)	13(S)	38(RI)	49(SC)			
				29(C)	5(S)	42(RE)	10(S)	44(RE)				
					24(Q)	23(Q)	25(Q)					
						34(RI)						
						50(SC)						

TABLE 4.29: Top-ranked and bottom-ranked statements of factor 7

Top-ranked statements	**Bottom-ranked statements**
Risk Management is essential	The waste produced as a result of project life-cycle is significant
The ecological footprint (Human demand on nature) should be	Estimating resource activity may directly affect other constraints
Customer or stakeholder engagement is essential	Sustainable resources should be used.
The project delivery within the estimated cost should be prioritized	Health and Safety measurements should be checked
Proactive risk management can ensure project success	Advance risk assessment provide aid to decision making
Short-range time management planning is more effective than long-range planning	Time is a very important factor
Cost is a very important factor to take into consideration	Being on schedule is very important
Project's success can be measured in term of accomplishing the schedule	Stakeholder commitment and engagement is important
A technique such as earned-value method (EV) should be used to analyze the project's progress	There should be long-term resource allocation should be prioritized
Efficient scope management can establish a control-factor that helps to control other constraints	We need to be aware of the community's opinions and point of views

Regarding the importance and consideration of sustainability, eight statements have been found in top 10-ranked as follows

1. The ecological footprint (Human demand on nature) should be considered
2. A proportion of project's budget and time should spend on safety and health practices

3. Sustainable resources should be used
4. People's point of views are listened to understand them
5. Stakeholder commitment and engagement is important
6. We need to be aware of the community's opinions and point of view
7. Health and Safety measurements should be checked
8. Renewable resources are important

While the most used sustainability statement is "The ecological footprint should be considered". Some of the respondents' comments are "we are already getting short of the main energy resources. To maintain a balance, it is necessary to use renewable resources", "Success cannot be obtained through meeting the budget", "To reduce the global warming, one should do a sustainable project", "Long-term planning is far better than short-term planning", and "Effective cost management is one of the basic key element toward project management".

Table 4.30 shows the percentages of all criteria. Sustainability holds 40% (high) in two factors 3 and 4, while least in factor 2 and 6.

TABLE 4.30: Percentages of all variables in all factors

Factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Sustainability	20%	0%	40%	40%	20%	0%	10%
Time	10%	30%	10%	10%	20%	10%	20%
Cost	10%	10%	0%	0%	0%	10%	30%
Risk	10%	20%	0%	0%	20%	30%	20%
Scope	10%	20%	20%	20%	10%	10%	10%
Quality	40%	0%	10%	10%	10%	30%	10%
Resource	0%	20%	20%	20%	20%	10%	0%

Chapter 5

Conclusion and Future Work

5.1 Conclusion

This research study is based on the Q-sorting of 20 participants. We found out seven perspectives, which are very valuable specially related to decision making process. These factors have different prioritizing elements and weigh equally. However, Perspective 1 is over represented and highest number of participants has determine this factor.

1. Perspective 1: People and quality
2. Perspective 2: Cost, risk, and time
3. Perspective 3: People, scope, and resource
4. Perspective 4: People and resource
5. Perspective 5: Time, risk, and resource
6. Perspective 6: Cost and risk
7. Perspective 7: Risk and people

By analyzing the sustainability criteria along with six constraints, it was clear that sustainability overrepresented in perspective 3 where ecological footprint,

sustainable resources, health, and safety practices are prioritized. Perspective 6 and 2 do not share any sustainability criteria. While remaining have minimum percentages. From this, it can be concluded that overall less importance has been given to sustainability as compared to six constraints. It is very important for the organization to organize such conferences or classes to develop the skills in their project managers to adapt sustainability in their decision making, no matter what perspective they are considering.

Factors	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Sustainability	20%	0%	40%	30%	20%	0%	10%
Triple Constraints	60%	40%	20%	40%	30%	50%	60%
Resource+Scope+Risk	20%	60%	40%	30%	50%	50%	30%

5.2 Limitations

There are certain limitations associated with this study, which are as follows

1. Data for this research study has been collected in the first quarter of 2020. As it is time-bounded, results may be different in a different period.
2. Q-sort is a time-consuming process, which sometimes results in the participant's frustration.
3. Q-methodology holds small-sample research.
4. Some argued that Q-methodology leads to biased responses as pre-determined statements are given to the participants, so it is recommended to select the statements from interviews of the participants.
5. Both methods and instructions need to be explained to the participants because of unfamiliarity. Lack of knowledge can lead to misinterpretation thus affecting the validity of the research.
6. Participants, selected for this research, were belonged to engineering fields so results cannot be implied to other fields.

5.3 Further Research

Project managers, who participated in this study were working in the engineering field, hence further research can be done by asking the same research question in other industries or fields i.e. medical or IT. Comparison can also be studied as different fields react differently to sustainability and constraints. Furthermore, Q-sorting can be performed at different phases of the project to examine the particular stage at which the project manager take sustainability into account. Some organization prefers sustainability at the start of the project while others prefer to incorporate in the finalizing phase. It all depends on the type of project. Further can be studied to find out the type of project which needs sustainability in the initiation phase. Besides, different levels of project managers share different responsibilities thus having different approaches toward sustainability and constraints. Studying their perspectives can be recommended for further study.

More domains of sustainability can be considered as Silvius suggested integrating politics domain within sustainability Q-sort statements.

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Appendix A

Appendix A shows coding which has been used to configure Html for q sorting. Coding for file "Configuration.xml, Map.xml, language.xml " has been presented below.

File "Configuration.xml"

?xml version="1.0" encoding="UTF-8"?>

<config version="1.0" htmlParse="false">

<item id="studyTitle">Name of your study</item>

<item id="textAlign">left</item>

<item id="shuffleCards">true</item>

<item id="loginrequired">false</item>

<item id="loginPassword"></item>

<item id="loginUrl"></item>

<item id="loginUrlMethod"></item>

<item id="showStep3">true</item>

<item id="showStep5">true</item>

<item id="form">

<label>Age*</label>

<note>Please enter your year of birth (YYYY, eg. 1980).</note>

<input type="text" required="true" maxlength="4" restricted="0-9"></input>

<label>Gender*</label>

<note>Please select your gender.</note>

<input type="radio" required="true">Female;Male</input>

<label>Any suggestion</label>

<input type="textarea" required="false"></input>

</item>

<item id="showStep4">true</item>

<item id="submitUrl"></item>

<item id="submitUrlMethod"></item>

<item id="submitMail">faiza2203@outlook.com</item>

</config>

File "Map.xml"

<?xml version="1.0" encoding="UTF-8"?>

<map version="1.0" htmlParse="false">

<column id="-6" colour="FFD5D5">1</column>

<column id="-5" colour="FFD5D5">2</column>

<column id="-4" colour="FFD5D5">3</column>

<column id=”-3” colour=”9FDFBF”>4</column>

<column id=”-2” colour=”9FDFBF”>5</column>

<column id=”-1” colour=”FFD5D5”>6</column>

<column id=” 0” colour=”FFD5D5”>8</column>

<column id=”+1” colour=”FFD5D5”>6</column>

<column id=”+2” colour=”9FDFBF”>5</column>

<column id=”+3” colour=”9FDFBF”>4</column>

<column id=”+4” colour=”FFD5D5”>3</column>

<column id=”+5” colour=”FFD5D5”>2</column>

<column id=”+6” colour=”FFD5D5”>1</column>

</map>

File “Language.xml”

?<?xml version=”1.0” encoding=”UTF-8”?>

<language version=”1.0” htmlParse=”true”>

<!– misc –>

<item id=”btnContinue”>Continue...</item>

<item id=”btnclose”>Close</item>

<item id=”btnHelp”>Help me!</item>

<item id=”btnAgreement”>Agree</item>

<item id=”btnNeutral”>Neutral</item>

<item id=”btnDisagreement”>Disagree</item>

<item id=”btnTransfer”>Submit data</item>

<item id="btnMail">Send via email</item>

<item id="btnPrint">Save as pdf</item>

<item id="btnExit">Exit</item>

<item id="selectItem">Please select...</item>

<!– errors –>

<item id="errorHead">Error!</item>

<item id="errorWindowTooSmall">Please maximize your browser for using this application.</item>

<item id="welcomeHead">Welcome!</item>

<item id="welcomeText">Thankyou for agreeing to take part in this important survey which is a part of master's thesis.{br}{br}Today we will be gaining your thoughts and opinions. This survey should only take 10 minutes to complete.{br}{br} Be assured that all answers you provide will be kept in strict confidentiallity.{br}{br} Please click on the continue-button.</item>

<item id="loginHead">User code</item>

<item id="loginText">Please enter your user code. Please note, that in this demo any user code will be accepted.{br}{br}{i}Tip: This is an optional step and you can deactivate it in your own survey.{i}</item>

<item id="loginFormHeader">User code</item>

<item id="loginNoInput">Please insert your user code.</item>

<item id="loginInvalidInput">User code invalid</item>

<item id="loginNoConnection">Connection to server failed. Please try again.
</item>

<item id="introHead">Introduction</item>

<item id="introText">This study is about how well sustainability takes part in project management decision making process in relation with the six constraints. We are interested in your attitude.{br}{br}Please maximize your browser window and click on the continue-button to start the survey.</item>

<item id="step1Head">Step 1 of 5</item>

<item id="step1Text">Read the folowing statements carefully and split them up into three piles: a pile for statements you tend to disagree with, a pile for cards you tend to agree with, and a pile for the rest.{br}{br}You can either drag the cards into one of the three piles or press 1, 2, 3 on your keyboard. Changes can be made later.{br}{br}If you want to read this instruction a second time, press the help-button at the bottom left corner.</item>

<item id="step2Head">Step 2 of 5</item>

<item id="step2Text">Take the cards from the "AGREE"-pile and read them again. You can scroll through the statements by using the scroll bar. Next, select the statements you most agree with and place them on right side of the score sheet below the "+6", then "+5".{br}{br}Now read the cards in the "DISAGREE"-pile again. Just like before, select the two statements you most disagree with and place them on the left side of the score sheet below the "-6".{br}{br}Next, select the statements you second most agree/disagree with and place them under "+5"/"-5". Follow this procedure for all cards in the "AGREE"- and "DISAGREE"-pile.{br}{br}Finally, read the "NEUTRAL"-cards again and arange them in the remaining open boxes of the score sheet.</item>

<item id="step3Head">Step 3 of 5</item>

<item id="step3Text">Now you have placed all cards on the score sheet. Please go over your distribution once more and shift cards if you want to.</item>

<item id="step4Head">Step 4 of 5</item>

<item id="step4Text">Please explain why you agree most or disagree most with the following statements you have placed below "+6" or "-6".{br}{br}</item>

<item id="step5Head">Step 5 of 5</item>

<item id="step5Text">Finally, please answer the following questions.</item>

<item id="transferHead">Submit Data</item>

<item id="transferText">You've finished the survey. Please submit your data now.{br}{br} If you have outlook, kindly click "submit data". it would be better if you click "print" button and save the file as pdf and then send it to faiza.k2203@gmail.com </item>

<item id="transferFailed">Data submission failed. Please try again or mail your results via email/post.</item>

<item id="transferOk">Thank you for unsing FlashQ. We would appreciate if you could send us feeddback.{br}{br}You can now close your browser window.</item>

<item id="mailHead">Submit Data</item>

<item id="mailText">You can either submit your data either via email.</item>

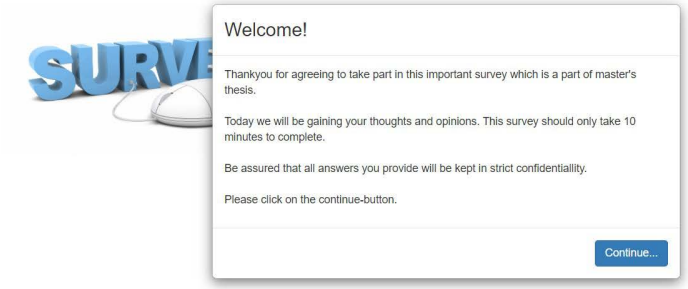
<item id="mailBody">Thank you for participating in our survey. Please do not modify the following text:</item>

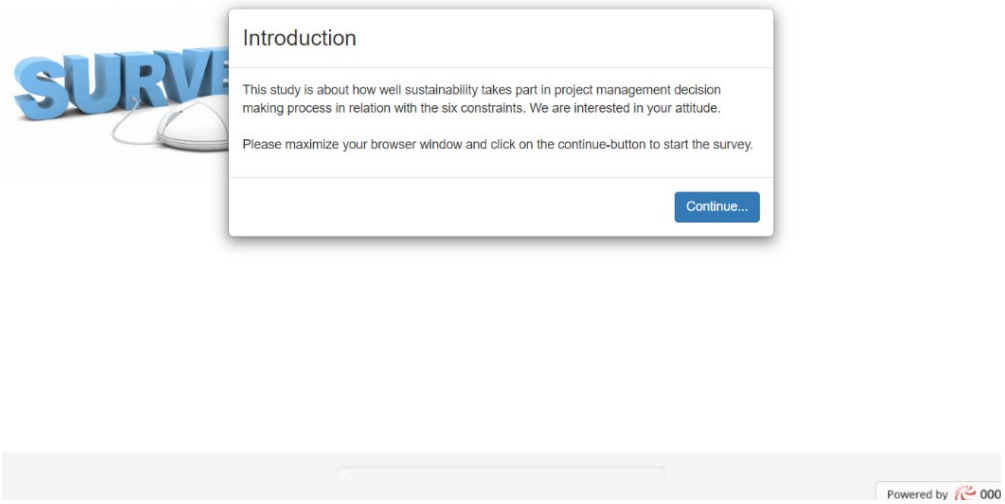
<item id="printoutText">Please save this file as pdf and send it to faiza.k2203@gmail.com.{br}{br} Thanks for you help.</item>

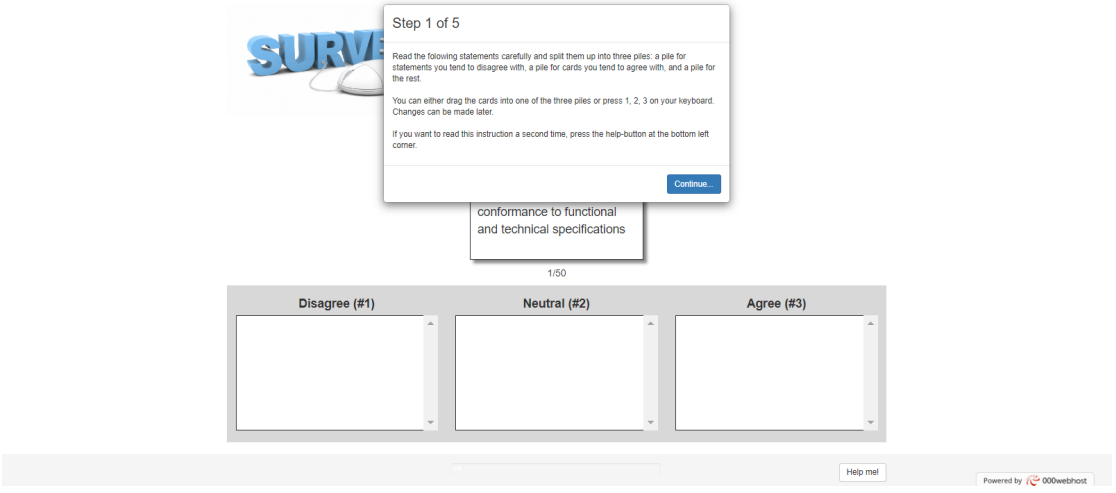
</language>

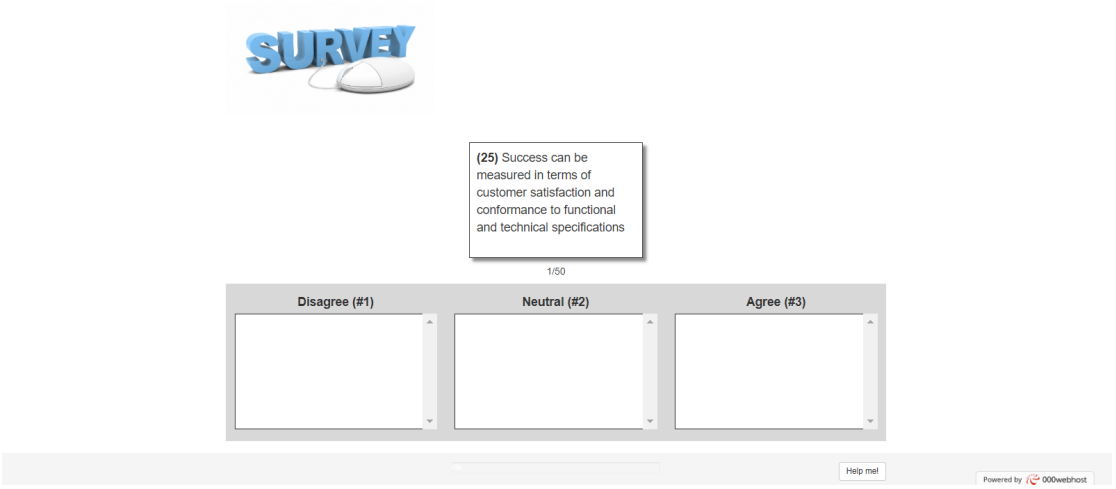
Appendix B

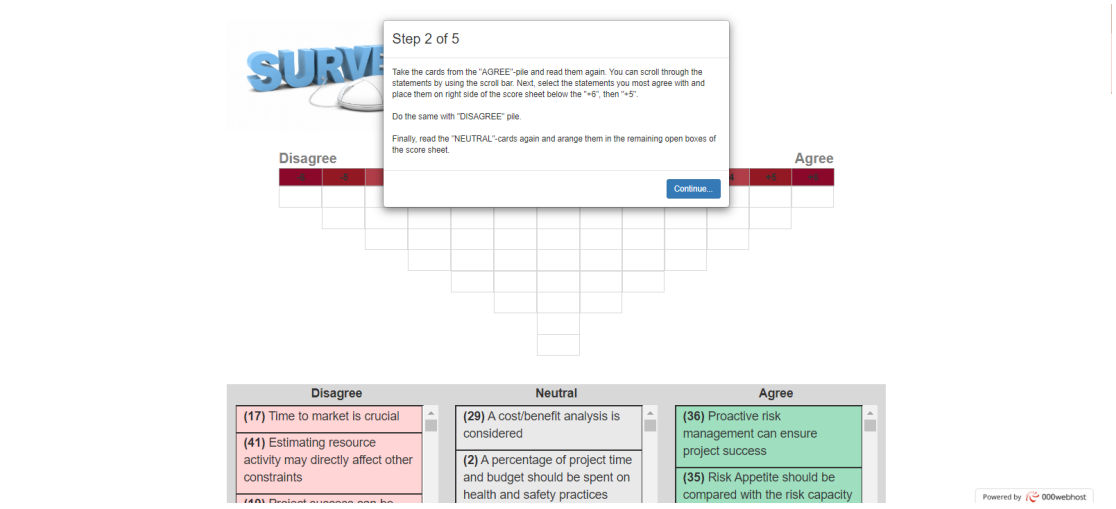
Appendix B shows graphical representation of Q sorting software which have been presented to participants

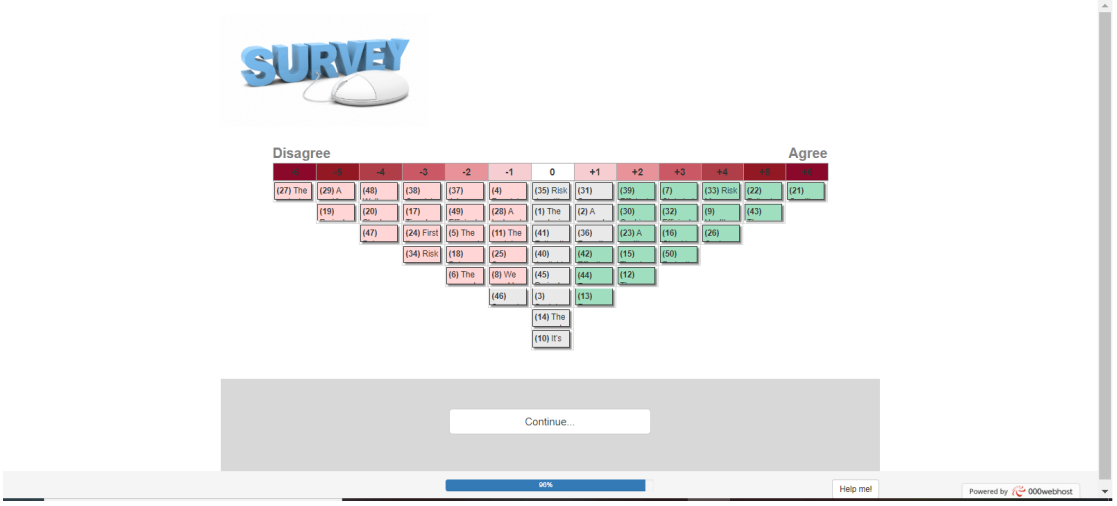


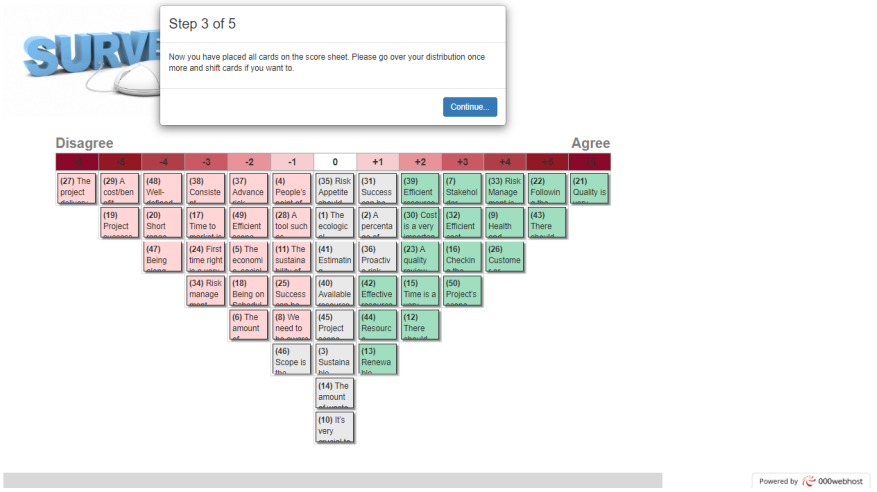

Introduction
This study is about how well sustainability takes part in project management decision making process in relation with the six constraints. We are interested in your attitude.
Please maximize your browser window and click on the continue-button to start the survey.
Continue...
Powered by 000


Step 1 of 5
Read the folowing statements carefully and split them up into three piles: a pile for statements you tend to disagree with, a pile for cards you tend to agree with, and a pile for the rest.
You can either drag the cards into one of the three piles or press 1, 2, 3 on your keyboard. Changes can be made later.
If you want to read this instruction a second time, press the help-button at the bottom left corner.
Continue...
conformance to functional and technical specifications
1/50
Disagree (#1)
Neutral (#2)
Agree (#3)
Help me!
Powered by 000webhost


SURVEY
(25) Success can be measured in terms of customer satisfaction and conformance to functional and technical specifications
1/50
Disagree (#1)
Neutral (#2)
Agree (#3)
Help me!
Powered by 000webhost


Step 2 of 5
Take the cards from the "AGREE"-pile and read them again. You can scroll through the statements by using the scroll bar. Next, select the statements you most agree with and place them on right side of the score sheet below the "+6", then "+5".
Do the same with "DISAGREE" pile.
Finally, read the "NEUTRAL"-cards again and arange them in the remaining open boxes of the score sheet.
Continue...
Disagree
Agree
Disagree
Neutral
Agree
(17) Time to market is crucial
(41) Estimating resource activity may directly affect other constraints
(29) A cost/benefit analysis is considered
(2) A percentage of project time and budget should be spent on health and safety practices
(36) Proactive risk management can ensure project success
(35) Risk Appetite should be compared with the risk capacity
Powered by 000webhost


SURVEY
Disagree
Agree
-6
-5
-4
-3
-2
-1
0
+1
+2
+3
+4
+5
+6
(27) The
(29) A
(48)
(38)
(37)
(4)
(35) Risk
(31)
(39)
(7)
(33) Risk
(22)
(21)
(19)
(20)
(17)
(49)
(28) A
(1) The
(2) A
(30)
(32)
(9)
(43)
(47)
(24) First
(5) The
(11) The
(41)
(36)
(23) A
(16)
(26)
(34) Risk
(18)
(25)
(40)
(42)
(15)
(50)
(6) The
(8) We
(45)
(44)
(12)
(46)
(3)
(13)
(14) The
(10) It's
Continue...
96%
Help me!
Powered by 000webhost


Step 3 of 5
Now you have placed all cards on the score sheet. Please go over your distribution once more and shift cards if you want to.
Continue...
Disagree
Agree
-6
-5
-4
-3
-2
-1
0
+1
+2
+3
+4
+5
+6
(27) The project
(29) A cost/ben
(48) Well-
(38) Consiste
(37) Advance
(4) People's
(35) Risk Appetite
(31) Success
(39) Efficient
(7) Stakehol
(33) Risk Manage
(22) Followin
(21) Quality is
(19) Project
(20) Short
(17) Time to
(49) Efficient
(28) A tool such
(1) The ecologic
(2) A percenta
(30) Cost is a very
(32) Efficient
(9) Health
(43) There
(47) Being
(24) First time right
(5) The economi
(11) The sustaina
(41) Estimatin
(36) Proactiv
(23) A quality
(16) Checkin
(26) Custome
(34) Risk manage
(18) Being on
(25) Success
(40) Available
(42) Effective
(15) Time is a
(50) Project's
(6) The amount
(8) We need to
(45) Project
(44) Resourc
(12) There
(46) Scope is
(3) Sustaina
(13) Renewa
(14) The amount
(10) It's very
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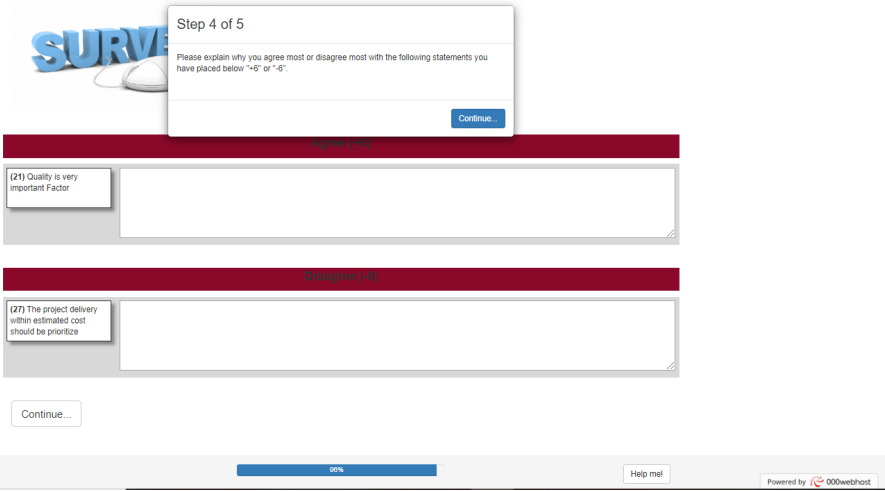
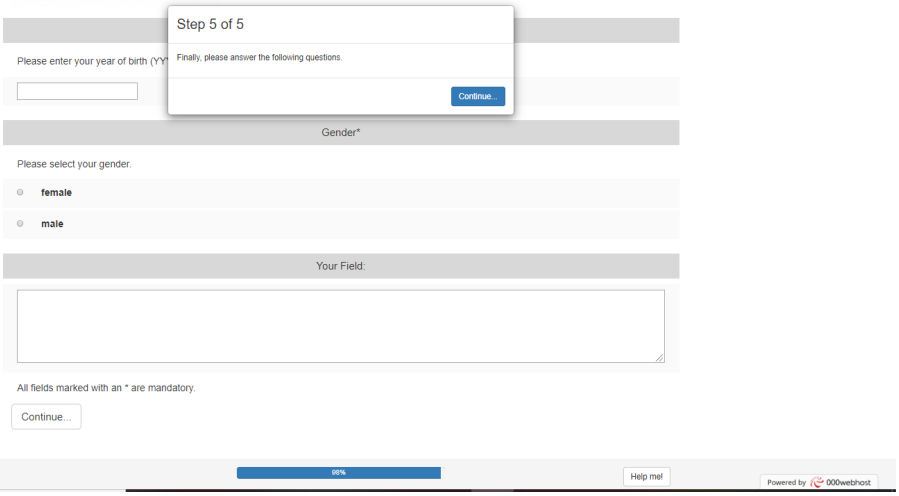
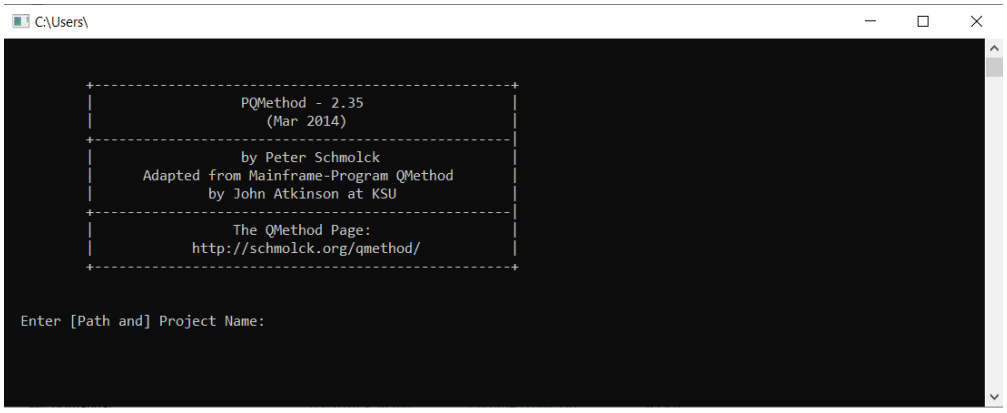

Step 4 of 5
Please explain why you agree most or disagree most with the following statements you have placed below "+6" or "-6".
Continue...
Agree (+6)
(21) Quality is very important Factor
Disagree (-6)
(27) The project delivery within estimated cost should be prioritize
Continue...
0%
Help me!
Powered by 000webhost

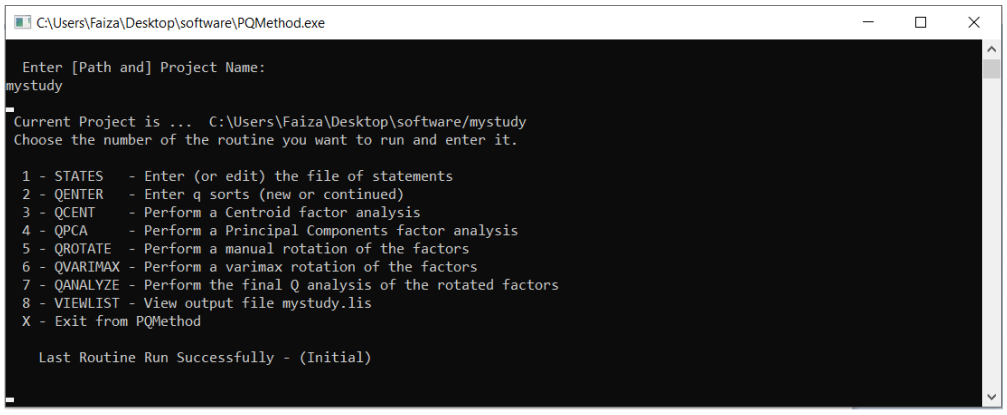

Step 5 of 5
Finally, please answer the following questions.
Continue...
Please enter your year of birth (YY
Gender*
Please select your gender.
female
male
Your Field:
All fields marked with an * are mandatory.
Continue...
0%
Help me!
Powered by 000webhost

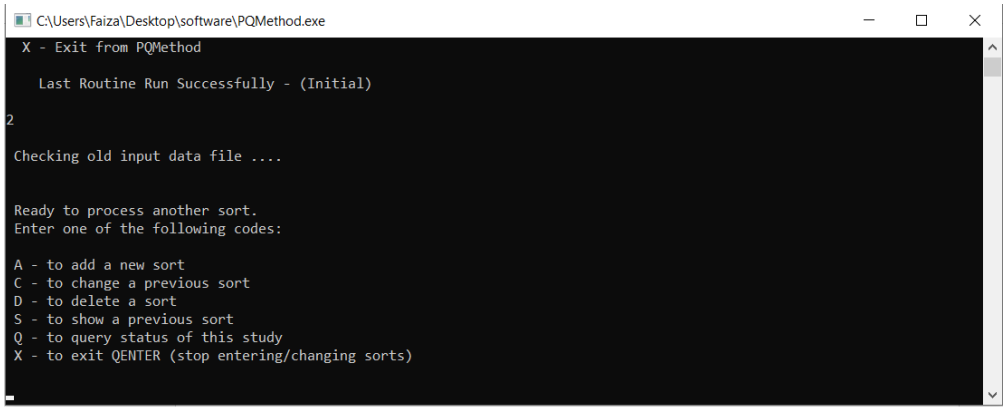

SURVEY
Submit Data
You've finished the survey. Please submit your data now.
Submit data
100%
Powered by 000webhost

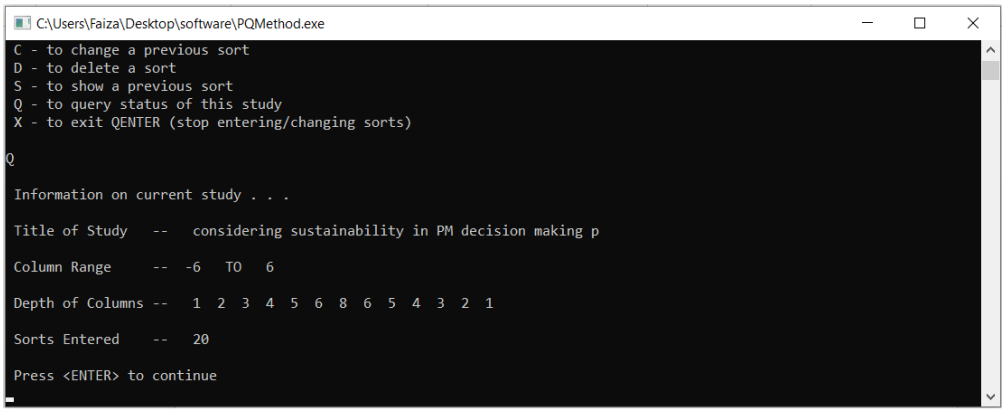
Appendix C

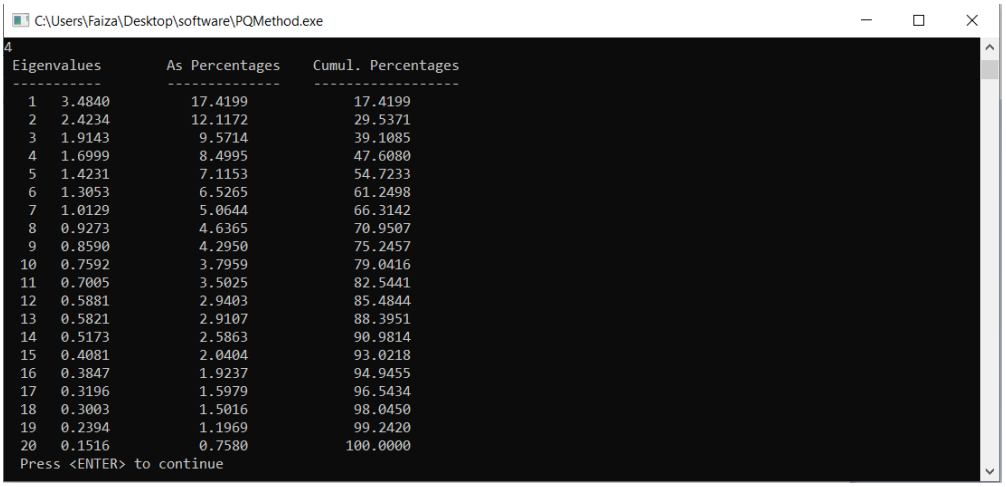
Appendix C shows the steps involved in PQMethod software for analysis

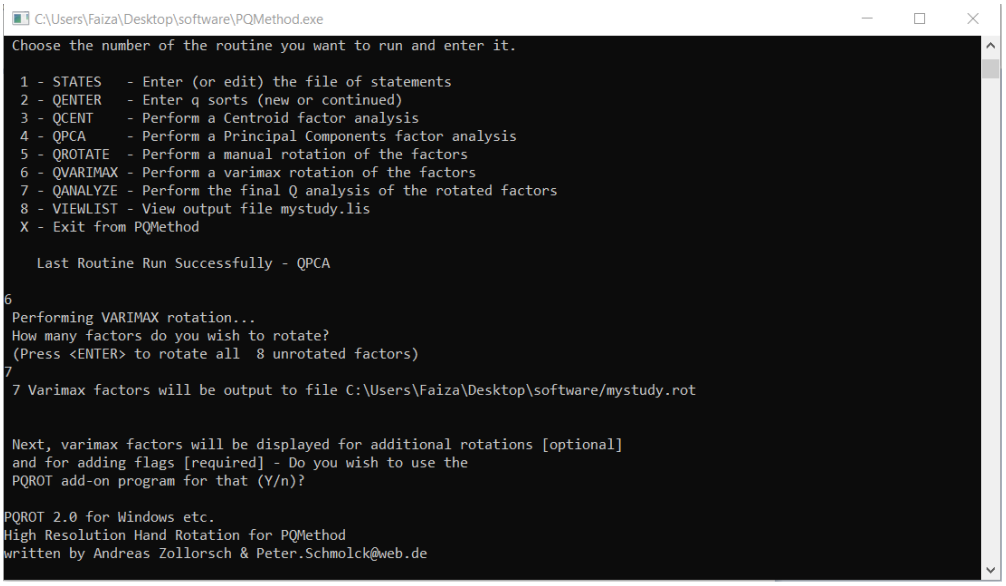







C:\Users\Faiza\Desktop\software\PQMethod.exe
C - to change a previous sort
D - to delete a sort
S - to show a previous sort
Q - to query status of this study
X - to exit QENTER (stop entering/changing sorts)
Q
Information on current study . . .
Title of Study -- considering sustainability in PM decision making p
Column Range -- -6 TO 6
Depth of Columns -- 1 2 3 4 5 6 8 6 5 4 3 2 1
Sorts Entered -- 20
Press <ENTER> to continue


C:\Users\Faiza\Desktop\software\PQMethod.exe
4
Eigenvalues As Percentages Cumul. Percentages
1 3.4840 17.4199 17.4199
2 2.4234 12.1172 29.5371
3 1.9143 9.5714 39.1085
4 1.6999 8.4995 47.6080
5 1.4231 7.1153 54.7233
6 1.3053 6.5265 61.2498
7 1.0129 5.0644 66.3142
8 0.9273 4.6365 70.9507
9 0.8590 4.2950 75.2457
10 0.7592 3.7959 79.0416
11 0.7005 3.5025 82.5441
12 0.5881 2.9403 85.4844
13 0.5821 2.9107 88.3951
14 0.5173 2.5863 90.9814
15 0.4081 2.0404 93.0218
16 0.3847 1.9237 94.9455
17 0.3196 1.5979 96.5434
18 0.3003 1.5016 98.0450
19 0.2394 1.1969 99.2420
20 0.1516 0.7580 100.0000
Press <ENTER> to continue


C:\Users\Faiza\Desktop\software\PQMethod.exe
Choose the number of the routine you want to run and enter it.
1 - STATES - Enter (or edit) the file of statements
2 - QENTER - Enter q sorts (new or continued)
3 - QCENT - Perform a Centroid factor analysis
4 - QPCA - Perform a Principal Components factor analysis
5 - QROTATE - Perform a manual rotation of the factors
6 - QVARIMAX - Perform a varimax rotation of the factors
7 - QANALYZE - Perform the final Q analysis of the rotated factors
8 - VIEWLIST - View output file mystudy.lis
X - Exit from PQMethod
Last Routine Run Successfully - QPCA
6
Performing VARIMAX rotation...
How many factors do you wish to rotate?
(Press <ENTER> to rotate all 8 unrotated factors)
7
7 Varimax factors will be output to file C:\Users\Faiza\Desktop\software/mystudy.rot
Next, varimax factors will be displayed for additional rotations [optional]
and for adding flags [required] - Do you wish to use the
PQROT add-on program for that (Y/n)?
PQROT 2.0 for Windows etc.
High Resolution Hand Rotation for PQMethod
written by Andreas Zollorsch & Peter.Schmolck@web.de

Appendix D

Appendix D shows descending array of differences between different factors.

Table D1: Descending Array of Differences between Factors 1 and 2.

Descending Array of Differences Between Factors 1 and 2				
No.	**Statement**	**Type 1**	**Type 2**	**Difference**
7	Stakeholder commitment and engagement is important	1.561	-1.804	3.365
21	Quality is very important Factor	1.693	-1.155	2.848
41	Estimating resource activity may directly affect other constraints	0.476	-1.73	2.206
13	Renewable resources are important	0.415	-1.263	1.677
9	Health and Safety measurements should be checked	1.658	0.022	1.636
22	Following the quality management (QM) plan is essential	1.596	0	1.596
33	Risk Management is essential	1.182	-0.277	1.458
26	Customer or stakeholder engagement is essential	1.499	0.108	1.391
14	The waste produced as a result of project life-cycle is significant	-0.476	-1.849	1.372
12	There should be sustainable procurement	0.511	-0.835	1.347
5	The economic, social and environmental consequences are crucial	-0.511	-1.816	1.305

1	The ecological footprint (Human demand on nature) should be	-0.318	-1.572	1.255
40	Available resources is the most important factor	0.159	-1.079	1.238
43	There should be long-term resource allocation should be prioritized	0.643	-0.589	1.233
6	The amount of energy used in the project is very important to consider	-0.035	-1.228	1.193
8	We need to be aware of community opinions and point of view	0.38	-0.802	1.182
15	Time is a very important factor	0.194	-0.815	1.008
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	-0.149	0.847
16	Checking the schedule must be prioritize	1.561	0.77	0.791
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	1.402	0.629	0.774
30	Cost is a very important factor to take into consideration	0.829	0.086	0.743
23	A quality review session is a must	0.829	0.127	0.702
36	Proactive risk management can ensure project success	-0.221	-0.409	0.188
50	Project's scope statement is very important	0.926	0.768	0.158
3	Sustainable resources should be used.	0.476	0.33	0.147
4	People's point of views are listened to understand	0.062	-0.082	0.144

49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	-0.694	0.024
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	0.663	-0.09
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	-0.972	-0.112
28	A technique such as earned-value method (EV) should be used to analyze the project's progress 28	-0.256	-0.086	-0.17
11	The sustainability of the project life cycle is very important	-0.415	-0.158	-0.257
31	Success can be measured in term of meeting the budget	0.415	0.675	-0.261
39	Efficient resource management plays a vital role in the decision-making process	0.353	0.661	-0.309
46	Scope is the baseline for managing other constraints	-0.415	0.256	-0.67
34	Risk management must be according to the goals of the organization	-0.767	0.278	-1.045
45	Project scope hold critical position	-0.476	0.624	-1.101
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	1.603	-1.347
24	First time right (FTR) is a very important approach	-0.926	0.448	-1.374
20	Short-range time management planning is more effective than long-range planning	-1.34	0.064	-1.404

10	It's very crucial to take carbon footprint into account	-0.794	0.696	-1.49
44	Resource availability may determine the duration of the project	-0.38	1.196	-1.575
35	Risk Appetite should be compared with the risk capacity	0	1.634	-1.634
47	Being along scope ensure project success	-1.658	0	-1.658
19	Project's success can be measured in term of accomplishing the schedule	-2.231	-0.301	-1.931
17	Time to market is a critical phase	-0.767	1.419	-2.186
27	The project delivery within the estimated cost should be prioritized	-2.328	0.045	-2.373
18	Being on schedule is very important	-0.988	1.433	-2.421
37	Advance risk assessment provide aid to decision making	-0.829	1.668	-2.497
48	Well-defined scope can help to avoid other common problems	-1.023	1.752	-2.775
29	A cost/benefit analysis is considered	-1.437	1.709	-3.147

TABLE D2: Descending Array of Differences Between Factors 1 and 3.

Descending Array of Differences Between Factors 1 and 3				
No.	**Statement**	**Type 1**	**Type 3**	**Difference**
31	Success can be measured in term of meeting the budget	0.415	-2.459	2.873
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	1.402	-1.269	2.671
22	Following the quality management (QM) plan is essential	1.596	-1.006	2.603
16	Checking the schedule must be prioritize	1.561	-0.859	2.42

21	Quality is very important Factor	1.693	-0.521	2.214
8	We need to be aware of community opinions and point of view	0.38	-1.751	2.13
9	Health and Safety measurements should be checked	1.658	-0.446	2.104
33	Risk Management is essential	1.182	-0.262	1.444
7	Stakeholder commitment and engagement is important	1.561	0.262	1.299
6	The amount of energy used in the project is very important to consider	-0.035	-1.006	0.971
4	People's point of views are listened to understand	0.062	-0.856	0.918
23	A quality review session is a must	0.829	-0.036	0.865
24	First time right (FTR) is a very important approach	-0.926	-1.528	0.602
50	Project's scope statement is very important	0.926	0.521	0.405
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	0.298	0.399
20	Short-range time management planning is more effective than long-range planning	-1.34	-1.714	0.374
41	Estimating resource activity may directly affect other constraints	0.476	0.151	0.326
26	Customer or stakeholder engagement is essential	1.499	1.193	0.306
35	Risk Appetite should be compared with the risk capacity	0	-0.223	0.223
30	Cost is a very important factor to take into consideration	0.829	0.633	0.196

28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256	-0.446	0.19
36	Proactive risk management can ensure project success	-0.221	-0.41	0.189
40	Available resources is the most important factor	0.159	0.075	0.084
39	Efficient resource management plays a vital role in the decision-making process	0.353	0.298	0.054
34	Risk management must be according to the goals of the organization	-0.767	-0.783	0.016
13	Renewable resources are important	0.415	0.485	-0.071
45	Project scope hold critical position	-0.476	-0.374	-0.103
17	Time to market is a critical phase	-0.767	-0.597	-0.17
12	There should be sustainable procurement	0.511	0.708	-0.197
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	0.485	-0.229
18	Being on schedule is very important	-0.988	-0.597	-0.391
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	-0.633	-0.452
43	There should be long-term resource allocation should be prioritized	0.643	1.118	-0.475
14	The waste produced as a result of project life-cycle is significant	-0.476	0	-0.476
5	The social, environmental and economical consequences are critical	-0.511	0.111	-0.623
10	It's very crucial to take carbon footprint into account	-0.794	0	-0.794

49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	0.148	-0.818
37	Advance risk assessment provide aid to decision making	-0.829	0.148	-0.977
48	Well-defined scope can help to avoid other common problems	-1.023	0.111	-1.134
15	Time is a very important factor	0.194	1.452	-1.259
3	Sustainable resources should be used.	0.476	1.862	-1.386
44	Resource availability may determine the duration of the project	-0.38	1.006	-1.386
27	The project delivery within the estimated cost should be prioritized	-2.328	-0.895	-1.433
19	Project's success can be measured in term of accomplishing the schedule	-2.231	-0.708	-1.523
11	The sustainability of the project life cycle is very important	-0.415	1.118	-1.532
29	A cost/benefit analysis is considered	-1.437	0.334	-1.772
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	2.347	-1.774
1	The ecological footprint (Human demand on nature) should be	-0.318	1.603	-1.921
46	Scope is the baseline for managing other constraints	-0.415	1.937	-2.352
47	Being along scope ensure project success	-1.658	0.97	-2.628

TABLE D3: Descending Array of Differences between Factors 1 and 4.

Descending Array of Differences Between Factors 1 and 4				
No.	**Statement**	**Type 1**	**Type 4**	**Difference**

26	Customer or stakeholder engagement is essential	1.499	-0.919	2.418
31	Success can be measured in term of meeting the budget	0.415	-1.286	1.7
7	Stakeholder commitment and engagement is important	1.561	-0.109	1.67
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	-0.996	1.569
36	Proactive risk management can ensure project success	-0.221	-1.768	1.547
10	It's very crucial to take carbon footprint into account	-0.794	-2.248	1.454
32	Efficient cost management ensure an adequate supply of funds	1.402	-0.037	1.439
43	There should be long-term resource allocation should be prioritized	0.643	-0.699	1.342
35	Risk Appetite should be compared with the risk capacity	0	-1.325	1.325
16	Checking the schedule must be prioritize	1.561	0.337	1.224
9	Health and Safety measurements should be checked	1.658	0.44	1.218
40	Available resources is the most important factor	0.159	-1.037	1.196
23	A quality review session is a must	0.829	-0.301	1.13
20	Short-range time management planning is more effective than long-range planning	-1.34	-2.429	1.088
22	Following the quality management (QM) plan is essential	1.596	0.516	1.081
33	Risk Management is essential	1.182	0.251	0.93

50	Project's scope statement is very important	0.926	0.147	0.779
3	Sustainable resources should be used.	0.476	-0.294	0.77
21	Quality is very important Factor	1.693	0.957	0.736
8	We need to be aware of community opinions and point of view	0.38	-0.07	0.45
5	The social, environmental and economical consequences are critical	-0.511	-0.886	0.375
6	The amount of energy used in the project is very important to consider	-0.035	-0.333	0.298
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	-0.037	0.292
17	Time to market is a critical phase	-0.767	-1.028	0.261
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256	-0.37	0.114
12	There should be sustainable procurement	0.511	0.406	0.106
24	First time right (FTR) is a very important approach	-0.926	-0.955	0.029
41	Estimating resource activity may directly affect other constraints	0.476	0.48	-0.004
14	The waste produced as a result of project life-cycle is significant	-0.476	-0.337	-0.14
47	Being along scope ensure project success	-1.658	-1.507	-0.151
39	Efficient resource management plays a vital role in the decision-making process	0.353	0.517	-0.164
34	Risk management must be according to the goals of the organization	-0.767	-0.479	-0.288

30	Cost is a very important factor to take into consideration	0.829	1.143	-0.314
46	Scope is the baseline for managing other constraints	-0.415	0.18	-0.595
18	Being on schedule is very important	-0.988	-0.373	-0.614
11	The sustainability of the project life cycle is very important	-0.415	0.445	-0.86
15	Time is a very important factor	0.194	1.209	-1.015
37	Advance risk assessment provide aid to decision making	-0.829	0.224	-1.053
44	Resource availability may determine the duration of the project	-0.38	0.776	-1.155
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	1.913	-1.216
13	Renewable resources are important	0.415	1.695	-1.281
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	0.629	-1.299
45	Project scope hold critical position	-0.476	0.927	-1.403
1	The ecological footprint (Human demand on nature) should be	-0.318	1.365	-1.683
4	People's point of views are listened to understand	0.062	1.917	-1.855
29	A cost/benefit analysis is considered	-1.437	0.442	-1.88
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	0.954	-2.039
48	Well-defined scope can help to avoid other common problems	-1.023	1.137	-2.16

19	Project's success can be measured in term of accomplishing the schedule	-2.231	0.081	-2.312
27	The project delivery within the estimated cost should be prioritized	-2.328	0.736	-3.064

TABLE D4: Descending Array of Differences between Factors 1 and 5.

Descending Array of Differences Between Factors 1 and 5				
No.	**Statement**	**Type 1**	**Type 5**	**Difference**
9	Health and Safety measurements should be checked	1.658	-1.061	2.719
33	Risk Management is essential	1.182	-1.414	2.596
22	Following the quality management (QM) plan is essential	1.596	-0.707	2.303
50	Project's scope statement is very important	0.926	-0.707	1.633
7	Stakeholder commitment and engagement is important	1.561	0	1.561
26	Customer or stakeholder engagement is essential	1.499	0	1.499
13	Renewable resources are important	0.415	-1.061	1.475
6	The amount of energy used in the project is very important to consider	-0.035	-1.414	1.379
21	Quality is very important Factor	1.693	0.354	1.339
30	Cost is a very important factor to take into consideration	0.829	-0.354	1.183
4	People's point of views are listened to understand	0.062	-1.061	1.123
31	Success can be measured in term of meeting the budget	0.415	-0.707	1.122
14	The waste produced as a result of project life-cycle is significant	-0.476	-1.414	0.938

40	Available resources is the most important factor	0.159	-0.707	0.866
16	Checking the schedule must be prioritize	1.561	0.707	0.854
20	Short-range time management planning is more effective than long-range planning	-1.34	-2.121	0.781
18	Being on schedule is very important	-0.988	-1.768	0.78
32	Efficient cost management ensure an adequate supply of funds fr	1.402	0.707	0.695
11	The sustainability of the project life cycle is very important	-0.415	-1.061	0.646
43	There should be long-term resource allocation should be prioritized	0.643	0	0.643
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	0	0.573
15	Time is a very important factor	0.194	-0.354	0.547
12	There should be sustainable procurement	0.511	0	0.511
3	Sustainable resources should be used.	0.476	0	0.476
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	0.354	0.344
29	A cost/benefit analysis is considered	-1.437	-1.768	0.33
23	A quality review session is a must	0.829	0.707	0.122
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256	-0.354	0.098
35	Risk Appetite should be compared with the risk capacity	0	0	0

34	Risk management must be according to the goals of the organization	-0.767	-0.707	-0.06
10	It's very crucial to take carbon footprint into account	-0.794	-0.354	-0.441
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	0.707	-0.451
37	Advance risk assessment provide aid to decision making	-0.829	-0.354	-0.475
41	Estimating resource activity may directly affect other constraints	0.476	1.061	-0.584
48	Well-defined scope can help to avoid other common problems	-1.023	-0.354	-0.669
44	Resource availability may determine the duration of the project	-0.38	0.354	-0.733
5	The social, environmental and economical consequences are critical	-0.511	0.354	-0.865
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	0.354	-1.024
8	We need to be aware of community opinions and point of view	0.38	1.414	-1.035
45	Project scope hold critical position	-0.476	0.707	-1.184
1	The ecological footprint (Human demand on nature) should be	-0.318	1.061	-1.378
39	Efficient resource management plays a vital role in the decision-making process	0.353	1.768	-1.415
46	Scope is the baseline for managing other constraints	-0.415	1.061	-1.475
17	Time to market is a critical phase	-0.767	1.061	-1.828

36	Proactive risk management can ensure project success	-0.221	1.768	-1.989
47	Being along scope ensure project success	-1.658	0.354	-2.012
27	The project delivery within the estimated cost should be prioritized	-2.328	0	-2.328
24	First time right (FTR) is a very important approach	-0.926	1.414	-2.34
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	1.414	-2.499
19	Project's success can be measured in term of accomplishing the schedule	-2.231	2.121	-4.353

TABLE D5: Descending Array of Differences between Factors 1 and 6.

Descending Array of Differences Between Factors 1 and 6				
No.	**Statement**	**Type 1**	**Type 6**	**Difference**
16	Checking the schedule must be prioritize	1.561	-1.266	2.828
26	Customer or stakeholder engagement is essential	1.499	-1.003	2.502
31	Success can be measured in term of meeting the budget	0.415	-1.671	2.085
43	There should be long-term resource allocation should be prioritized	0.643	-1.374	2.017
13	Renewable resources are important	0.415	-1.174	1.588
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	-2.255	1.585
50	Project's scope statement is very important	0.926	-0.434	1.36

7	Stakeholder commitment and engagement is important	1.561	0.265	1.296
24	First time right (FTR) is a very important approach	-0.926	-2.162	1.237
46	Scope is the baseline for managing other constraints	-0.415	-1.593	1.178
22	Following the quality management (QM) plan is essential	1.596	0.482	1.114
41	Estimating resource activity may directly affect other constraints	0.476	-0.57	1.046
9	Health and Safety measurements should be checked	1.658	0.728	0.93
14	The waste produced as a result of project life-cycle is significant	-0.476	-1.144	0.668
17	Time to market is a critical phase	-0.767	-1.405	0.638
21	Quality is very important Factor	1.693	1.084	0.609
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	-0.324	0.579
30	Cost is a very important factor to take into consideration	0.829	0.324	0.505
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256	-0.696	0.441
35	Risk Appetite should be compared with the risk capacity	0	-0.417	0.417
1	The ecological footprint (Human demand on nature) should be	-0.318	-0.604	0.286
33	Risk Management is essential	1.182	1.174	0.008
12	There should be sustainable procurement	0.511	0.558	-0.047
3	Sustainable resources should be used.	0.476	0.54	-0.064

23	A quality review session is a must	0.829	0.942	-0.113
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	0.726	-0.152
4	People's point of views are listened to understand	0.062	0.229	-0.167
6	The amount of energy used in the project is very important to consider	-0.035	0.136	-0.171
8	We need to be aware of community opinions and point of view	0.38	0.616	-0.236
44	Resource availability may determine the duration of the project	-0.38	-0.014	-0.365
40	Available resources is the most important factor	0.159	0.535	-0.376
15	Time is a very important factor	0.194	0.743	-0.549
5	The social, environmental and economical consequences are critical	-0.511	0.061	-0.572
11	The sustainability of the project life cycle is very important	-0.415	0.263	-0.678
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	1.391	-0.693
45	Project scope hold critical position	-0.476	0.248	-0.725
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	1.402	2.133	-0.731
10	It's very crucial to take carbon footprint into account	-0.794	0.061	-0.855
18	Being on schedule is very important	-0.988	-0.044	-0.944

39	Efficient resource management plays a vital role in the decision-making process	0.353	1.359	-1.006
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	-0.061	-1.024
19	Project's success can be measured in term of accomplishing the schedule	-2.231	-1.173	-1.058
37	Advance risk assessment provide aid to decision making	-0.829	0.662	-1.491
20	Short-range time management planning is more effective than long-range planning	-1.34	0.155	-1.496
34	Risk management must be according to the goals of the organization	-0.767	0.74	-1.507
27	The project delivery within the estimated cost should be prioritized	-2.328	-0.694	-1.634
36	Proactive risk management can ensure project success	-0.221	1.434	-1.655
29	A cost/benefit analysis is considered	-1.437	0.232	-1.669
48	Well-defined scope can help to avoid other common problems	-1.023	0.728	-1.751
47	Being along scope ensure project success	-1.658	1.527	-3.185

TABLE D6: Descending Array of Differences between Factors 1 and 7.

Descending Array of Differences Between Factors 1 and 7				
No.	**Statement**	**Type 1**	**Type 7**	**Difference**
9	Health and Safety measurements should be checked	1.658	-1.42	3.078
7	Stakeholder commitment and engagement is important	1.561	-1.072	2.633

41	Estimating resource activity may directly affect other constraints	0.476	-2.057	2.534
21	Quality is very important Factor	1.693	-0.753	2.446
3	Sustainable resources should be used.	0.476	-1.941	2.418
14	The waste produced as a result of project life-cycle is significant	-0.476	-2.492	2.015
43	There should be long-term resource allocation should be prioritized	0.643	-1.072	1.715
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	1.402	-0.116	1.518
22	Following the quality management (QM) plan is essential	1.596	0.145	1.451
8	We need to be aware of community opinions and point of view	0.38	-1.015	1.394
15	Time is a very important factor	0.194	-1.188	1.382
39	Efficient resource management plays a vital role in the decision-making process	0.353	-0.869	1.222
50	Project's scope statement is very important	0.926	0	0.926
16	Checking the schedule must be prioritize	1.561	0.753	0.808
23	A quality review session is a must	0.829	0.087	0.742
31	Success can be measured in term of meeting the budget	0.415	-0.319	0.733
40	Available resources is the most important factor	0.159	-0.319	0.478
37	Advance risk assessment provide aid to decision making	-0.829	-1.275	0.446

25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.697	0.289	0.408
11	The sustainability of the project life cycle is very important	-0.415	-0.637	0.223
18	Being on schedule is very important	-0.988	-1.159	0.171
42	Effective resource allocation and management can improve organizational effectiveness and capability	0.256	0.087	0.169
26	Customer or stakeholder engagement is essential	1.499	1.361	0.138
6	The amount of energy used in the project is very important to consider	-0.035	-0.057	0.023
2	A proportion of project's budget and time should spend on safety and health practices.	0.573	0.58	-0.007
13	Renewable resources are important	0.415	0.435	-0.02
12	There should be sustainable procurement	0.511	0.551	-0.039
5	The social, environmental and economical consequences are critical	-0.511	-0.348	-0.163
4	People's point of views are listened to understand	0.062	0.232	-0.17
30	Cost is a very important factor to take into consideration	0.829	1.101	-0.272
24	First time right (FTR) is a very important approach	-0.926	-0.521	-0.405
48	Well-defined scope can help to avoid other common problems	-1.023	-0.579	-0.444
29	A cost/benefit analysis is considered	-1.437	-0.899	-0.539
45	Project scope hold critical position	-0.476	0.232	-0.708

35	Risk Appetite should be compared with the risk capacity	0	0.783	-0.783
34	Risk management must be according to the goals of the organization	-0.767	0.029	-0.796
33	Risk Management is essential	1.182	2.144	-0.962
44	Resource availability may determine the duration of the project	-0.38	0.637	-1.017
46	Scope is the baseline for managing other constraints	-0.415	0.608	-1.023
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.256	0.84	-1.096
10	It's very crucial to take carbon footprint into account	-0.794	0.348	-1.142
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.67	0.811	-1.481
36	Proactive risk management can ensure project success	-0.221	1.275	-1.495
17	Time to market is a critical phase	-0.767	0.753	-1.52
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-1.085	0.667	-1.751
47	Being along scope ensure project success	-1.658	0.232	-1.89
1	The ecological footprint (Human demand on nature) should be	-0.318	1.593	-1.911
20	Short-range time management planning is more effective than long-range planning	-1.34	1.159	-2.499
19	Project's success can be measured in term of accomplishing the schedule	-2.231	1.072	-3.303

27	The project delivery within the estimated cost should be prioritized	-2.328	1.304	-3.632

Table D7: Descending Array of Differences between Factors 2 and 3.

Descending Array of Differences Between Factors 2 and 3				
No.	**Statement**	**Type 2**	**Type 3**	**Difference**
31	Success can be measured in term of meeting the budget	0.675	-2.459	3.134
18	Being on schedule is very important	1.433	-0.597	2.03
17	Time to market is a critical phase	1.419	-0.597	2.016
24	First time right (FTR) is a very important approach	0.448	-1.528	1.976
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629	-1.269	1.897
35	Risk Appetite should be compared with the risk capacity	1.634	-0.223	1.857
20	Short-range time management planning is more effective than long-range planning	0.064	-1.714	1.778
48	A well-defined scope can help to avoid other common problems	1.752	0.111	1.641
16	Checking the schedule must be prioritize	0.77	-0.859	1.628
37	Advance risk assessment provide aid to decision making	1.668	0.148	1.521
29	A cost/benefit analysis is considered	1.709	0.334	1.375
42	Effective resource allocation and management can improve organizational effectiveness and capability	1.603	0.485	1.118
34	Risk management must be according to the goals of the organization	0.278	-0.783	1.062

22	Following the quality management (QM) plan is essential	0	-1.006	1.006
45	Project scope hold critical position	0.624	-0.374	0.998
8	We need to be aware of community opinions and point of view	-0.802	-1.751	0.948
27	The project delivery within the estimated cost should be prioritized	0.045	-0.895	0.94
4	People's point of views are listened to understand	-0.082	-0.856	0.774
10	It's very crucial to take carbon footprint into account	0.696	0	0.696
9	Health and Safety measurements should be checked	0.022	-0.446	0.468
19	Project's success can be measured in term of accomplishing the schedule	-0.301	-0.708	0.407
39	Efficient resource management plays a vital role in the decision-making process	0.661	0.298	0.363
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086	-0.446	0.36
50	Project's scope statement is very important	0.768	0.521	0.247
44	Resource availability may determine the duration of the project	1.196	1.006	0.189
23	A quality review session is a must	0.127	-0.036	0.163
36	Proactive risk management can ensure project success	-0.409	-0.41	0.001
33	Risk Management is essential	-0.277	-0.262	-0.014
6	The amount of energy used in the project is very important to consider	-1.228	-1.006	-0.222

38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972	-0.633	-0.34
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149	0.298	-0.448
30	Cost is a very important factor to take into consideration	0.086	0.633	-0.547
21	Quality is very important Factor	-1.155	-0.521	-0.633
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.694	0.148	-0.842
47	Being along scope ensure project success	0	0.97	-0.97
26	Customer or stakeholder engagement is essential	0.108	1.193	-1.085
40	Available resources is the most important factor	-1.079	0.075	-1.154
11	The sustainability of the project life cycle is very important	-0.158	1.118	-1.276
3	Sustainable resources should be used.	0.33	1.862	-1.532
12	There should be sustainable procurement	-0.835	0.708	-1.543
46	Scope is the baseline for managing other constraints	0.256	1.937	-1.682
2	A proportion of project's budget and time should spend on safety and health practices.	0.663	2.347	-1.684
43	There should be long-term resource allocation should be prioritized	-0.589	1.118	-1.707
13	Renewable resources are important	-1.263	0.485	-1.748

14	The waste produced as a result of project life-cycle is significant	-1.849	0	-1.849
41	Estimating resource activity may directly affect other constraints	-1.73	0.151	-1.881
5	The social, environmental and economical consequences are critical	-1.816	0.111	-1.927
7	Stakeholder commitment and engagement is important	-1.804	0.262	-2.066
15	Time is a very important factor	-0.815	1.452	-2.267
1	The ecological footprint (Human demand on nature) should be	-1.572	1.603	-3.175

TABLE D8: Descending Array of Differences between Factors 2 and 4.

Descending Array of Differences Between Factors 2 and 4				
No.	**Statement**	**Type 2**	**Type 4**	**Difference**
35	Risk Appetite should be compared with the risk capacity	1.634	-1.325	2.959
10	It's very crucial to take carbon footprint into account	0.696	-2.248	2.944
20	Short-range time management planning is more effective than long-range planning	0.064	-2.429	2.492
17	Time to market is a critical phase	1.419	-1.028	2.447
31	Success can be measured in term of meeting the budget	0.675	-1.286	1.961
18	Being on schedule is very important	1.433	-0.373	1.806
2	A proportion of project's budget and time should spend on safety and health practices.	0.663	-0.996	1.659
42	Effective resource allocation and management can improve org	1.603	-0.037	1.64

47	Being along scope ensure project success	0	-1.507	1.507
37	Advance risk assessment provide aid to decision making	1.668	0.224	1.445
24	First time right (FTR) is a very important approach	0.448	-0.955	1.404
36	Proactive risk management can ensure project success	-0.409	-1.768	1.358
29	A cost/benefit analysis is considered	1.709	0.442	1.267
26	Customer or stakeholder engagement is essential	0.108	-0.919	1.027
34	Risk management must be according to the goals of the organization	0.278	-0.479	0.757
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629	-0.037	0.665
3	Sustainable resources should be used.	0.33	-0.294	0.624
50	Project's scope statement is very important	0.768	0.147	0.621
48	A well-defined scope can help to avoid other common problems	1.752	1.137	0.615
16	Checking the schedule must be prioritize	0.77	0.337	0.433
23	A quality review session is a must	0.127	-0.301	0.428
44	Resource availability may determine the duration of the project	1.196	0.776	0.42
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086	-0.37	0.284
39	Efficient resource management plays a vital role in the decision-making process	0.661	0.517	0.144

43	There should be long-term resource allocation should be prioritized	-0.589	-0.699	0.11
46	Scope is the baseline for managing other constraints	0.256	0.18	0.076
40	Available resources is the most important factor	-1.079	-1.037	-0.042
45	Project scope hold critical position	0.624	0.927	-0.303
19	Project's success can be measured in term of accomplishing the schedule	-0.301	0.081	-0.382
9	Health and Safety measurements should be checked	0.022	0.44	-0.417
22	Following the quality management (QM) plan is essential	0	0.516	-0.516
33	Risk Management is essential	-0.277	0.251	-0.528
11	The sustainability of the project life cycle is very important	-0.158	0.445	-0.603
27	The project delivery within the estimated cost should be prioritized	0.045	0.736	-0.691
8	We need to be aware of community opinions and point of view	-0.802	-0.07	-0.732
6	The amount of energy used in the project is very important to consider	-1.228	-0.333	-0.895
5	The social, environmental and economical consequences are critical	-1.816	-0.886	-0.93
30	Cost is a very important factor to take into consideration	0.086	1.143	-1.057
12	There should be sustainable procurement	-0.835	0.406	-1.241
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.694	0.629	-1.323

14	The waste produced as a result of project life-cycle is significant	-1.849	-0.337	-1.512
7	Stakeholder commitment and engagement is important	-1.804	-0.109	-1.695
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972	0.954	-1.926
4	People's point of view are listened to understand	-0.082	1.917	-1.999
15	Time is a very important factor	-0.815	1.209	-2.024
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149	1.913	-2.063
21	Quality is very important Factor	-1.155	0.957	-2.111
41	Estimating resource activity may directly affect other constraints	-1.73	0.48	-2.21
1	The ecological footprint (Human demand on nature) should be	-1.572	1.365	-2.937
13	Renewable resources are important	-1.263	1.695	-2.958

TABLE D9: Descending Array of Differences between Factors 2 and 5.

Descending Array of Differences Between Factors 2 and 5				
No.	**Statement**	**Type 2**	**Type 5**	**Difference**
29	A cost/benefit analysis is considered	1.709	-1.768	3.477
18	Being on schedule is very important	1.433	-1.768	3.201
20	Short-range time management planning is more effective than long-range planning	0.064	-2.121	2.185
48	Well-defined scope can help to avoid other common problems	1.752	-0.354	2.106

37	Advance risk assessment provide aid to decision making	1.668	-0.354	2.022
35	Risk Appetite should be compared with the risk capacity	1.634	0	1.634
50	Project's scope statement is very important	0.768	-0.707	1.475
31	Success can be measured in term of meeting the budget	0.675	-0.707	1.383
33	Risk Management is essential	-0.277	-1.414	1.138
9	Health and Safety measurements should be checked	0.022	-1.061	1.083
10	It's very crucial to take carbon footprint into account	0.696	-0.354	1.05
34	Risk management must be according to the goals of the organization	0.278	-0.707	0.985
4	People's point of views are listened to understand	-0.082	-1.061	0.979
11	The sustainability of the project life cycle is very important	-0.158	-1.061	0.903
42	Effective resource allocation and management can improve org	1.603	0.707	0.896
44	Resource availability may determine the duration of the project	1.196	0.354	0.842
22	Following the quality management (QM) plan is essential	0	-0.707	0.707
2	A proportion of project's budget and time should spend on safety and health practices.	0.663	0	0.663
30	Cost is a very important factor to take into consideration	0.086	-0.354	0.44
17	Time to market is a critical phase	1.419	1.061	0.358
3	Sustainable resources should be used.	0.33	0	0.33

28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086	-0.354	0.268
6	The amount of energy used in the project is very important to consider	-1.228	-1.414	0.186
26	Customer or stakeholder engagement is essential	0.108	0	0.108
16	Checking the schedule must be prioritize	0.77	0.707	0.063
27	The project delivery within the estimated cost should be prioritized	0.045	0	0.045
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629	0.707	-0.078
45	Project scope hold critical position	0.624	0.707	-0.083
13	Renewable resources are important	-1.263	-1.061	-0.202
47	Being along scope ensure project success	0	0.354	-0.354
40	Available resources is the most important factor	-1.079	-0.707	-0.372
14	The waste produced as a result of project life-cycle is significant	-1.849	-1.414	-0.434
15	Time is a very important factor	-0.815	-0.354	-0.461
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149	0.354	-0.503
23	A quality review session is a must	0.127	0.707	-0.58
43	There should be long-term resource allocation should be prioritized	-0.589	0	-0.589
46	Scope is the baseline for managing other constraints	0.256	1.061	-0.805

12	There should be sustainable procurement	-0.835	0	-0.835
24	First time right (FTR) is a very important approach	0.448	1.414	-0.966
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.694	0.354	-1.048
39	Efficient resource management plays a vital role in the decision-making process	0.661	1.768	-1.106
21	Quality is very important Factor	-1.155	0.354	-1.508
7	Stakeholder commitment and engagement is important	-1.804	0	-1.804
5	The social, environmental and economical consequences are critical	-1.816	0.354	-2.169
36	Proactive risk management can ensure project success	-0.409	1.768	-2.177
8	We need to be aware of community opinions and point of view	-0.802	1.414	-2.217
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972	1.414	-2.387
19	Project's success can be measured in term of accomplishing the schedule	-0.301	2.121	-2.422
1	The ecological footprint (Human demand on nature) should be	-1.572	1.061	-2.633
41	Estimating resource activity may directly affect other constraints	-1.73	1.061	-2.791

TABLE D10: Descending Array of Differences between Factors 2 and 6.

Descending Array of Differences Between Factors 2 and 6				
No.	**Statement**	**Type 2**	**Type 6**	**Difference**

17	Time to market is a critical phase	1.419	-1.405	2.824
24	First time right (FTR) is a very important approach	0.448	-2.162	2.611
31	Success can be measured in term of meeting the budget	0.675	-1.671	2.346
35	Risk Appetite should be compared with the risk capacity	1.634	-0.417	2.05
16	Checking the schedule must be prioritize	0.77	-1.266	2.036
42	Effective resource allocation and management can improve org	1.603	-0.324	1.927
46	Scope is the baseline for managing other constraints	0.256	-1.593	1.849
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.694	-2.255	1.561
29	A cost/benefit analysis is considered	1.709	0.232	1.478
18	Being on schedule is very important	1.433	-0.044	1.477
44	Resource availability may determine the duration of the project	1.196	-0.014	1.21
50	Project's scope statement is very important	0.768	-0.434	1.201
26	Customer or stakeholder engagement is essential	0.108	-1.003	1.111
48	A well-defined scope can help to avoid other common problems	1.752	0.728	1.024
37	Advance risk assessment provide aid to decision making	1.668	0.662	1.007
19	Project's success can be measured in term of accomplishing the schedule	-0.301	-1.173	0.873
43	There should be long-term resource allocation should be prioritized	-0.589	-1.374	0.784

27	The project delivery within the estimated cost should be prioritized	0.045	-0.694	0.739
10	It's very crucial to take carbon footprint into account	0.696	0.061	0.635
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086	-0.696	0.61
45	Project scope hold critical position	0.624	0.248	0.376
2	A proportion of project's budget and time should spend on safety and health practices.	0.663	0.726	-0.063
13	Renewable resources are important	-1.263	-1.174	-0.089
20	Short-range time management planning is more effective than long-range planning	0.064	0.155	-0.092
3	Sustainable resources should be used.	0.33	0.54	-0.211
30	Cost is a very important factor to take into consideration	0.086	0.324	-0.238
4	People's point of views are listened to understand	-0.082	0.229	-0.311
11	The sustainability of the project life cycle is very important	-0.158	0.263	-0.421
34	Risk management must be according to the goals of the organization	0.278	0.74	-0.462
22	Following the quality management (QM) plan is essential	0	0.482	-0.482
39	Efficient resource management plays a vital role in the decision-making process	0.661	1.359	-0.697
14	The waste produced as a result of project life-cycle is significant	-1.849	-1.144	-0.704

9	Health and Safety measurements should be checked	0.022	0.728	-0.706
23	A quality review session is a must	0.127	0.942	-0.815
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972	-0.061	-0.912
1	The ecological footprint (Human demand on nature) should be	-1.572	-0.604	-0.968
41	Estimating resource activity may directly affect other constraints	-1.73	-0.57	-1.16
6	The amount of energy used in the project is very important to consider	-1.228	0.136	-1.365
12	There should be sustainable procurement	-0.835	0.558	-1.393
8	We need to be aware of community opinions and point of view	-0.802	0.616	-1.418
33	Risk Management is essential	-0.277	1.174	-1.45
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629	2.133	-1.504
47	Being along scope ensure project success	0	1.527	-1.527
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149	1.391	-1.54
15	Time is a very important factor	-0.815	0.743	-1.557
40	Available resources is the most important factor	-1.079	0.535	-1.614
36	Proactive risk management can ensure project success	-0.409	1.434	-1.843

5	The social, environmental and economical consequences are critical	-1.816	0.061	-1.877
7	Stakeholder commitment and engagement is important	-1.804	0.265	-2.069
21	Quality is very important Factor	-1.155	1.084	-2.238

TABLE D11: Descending Array of Differences between Factors 2 and 7.

Descending Array of Differences Between Factors 2 and 7				
No.	**Statement**	**Type 2**	**Type 7**	**Difference**
37	Advance risk assessment provide aid to decision making	1.668	-1.275	2.943
29	A cost/benefit analysis is considered	1.709	-0.899	2.608
18	Being on schedule is very important	1.433	-1.159	2.592
48	A well-defined scope can help to avoid other common problems	1.752	-0.579	2.331
3	Sustainable resources should be used.	0.33	-1.941	2.271
39	Efficient resource management plays a vital role in the decision-making process	0.661	-0.869	1.531
42	Effective resource allocation and management can improve org	1.603	0.087	1.516
9	Health and Safety measurements should be checked	0.022	-1.42	1.442
31	Success can be measured in term of meeting the budget	0.675	-0.319	0.994
24	First time right (FTR) is a very important approach	0.448	-0.521	0.97
35	Risk Appetite should be compared with the risk capacity	1.634	0.783	0.851
50	Project's scope statement is very important	0.768	0	0.768

32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	0.629	-0.116	0.745
17	Time to market is a critical phase	1.419	0.753	0.666
14	The waste produced as a result of project life-cycle is significant	-1.849	-2.492	0.643
44	Resource availability may determine the duration of the project	1.196	0.637	0.558
43	There should be long-term resource allocation should be prioritized	-0.589	-1.072	0.483
11	The sustainability of the project life cycle is very important	-0.158	-0.637	0.479
45	Project scope hold critical position	0.624	0.232	0.392
15	Time is a very important factor	-0.815	-1.188	0.373
10	It's very crucial to take carbon footprint into account	0.696	0.348	0.348
41	Estimating resource activity may directly affect other constraints	-1.73	-2.057	0.327
34	Risk management must be according to the goals of the organization	0.278	0.029	0.249
8	We need to be aware of community opinions and point of view	-0.802	-1.015	0.212
2	A proportion of project's budget and time should spend on safety and health practices.	0.663	0.58	0.083
23	A quality review session is a must	0.127	0.087	0.04
16	Checking the schedule must be prioritize	0.77	0.753	0.016
22	Following the quality management (QM) plan is essential	0	0.145	-0.145
47	Being along scope ensure project success	0	0.232	-0.232

4	People's point of views are listened to understand	-0.082	0.232	-0.314
46	Scope is the baseline for managing other constraints	0.256	0.608	-0.352
21	Quality is very important Factor	-1.155	-0.753	-0.401
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	-0.149	0.289	-0.439
7	Stakeholder commitment and engagement is important	-1.804	-1.072	-0.732
40	Available resources is the most important factor	-1.079	-0.319	-0.76
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.086	0.84	-0.926
30	Cost is a very important factor to take into consideration	0.086	1.101	-1.015
20	Short-range time management planning is more effective than long-range planning	0.064	1.159	-1.095
6	The amount of energy used in the project is very important to consider	-1.228	-0.057	-1.171
26	Customer or stakeholder engagement is essential	0.108	1.361	-1.253
27	The project delivery within the estimated cost should be prioritized	0.045	1.304	-1.259
19	Project's success can be measured in term of accomplishing the schedule	-0.301	1.072	-1.373
12	There should be sustainable procurement	-0.835	0.551	-1.386

5	The social, environmental and economical consequences are critical	-1.816	-0.348	-1.468
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-0.694	0.811	-1.505
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.972	0.667	-1.639
36	Proactive risk management can ensure project success	-0.409	1.275	-1.684
13	Renewable resources are important	-1.263	0.435	-1.698
33	Risk Management is essential	-0.277	2.144	-2.421
1	The ecological footprint (Human demand on nature) should be	-1.572	1.593	-3.166

TABLE D12: Descending Array of Differences between Factors 3 and 4.

Descending Array of Differences Between Factors 3 and 4				
No.	**Statement**	**Type 3**	**Type 4**	**Difference**
2	A proportion of project's budget and time should spend on safety and health practices.	2.347	-0.996	3.343
47	Being along scope ensure project success	0.97	-1.507	2.478
10	It's very crucial to take carbon footprint into account	0	-2.248	2.248
3	Sustainable resources should be used.	1.862	-0.294	2.156
26	Customer or stakeholder engagement is essential	1.193	-0.919	2.112
43	There should be long-term resource allocation should be prioritized	1.118	-0.699	1.817
46	The scope is the baseline for managing other constraints	1.937	0.18	1.757

36	Proactive risk management can ensure project success	-0.41	-1.768	1.358
40	Available resources is the most important factor	0.075	-1.037	1.113
35	Risk Appetite should be compared with the risk capacity	-0.223	-1.325	1.102
5	The social, environmental and economical consequences are critical	0.111	-0.886	0.998
20	Short-range time management planning is more effective than long-range planning	-1.714	-2.429	0.714
11	The sustainability of the project life cycle is very important	1.118	0.445	0.673
42	Effective resource allocation and management can improve org	0.485	-0.037	0.522
17	Time to market is a critical phase	-0.597	-1.028	0.432
50	Project's scope statement is very important	0.521	0.147	0.374
7	Stakeholder commitment and engagement is important	0.262	-0.109	0.371
14	The waste produced as a result of project life-cycle is significant	0	-0.337	0.337
12	There should be sustainable procurement	0.708	0.406	0.302
23	A quality review session is a must	-0.036	-0.301	0.265
15	Time is a very important factor	1.452	1.209	0.243
1	The ecological footprint (Human demand on nature) should be	1.603	1.365	0.238
44	Resource availability may determine the duration of the project	1.006	0.776	0.231
37	Advance risk assessment provide aid to decision making	0.148	0.224	-0.076

28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.446	-0.37	-0.076
29	A cost/benefit analysis is considered	0.334	0.442	-0.108
39	Efficient resource management plays a vital role in the decision-making process	0.298	0.517	-0.219
18	Being on schedule is very important	-0.597	-0.373	-0.223
34	Risk management must be according to the goals of the organization	-0.783	-0.479	-0.304
41	Estimating resource activity may directly affect other constraints	0.151	0.48	-0.33
49	Efficient scope management can establish a control factor that helps to control other constraints	0.148	0.629	-0.481
30	Cost is a very important factor to take into consideration	0.633	1.143	-0.51
33	Risk Management is essential	-0.262	0.251	-0.513
24	First time right (FTR) is a very important approach	-1.528	-0.955	-0.572
6	The amount of energy used in the project is very important to consider	-1.006	-0.333	-0.673
19	Project's success can be measured in term of accomplishing the schedule	-0.708	0.081	-0.789
9	Health and Safety measurements should be checked	-0.446	0.44	-0.886
48	A well-defined scope can help to avoid other common problems	0.111	1.137	-1.026
31	Success can be measured in term of meeting the budget	-2.459	-1.286	-1.173
16	Checking the schedule must be prioritize	-0.859	0.337	-1.196

13	Renewable resources are important	0.485	1.695	-1.21
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-1.269	-0.037	-1.232
45	Project scope hold critical position	-0.374	0.927	-1.301
21	Quality is very important Factor	-0.521	0.957	-1.478
22	Following the quality management (QM) plan is essential	-1.006	0.516	-1.522
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.633	0.954	-1.587
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.298	1.913	-1.615
27	The project delivery within the estimated cost should be prioritized	-0.895	0.736	-1.631
8	We need to be aware of community opinions and point of view	-1.751	-0.07	-1.68
4	People's point of views are listened to understand	-0.856	1.917	-2.773

TABLE D13: Descending Array of Differences between Factors 3 and 5.

Descending Array of Differences Between Factors 3 and 5				
No.	**Statement**	**Type 3**	**Type 5**	**Difference**
2	A proportion of project's budget and time should spend on safety and health practices.	2.347	0	2.347
11	The sustainability of the project life cycle is very important	1.118	-1.061	2.179
29	A cost/benefit analysis is considered	0.334	-1.768	2.102
3	Sustainable resources should be used.	1.862	0	1.862

15	Time is a very important factor	1.452	-0.354	1.806
13	Renewable resources are important	0.485	-1.061	1.546
14	The waste produced as a result of project life-cycle is significant	0	-1.414	1.414
50	Project's scope statement is very important	0.521	-0.707	1.228
26	Customer or stakeholder engagement is essential	1.193	0	1.193
18	Being on schedule is very important	-0.597	-1.768	1.171
33	Risk Management is essential	-0.262	-1.414	1.152
43	There should be long-term resource allocation should be prioritized	1.118	0	1.118
30	Cost is a very important factor to take into consideration	0.633	-0.354	0.986
46	The scope is the baseline for managing other constraints	1.937	1.061	0.877
40	Available resources is the most important factor	0.075	-0.707	0.782
12	There should be sustainable procurement	0.708	0	0.708
44	Resource availability may determine the duration of the project	1.006	0.354	0.653
47	Being along scope ensure project success	0.97	0.354	0.617
9	Health and Safety measurements should be checked	-0.446	-1.061	0.615
1	The ecological footprint (Human demand on nature) should be	1.603	1.061	0.542
37	Advance risk assessment provide aid to decision making	0.148	-0.354	0.501
48	Well-defined scope can help to avoid other common problems	0.111	-0.354	0.465

6	The amount of energy used in the project is very important to consider	-1.006	-1.414	0.408
20	Short-range time management planning is more effective than long-range planning	-1.714	-2.121	0.407
10	It's very crucial to take carbon footprint into account	0	-0.354	0.354
7	Stakeholder commitment and engagement is important	0.262	0	0.262
4	People's point of view are listened to understand	-0.856	-1.061	0.205
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.298	0.354	-0.055
34	Risk management must be according to the goals of the organization	-0.783	-0.707	-0.076
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.446	-0.354	-0.092
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.148	0.354	-0.206
42	Effective resource allocation and management can improve org	0.485	0.707	-0.222
35	Risk Appetite should be compared with the risk capacity	-0.223	0	-0.223
5	The social, environmental and economical consequences are critical	0.111	0.354	-0.242
22	Following the quality management (QM) plan is essential	-1.006	-0.707	-0.299
23	A quality review session is a must	-0.036	0.707	-0.743

21	Quality is very important Factor	-0.521	0.354	-0.875
27	The project delivery within the estimated cost should be prioritized	-0.895	0	-0.895
41	Estimating resource activity may directly affect other constraints	0.151	1.061	-0.91
45	Project scope hold critical position	-0.374	0.707	-1.081
39	Efficient resource management plays a vital role in the decision-making process	0.298	1.768	-1.469
16	Checking the schedule must be prioritize	-0.859	0.707	-1.566
17	Time to market is a critical phase	-0.597	1.061	-1.657
31	Success can be measured in term of meeting the budget	-2.459	-0.707	-1.752
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-1.269	0.707	-1.976
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.633	1.414	-2.047
36	Proactive risk management can ensure project success	-0.41	1.768	-2.178
19	Project's success can be measured in term of accomplishing the schedule	-0.708	2.121	-2.829
24	First time right (FTR) is a very important approach	-1.528	1.414	-2.942
8	We need to be aware of community opinions and point of view	-1.751	1.414	-3.165

TABLE D14: Descending Array of Differences between Factors 3 and 6.

Descending Array of Differences Between Factors 3 and 6				
No.	**Statement**	**Type 3**	**Type 6**	**Difference**

46	Scope is the baseline for managing other constraints	1.937	-1.593	3.53
43	There should be long-term resource allocation should be prioritized	1.118	-1.374	2.492
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.148	-2.255	2.403
1	The ecological footprint (Human demand on nature) should be	1.603	-0.604	2.207
26	Customer or stakeholder engagement is essential	1.193	-1.003	2.196
13	Renewable resources are important	0.485	-1.174	1.659
2	A proportion of project's budget and time should spend on safety and health practices.	2.347	0.726	1.621
3	Sustainable resources should be used.	1.862	0.54	1.322
14	The waste produced as a result of project life-cycle is significant	0	-1.144	1.144
44	Resource availability may determine the duration of the project	1.006	-0.014	1.021
50	Project's scope statement is very important	0.521	-0.434	0.955
11	The sustainability of the project life cycle is very important	1.118	0.263	0.855
42	Effective resource allocation and management can improve org	0.485	-0.324	0.809
17	Time to market is a critical phase	-0.597	-1.405	0.809
41	Estimating resource activity may directly affect other constraints	0.151	-0.57	0.721
15	Time is a very important factor	1.452	0.743	0.71
24	First time right (FTR) is a very important approach	-1.528	-2.162	0.635

19	Project's success can be measured in term of accomplishing the schedule	-0.708	-1.173	0.465
16	Checking the schedule must be prioritize	-0.859	-1.266	0.408
30	Cost is a very important factor to take into consideration	0.633	0.324	0.309
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.446	-0.696	0.25
35	Risk Appetite should be compared with the risk capacity	-0.223	-0.417	0.194
12	There should be sustainable procurement	0.708	0.558	0.15
29	A cost/benefit analysis is considered	0.334	0.232	0.103
5	The social, environmental and economical consequences are critical	0.111	0.061	0.051
7	Stakeholder commitment and engagement is important	0.262	0.265	-0.003
10	It's very crucial to take carbon footprint into account	0	0.061	-0.061
27	The project delivery within the estimated cost should be prioritized	-0.895	-0.694	-0.201
40	Available resources is the most important factor	0.075	0.535	-0.46
37	Advance risk assessment provide aid to decision making	0.148	0.662	-0.514
18	Being on schedule is very important	-0.597	-0.044	-0.553
47	Being along scope ensure project success	0.97	1.527	-0.557
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.633	-0.061	-0.572

48	Well-defined scope can help to avoid other common problems	0.111	0.728	-0.617
45	Project scope hold critical position	-0.374	0.248	-0.622
31	Success can be measured in term of meeting the budget	-2.459	-1.671	-0.788
23	A quality review session is a must	-0.036	0.942	-0.978
39	Efficient resource management plays a vital role in the decision-making process	0.298	1.359	-1.06
4	People's point of views are listened to understand	-0.856	0.229	-1.084
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.298	1.391	-1.092
6	The amount of energy used in the project is very important to consider	-1.006	0.136	-1.143
9	Health and Safety measurements should be checked	-0.446	0.728	-1.174
33	Risk Management is essential	-0.262	1.174	-1.436
22	Following the quality management (QM) plan is essential	-1.006	0.482	-1.489
34	Risk management must be according to the goals of the organization	-0.783	0.74	-1.524
21	Quality is very important Factor	-0.521	1.084	-1.605
36	Proactive risk management can ensure project success	-0.41	1.434	-1.844
20	Short-range time management planning is more effective than long-range planning	-1.714	0.155	-1.87
8	We need to be aware of community opinions and point of view	-1.751	0.616	-2.367

32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-1.269	2.133	-3.402

TABLE D15: Descending Array of Differences between Factors 3 and 7.

Descending Array of Differences Between Factors 3 and 7				
No.	**Statement**	**Type 3**	**Type 7**	**Difference**
3	Sustainable resources should be used.	1.862	-1.941	3.803
15	Time is a very important factor	1.452	-1.188	2.64
14	The waste produced as a result of project life-cycle is significant	0	-2.492	2.492
41	Estimating resource activity may directly affect other constraints	0.151	-2.057	2.208
43	There should be long-term resource allocation should be prioritized	1.118	-1.072	2.19
2	A proportion of project's budget and time should spend on safety and health practices.	2.347	0.58	1.767
11	The sustainability of the project life cycle is very important	1.118	-0.637	1.755
37	Advance risk assessment provide aid to decision making	0.148	-1.275	1.422
7	Stakeholder commitment and engagement is important	0.262	-1.072	1.334
46	The scope is the baseline for managing other constraints	1.937	0.608	1.329
29	A cost/benefit analysis is considered	0.334	-0.899	1.233
39	Efficient resource management plays a vital role in the decision-making process	0.298	-0.869	1.168
9	Health and Safety measurements should be checked	-0.446	-1.42	0.974

47	Being along scope ensure project success	0.97	0.232	0.738
48	Well-defined scope can help to avoid other common problems	0.111	-0.579	0.69
18	Being on schedule is very important	-0.597	-1.159	0.562
50	Project's scope statement is very important	0.521	0	0.521
5	The social, environmental and economical consequences are critical	0.111	-0.348	0.459
42	Effective resource allocation and management can improve org	0.485	0.087	0.398
40	Available resources is the most important factor	0.075	-0.319	0.394
44	Resource availability may determine the duration of the project	1.006	0.637	0.369
21	Quality is very important Factor	-0.521	-0.753	0.232
12	There should be sustainable procurement	0.708	0.551	0.157
13	Renewable resources are important	0.485	0.435	0.05
1	The ecological footprint (Human demand on nature) should be	1.603	1.593	0.01
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.298	0.289	0.009
23	A quality review session is a must	-0.036	0.087	-0.123
26	Customer or stakeholder engagement is essential	1.193	1.361	-0.168
10	It's very crucial to take carbon footprint into account	0	0.348	-0.348
30	Cost is a very important factor to take into consideration	0.633	1.101	-0.468

45	Project scope hold critical position	-0.374	0.232	-0.606
49	Efficient scope management can establish a control factor that helps to control other constraints	0.148	0.811	-0.663
8	We need to be aware of community opinions and point of view	-1.751	-1.015	-0.736
34	Risk management must be according to the goals of the organization	-0.783	0.029	-0.813
6	The amount of energy used in the project is very important to consider	-1.006	-0.057	-0.949
35	Risk Appetite should be compared with the risk capacity	-0.223	0.783	-1.006
24	First time right (FTR) is a very important approach	-1.528	-0.521	-1.006
4	People's point of views are listened to understand	-0.856	0.232	-1.088
22	Following the quality management (QM) plan is essential	-1.006	0.145	-1.152
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-1.269	-0.116	-1.153
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.446	0.84	-1.286
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.633	0.667	-1.299
17	Time to market is a critical phase	-0.597	0.753	-1.35
16	Checking the schedule must be prioritize	-0.859	0.753	-1.612
36	Proactive risk management can ensure project success	-0.41	1.275	-1.684

19	Project's success can be measured in term of accomplishing the schedule	-0.708	1.072	-1.78
31	Success can be measured in term of meeting the budget	-2.459	-0.319	-2.14
27	The project delivery within the estimated cost should be prioritized	-0.895	1.304	-2.199
33	Risk Management is essential	-0.262	2.144	-2.406
20	Short-range time management planning is more effective than long-range planning	-1.714	1.159	-2.873

TABLE D16: Descending Array of Differences between Factors 4 and 5.

Descending Array of Differences Between Factors 4 and 5				
No.	**Statement**	**Type 4**	**Type 5**	**Difference**
4	People's point of views are listened to understand	1.917	-1.061	2.978
13	Renewable resources are important	1.695	-1.061	2.756
29	A cost/benefit analysis is considered	0.442	-1.768	2.21
33	Risk Management is essential	0.251	-1.414	1.665
15	Time is a very important factor	1.209	-0.354	1.563
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	1.913	0.354	1.56
11	The sustainability of the project life cycle is very important	0.445	-1.061	1.506
9	Health and Safety measurements should be checked	0.44	-1.061	1.5
30	Cost is a very important factor to take into consideration	1.143	-0.354	1.496
48	A well-defined scope can help to avoid other common problems	1.137	-0.354	1.491

18	Being on schedule is very important	-0.373	-1.768	1.394
22	Following the quality management (QM) plan is essential	0.516	-0.707	1.223
6	The amount of energy used in the project is very important to consider	-0.333	-1.414	1.081
14	The waste produced as a result of project life-cycle is significant	-0.337	-1.414	1.077
50	Project's scope statement is very important	0.147	-0.707	0.854
27	The project delivery within the estimated cost should be prioritized	0.736	0	0.736
21	Quality is very important Factor	0.957	0.354	0.603
37	Advance risk assessment provide aid to decision making	0.224	-0.354	0.577
44	Resource availability may determine the duration of the project	0.776	0.354	0.422
12	There should be sustainable procurement	0.406	0	0.406
1	The ecological footprint (Human demand on nature) should be	1.365	1.061	0.305
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.629	0.354	0.275
34	Risk management must be according to the goals of the organization	-0.479	-0.707	0.228
45	Project scope hold critical position	0.927	0.707	0.22
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.37	-0.354	-0.016
7	Stakeholder commitment and engagement is important	-0.109	0	-0.109
3	Sustainable resources should be used.	-0.294	0	-0.294

20	Short-range time management planning is more effective than long-range planning	-2.429	-2.121	-0.307
40	Available resources is the most important factor	-1.037	-0.707	-0.33
16	Checking the schedule must be prioritize	0.337	0.707	-0.37
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	0.954	1.414	-0.46
31	Success can be measured in term of meeting the budget	-1.286	-0.707	-0.579
41	Estimating resource activity may directly affect other constraints	0.48	1.061	-0.58
43	There should be long-term resource allocation should be prioritized	-0.699	0	-0.699
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-0.037	0.707	-0.744
42	Effective resource allocation and management can improve org	-0.037	0.707	-0.744
46	The scope is the baseline for managing other constraints	0.18	1.061	-0.881
26	Customer or stakeholder engagement is essential	-0.919	0	-0.919
2	A proportion of project's budget and time should spend on safety and health practices.	-0.996	0	-0.996
23	A quality review session is a must	-0.301	0.707	-1.008
5	The social, environmental and economical consequences are critical	-0.886	0.354	-1.24

39	Efficient resource management plays a vital role in the decision-making process	0.517	1.768	-1.251
35	Risk Appetite should be compared with the risk capacity	-1.325	0	-1.325
8	We need to be aware of community opinions and point of view	-0.07	1.414	-1.485
47	Being along scope ensure project success	-1.507	0.354	-1.861
10	It's very crucial to take carbon footprint into account	-2.248	-0.354	-1.894
19	Project's success can be measured in term of accomplishing the schedule	0.081	2.121	-2.041
17	Time to market is a critical phase	-1.028	1.061	-2.089
24	First time right (FTR) is a very important approach	-0.955	1.414	-2.369
36	Proactive risk management can ensure project success	-1.768	1.768	-3.535

TABLE D17: Descending Array of Differences between Factors 4 and 6.

Descending Array of Differences Between Factors 4 and 6				
No.	**Statement**	**Type 4**	**Type 6**	**Difference**
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.629	-2.255	2.884
13	Renewable resources are important	1.695	-1.174	2.869
1	The ecological footprint (Human demand on nature) should be	1.365	-0.604	1.969
46	Scope is the baseline for managing other constraints	0.18	-1.593	1.773
4	People's point of views are listened to understand	1.917	0.229	1.689

16	Checking the schedule must be prioritize	0.337	-1.266	1.603
27	The project delivery within the estimated cost should be prioritized	0.736	-0.694	1.43
19	Project's success can be measured in term of accomplishing the schedule	0.081	-1.173	1.254
24	First time right (FTR) is a very important approach	-0.955	-2.162	1.207
41	Estimating resource activity may directly affect other constraints	0.48	-0.57	1.05
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	0.954	-0.061	1.015
30	Cost is a very important factor to take into consideration	1.143	0.324	0.819
14	The waste produced as a result of project life-cycle is significant	-0.337	-1.144	0.808
44	Resource availability may determine the duration of the project	0.776	-0.014	0.79
45	Project scope hold critical position	0.927	0.248	0.679
43	There should be long-term resource allocation should be prioritized	-0.699	-1.374	0.675
50	Project's scope statement is very important	0.147	-0.434	0.581
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	1.913	1.391	0.522
15	Time is a very important factor	1.209	0.743	0.466
48	A well-defined scope can help to avoid other common problems	1.137	0.728	0.409

31	Success can be measured in term of meeting the budget	-1.286	-1.671	0.385
17	Time to market is a critical phase	-1.028	-1.405	0.377
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.37	-0.696	0.326
42	Effective resource allocation and management can improve org	-0.037	-0.324	0.287
29	A cost/benefit analysis is considered	0.442	0.232	0.211
11	The sustainability of the project life cycle is very important	0.445	0.263	0.182
26	Customer or stakeholder engagement is essential	-0.919	-1.003	0.084
22	Following the quality management (QM) plan is essential	0.516	0.482	0.033
21	Quality is very important Factor	0.957	1.084	-0.127
12	There should be sustainable procurement	0.406	0.558	-0.152
9	Health and Safety measurements should be checked	0.44	0.728	-0.289
18	Being on schedule is very important	-0.373	-0.044	-0.33
7	Stakeholder commitment and engagement is important	-0.109	0.265	-0.374
37	Advance risk assessment provide aid to decision making	0.224	0.662	-0.438
6	The amount of energy used in the project is very important to consider	-0.333	0.136	-0.47
8	We need to be aware of community opinions and point of view	-0.07	0.616	-0.686
3	Sustainable resources should be used.	-0.294	0.54	-0.835

39	Efficient resource management plays a vital role in the decision-making process	0.517	1.359	-0.842
35	Risk Appetite should be compared with the risk capacity	-1.325	-0.417	-0.909
33	Risk Management is essential	0.251	1.174	-0.923
5	The social, environmental and economical consequences are critical	-0.886	0.061	-0.947
34	Risk management must be according to the goals of the organization	-0.479	0.74	-1.219
23	A quality review session is a must	-0.301	0.942	-1.243
40	Available resources is the most important factor	-1.037	0.535	-1.573
2	A proportion of project's budget and time should spend on safety and health practices.	-0.996	0.726	-1.722
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-0.037	2.133	-2.17
10	It's very crucial to take carbon footprint into account	-2.248	0.061	-2.309
20	Short-range time management planning is more effective than long-range planning	-2.429	0.155	-2.584
47	Being along scope ensure project success	-1.507	1.527	-3.034
36	Proactive risk management can ensure project success	-1.768	1.434	-3.202

TABLE D18: Descending Array of Differences between Factors 4 and 7.

Descending Array of Differences Between Factors 4 and 7				
No.	**Statement**	**Type 4**	**Type 7**	**Difference**

41	Estimating resource activity may directly affect other constraints	0.48	-2.057	2.538
15	Time is a very important factor	1.209	-1.188	2.397
14	The waste produced as a result of project life-cycle is significant	-0.337	-2.492	2.155
9	Health and Safety measurements should be checked	0.44	-1.42	1.86
48	A well-defined scope can help to avoid other common problems	1.137	-0.579	1.716
21	Quality is very important Factor	0.957	-0.753	1.71
4	People's point of views are listened to understand	1.917	0.232	1.685
3	Sustainable resources should be used.	-0.294	-1.941	1.647
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	1.913	0.289	1.624
37	Advance risk assessment provide aid to decision making	0.224	-1.275	1.498
39	Efficient resource management plays a vital role in the decision-making process	0.517	-0.869	1.386
29	A cost/benefit analysis is considered	0.442	-0.899	1.341
13	Renewable resources are important	1.695	0.435	1.26
11	The sustainability of the project life cycle is very important	0.445	-0.637	1.083
7	Stakeholder commitment and engagement is important	-0.109	-1.072	0.963
8	We need to be aware of community opinions and point of view	-0.07	-1.015	0.944
18	Being on schedule is very important	-0.373	-1.159	0.785
45	Project scope hold critical position	0.927	0.232	0.695

43	There should be long-term resource allocation should be prioritized	-0.699	-1.072	0.373
22	Following the quality management (QM) plan is essential	0.516	0.145	0.37
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	0.954	0.667	0.287
50	Project's scope statement is very important	0.147	0	0.147
44	Resource availability may determine the duration of the project	0.776	0.637	0.138
32	Efficient cost management ensures an adequate supply of funds from the right source at the right cost and time	-0.037	-0.116	0.079
30	Cost is a very important factor to take into consideration	1.143	1.101	0.042
42	Effective resource allocation and management can improve org	-0.037	0.087	-0.123
12	There should be sustainable procurement	0.406	0.551	-0.145
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.629	0.811	-0.182
1	The ecological footprint (Human demand on nature) should be	1.365	1.593	-0.228
6	The amount of energy used in the project is very important to consider	-0.333	-0.057	-0.276
23	A quality review session is a must	-0.301	0.087	-0.388
16	Checking the schedule must be prioritize	0.337	0.753	-0.416
46	Scope is the baseline for managing other constraints	0.18	0.608	-0.428

24	First time right (FTR) is a very important approach	-0.955	-0.521	-0.434
34	Risk management must be according to the goals of the organization	-0.479	0.029	-0.508
5	The social, environmental and economical consequences are critical	-0.886	-0.348	-0.538
27	The project delivery within the estimated cost should be prioritized	0.736	1.304	-0.568
40	Available resources is the most important factor	-1.037	-0.319	-0.719
31	Success can be measured in term of meeting the budget	-1.286	-0.319	-0.967
19	Project's success can be measured in term of accomplishing the schedule	0.081	1.072	-0.991
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.37	0.84	-1.21
2	A proportion of project's budget and time should spend on safety and health practices.	-0.996	0.58	-1.576
47	Being along scope ensure project success	-1.507	0.232	-1.739
17	Time to market is a critical phase	-1.028	0.753	-1.782
33	Risk Management is essential	0.251	2.144	-1.893
35	Risk Appetite should be compared with the risk capacity	-1.325	0.783	-2.108
26	Customer or stakeholder engagement is essential	-0.919	1.361	-2.28
10	It's very crucial to take carbon footprint into account	-2.248	0.348	-2.596
36	Proactive risk management can ensure project success	-1.768	1.275	-3.042

20	Short-range time management planning is more effective than long-range planning	-2.429	1.159	-3.587

TABLE D19: Descending Array of Differences between Factors 5 and 6.

Descending Array of Differences Between Factors 5 and 6				
No.	**Statement**	**Type 5**	**Type 6**	**Difference**
24	First time right (FTR) is a very important approach	1.414	-2.162	3.577
19	Project's success can be measured in term of accomplishing the schedule	2.121	-1.173	3.295
46	The scope is the baseline for managing other constraints	1.061	-1.593	2.653
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.354	-2.255	2.608
17	Time to market is a critical phase	1.061	-1.405	2.466
16	Checking the schedule must be prioritize	0.707	-1.266	1.973
1	The ecological footprint (Human demand on nature) should be	1.061	-0.604	1.665
41	Estimating resource activity may directly affect other constraints	1.061	-0.57	1.631
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	1.414	-0.061	1.475
43	There should be long-term resource allocation should be prioritized	0	-1.374	1.374
42	Effective resource allocation and management can improve org	0.707	-0.324	1.031
26	Customer or stakeholder engagement is essential	0	-1.003	1.003

31	Success can be measured in term of meeting the budget	-0.707	-1.671	0.963
8	We need to be aware of community opinions and point of view	1.414	0.616	0.798
27	The project delivery within the estimated cost should be prioritized	0	-0.694	0.694
45	Project scope hold critical position	0.707	0.248	0.459
35	Risk Appetite should be compared with the risk capacity	0	-0.417	0.417
39	Efficient resource management plays a vital role in the decision-making process	1.768	1.359	0.409
44	Resource availability may determine the duration of the project	0.354	-0.014	0.368
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.354	-0.696	0.343
36	Proactive risk management can ensure project success	1.768	1.434	0.334
5	The social, environmental and economical consequences are critical	0.354	0.061	0.293
13	Renewable resources are important	-1.061	-1.174	0.113
23	A quality review session is a must	0.707	0.942	-0.235
7	Stakeholder commitment and engagement is important	0	0.265	-0.265
14	The waste produced as a result of project life-cycle is significant	-1.414	-1.144	-0.27
50	Project's scope statement is very important	-0.707	-0.434	-0.273
10	It's very crucial to take carbon footprint into account	-0.354	0.061	-0.414
3	Sustainable resources should be used.	0	0.54	-0.54

12	There should be sustainable procurement	0	0.558	-0.558
30	Cost is a very important factor to take into consideration	-0.354	0.324	-0.678
2	A proportion of project's budget and time should spend on safety and health practices.	0	0.726	-0.726
21	Quality is very important Factor	0.354	1.084	-0.73
37	Advance risk assessment provide aid to decision making	-0.354	0.662	-1.015
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.354	1.391	-1.037
48	Well-defined scope can help to avoid other common problems	-0.354	0.728	-1.082
15	Time is a very important factor	-0.354	0.743	-1.096
47	Being along scope ensure project success	0.354	1.527	-1.173
22	Following the quality management (QM) plan is essential	-0.707	0.482	-1.189
40	Available resources is the most important factor	-0.707	0.535	-1.242
4	People's point of views are listened to understand	-1.061	0.229	-1.289
11	The sustainability of the project life cycle is very important	-1.061	0.263	-1.324
32	Efficient cost management ensures an adequate supply of funds fr	0.707	2.133	-1.426
34	Risk management must be according to the goals of the organization	-0.707	0.74	-1.447

6	The amount of energy used in the project is very important to consider	-1.414	0.136	-1.55
18	Being on schedule is very important	-1.768	-0.044	-1.724
9	Health and Safety measurements should be checked	-1.061	0.728	-1.789
29	A cost/benefit analysis is considered	-1.768	0.232	-2
20	Short-range time management planning is more effective than long-range planning	-2.121	0.155	-2.277
33	Risk Management is essential	-1.414	1.174	-2.588

TABLE D20: Descending Array of Differences between Factors 5 and 7.

Descending Array of Differences Between Factors 5 and 7				
No.	**Statement**	**Type 5**	**Type 7**	**Difference**
41	Estimating resource activity may directly affect other constraints	1.061	-2.057	3.118
39	Efficient resource management plays a vital role in the decision-making process	1.768	-0.869	2.637
8	We need to be aware of community opinions and point of view	1.414	-1.015	2.429
3	Sustainable resources should be used.	0	-1.941	1.941
24	First time right (FTR) is a very important approach	1.414	-0.521	1.936
21	Quality is very important Factor	0.354	-0.753	1.107
14	The amount of waste produced in the project life cycle is significan	-1.414	-2.492	1.078
7	Stakeholder commitment and engagement is important	0	-1.072	1.072
43	There should be long-term resource allocation should be prioritized	0	-1.072	1.072

19	Project's success can be measured in term of accomplishing the schedule	2.121	1.072	1.049
37	Advance risk assessment provide aid to decision making	-0.354	-1.275	0.921
15	Time is a very important factor	-0.354	-1.188	0.834
32	Efficient cost management ensure adequate supply of funds	0.707	-0.116	0.823
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	1.414	0.667	0.748
5	The social, environmental and economical consequences are critical	0.354	-0.348	0.701
23	A quality review session is a must	0.707	0.087	0.62
42	Effective resource allocation and management can improve org	0.707	0.087	0.62
36	Proactive risk management can ensure project success	1.768	1.275	0.493
45	Project scope hold critical position	0.707	0.232	0.475
46	Scope is the baseline for managing other constraints	1.061	0.608	0.453
9	Health and Safety measurements should be checked	-1.061	-1.42	0.359
17	Time to market is a critical phase	1.061	0.753	0.307
48	Well-defined scope can help to avoid other common problems	-0.354	-0.579	0.225
47	Being along scope ensure project success	0.354	0.232	0.122
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	0.354	0.289	0.064

16	Checking the schedule must be prioritize	0.707	0.753	-0.046
44	Resource availability may determine the duration of the project	0.354	0.637	-0.284
31	Success can be measured in term of meeting the budget	-0.707	-0.319	-0.388
40	Available resources is the most important factor	-0.707	-0.319	-0.388
11	The sustainability of the project life cycle is very important	-1.061	-0.637	-0.423
49	Efficient scope management can establish a controlling factor that helps to control other constraints	0.354	0.811	-0.457
1	The ecological footprint (Human demand on nature) should be	1.061	1.593	-0.533
12	There should be sustainable procurement	0	0.551	-0.551
2	A proportion of project's budget and time should spend on safety and health practices.	0	0.58	-0.58
18	Being on schedule is very important	-1.768	-1.159	-0.609
10	It's very crucial to take carbon footprint into account	-0.354	0.348	-0.701
50	Project's scope statement is very important	-0.707	0	-0.707
34	Risk management must be according to the goals of the organization	-0.707	0.029	-0.736
35	Risk Appetite should be compared with the risk capacity	0	0.783	-0.783
22	Following the quality management (QM) plan is essential	-0.707	0.145	-0.852
29	A cost/benefit analysis is considered	-1.768	-0.899	-0.869

28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.354	0.84	-1.194
4	People's point of views are listened to understand	-1.061	0.232	-1.293
27	The project delivery within the estimated cost should be prioritized	0	1.304	-1.304
6	The amount of energy used in the project is very important to consider	-1.414	-0.057	-1.357
26	Customer or stakeholder engagement is essential	0	1.361	-1.361
30	Cost is a very important factor to take into consideration	-0.354	1.101	-1.455
13	Renewable resources are important	-1.061	0.435	-1.495
20	Short-range time management planning is more effective than long-range planning	-2.121	1.159	-3.28
33	Risk Management is essential	-1.414	2.144	-3.558

TABLE D21: Descending Array of Differences between Factors 6 and 7.

Descending Array of Differences Between Factors 6 and 7				
No.	**Statement**	**Type 6**	**Type 7**	**Difference**
3	Sustainable resources should be used.	0.54	-1.941	2.482
32	Efficient cost management ensures an adequate supply of funds fr	2.133	-0.116	2.249
39	Efficient resource management plays a vital role in the decision-making process	1.359	-0.869	2.228
9	Health and Safety measurements should be checked	0.728	-1.42	2.148
37	Advance risk assessment provide aid to decision making	0.662	-1.275	1.936

15	Time is a very important factor	0.743	-1.188	1.931
21	Quality is very important Factor	1.084	-0.753	1.837
8	We need to be aware of community opinions and point of view	0.616	-1.015	1.63
41	Estimating resource activity may directly affect other constraints	-0.57	-2.057	1.487
14	The waste produced as a result of project life-cycle is significant	-1.144	-2.492	1.347
7	Stakeholder commitment and engagement is important	0.265	-1.072	1.337
48	The well-defined scope can help to avoid other common problems	0.728	-0.579	1.307
47	Being along scope ensure project success	1.527	0.232	1.295
29	A cost/benefit analysis is considered	0.232	-0.899	1.13
18	Being on schedule is very important	-0.044	-1.159	1.115
25	Success can be measured in terms of customer satisfaction and conformance to functional and technical specification	1.391	0.289	1.101
11	The sustainability of the project life cycle is very important	0.263	-0.637	0.901
23	A quality review session is a must	0.942	0.087	0.855
40	Available resources is the most important factor	0.535	-0.319	0.854
34	Risk management must be according to the goals of the organization	0.74	0.029	0.711
5	The social, environmental and economical consequences are critical	0.061	-0.348	0.409
22	Following the quality management (QM) plan is essential	0.482	0.145	0.337

6	The amount of energy used in the project is very important to consider	0.136	-0.057	0.194
36	Proactive risk management can ensure project success	1.434	1.275	0.159
2	A proportion of project's budget and time should spend on safety and health practices.	0.726	0.58	0.146
45	Project scope hold critical position	0.248	0.232	0.016
12	There should be sustainable procurement	0.558	0.551	0.007
4	People's point of view are listened to understand	0.229	0.232	-0.003
10	It's very crucial to take carbon footprint into account	0.061	0.348	-0.287
43	There should be long-term resource allocation should be prioritized	-1.374	-1.072	-0.302
42	Effective resource allocation and management can improve org	-0.324	0.087	-0.41
50	Project's scope statement is very important	-0.434	0	-0.434
44	Resource availability may determine the duration of the project	-0.014	0.637	-0.652
38	A consistent approach, re-assessment, communication, and handling of risks should be prioritized	-0.061	0.667	-0.728
30	Cost is a very important factor to take into consideration	0.324	1.101	-0.777
33	Risk Management is essential	1.174	2.144	-0.97
20	Short-range time management planning is more effective than long-range planning	0.155	1.159	-1.003

35	Risk Appetite should be compared with the risk capacity	-0.417	0.783	-1.199
31	Success can be measured in term of meeting the budget	-1.671	-0.319	-1.352
28	A technique such as earned-value method (EV) should be used to analyze the project's progress	-0.696	0.84	-1.536
13	Renewable resources are important	-1.174	0.435	-1.609
24	First time right (FTR) is a very important approach	-2.162	-0.521	-1.641
27	The project delivery within the estimated cost should be prioritized	-0.694	1.304	-1.998
16	Checking the schedule must be prioritize	-1.266	0.753	-2.02
17	Time to market is a critical phase	-1.405	0.753	-2.158
1	The ecological footprint (Human demand on nature) should be	-0.604	1.593	-2.197
46	Scope is the baseline for managing other constraints	-1.593	0.608	-2.201
19	Project's success can be measured in term of accomplishing the schedule	-1.173	1.072	-2.245
26	Customer or stakeholder engagement is essential	-1.003	1.361	-2.364
49	Efficient scope management can establish a controlling factor that helps to control other constraints	-2.255	0.811	-3.066