T.C.
ISTANBUL GEDİK UNIVERSITY
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PROJECT MANAGEMENT PROCEDURE FOR THE CONSTRUCTION OF COOLED STORES FOR DRUGS AND MEDICINE IN IRAQ

MASTER'S THESIS

Abdulrasul Rahaif Radhi OGAILI

Engineering Management Master in English Program

JULY 2021

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(191281020)

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Thesis Advisor: Asst. Prof. Dr. Ahmet GÜLLÜ

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İSTANBUL GEDİK ÜNİVERSİTESİ
LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ MÜDÜRLÜĞÜ

Yüksek Lisans Tez Onay Belgesi

Enstitümüz, Engineering Management Department İngilizce Tezli Yüksek Lisans Programı 191281020) numaralı öğrencisi Abdulrasul Rahaif Radhi Ogaili'nin "Project Management Procedure for the Construction of Cooled Stores for Drugs and Medicine in Iraq" adlı tezçalışması Enstitümüz Yönetim Kurulunun 16.07.2021 tarihinde oluşturulan jüri tarafından *Oy Birliği* ile Yüksek Lisans tezi olarak *Kabul* edilmiştir.

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DECLARATION

I, Abdulrasul Rahaif Radhi OGAILI, do hereby declare that this thesis titled as "Project Management Procedure for the Construction of Cooled Stores for Drugs and Medicine in Iraq" is original work done by me for the award of the masters degree in the faculty of Engineering Management. I also declare that this thesis or any part of it has not been submitted and presented for any other degree or research paper in any other university or institution. (16/07/2021)

Abdulrasul Rahaif Radhi OGAILI

DEDICATION

My wonderful parents, who never cease to give of themselves in so many ways,

My beloved brothers and sisters, who are always there for me when things seem hopeless,

My cherished children.

To my whole family, the emblem of love and generosity,

My friends who love and inspire me,

All of the people in my life who have left an impression on me,

I dedicate this work….

PREFACE

I am grateful to everyone who helped me or advised me during my studies, especially my supervisor" Asst. Prof. Dr. Ahmet GÜLLÜ" and all the university staff who provided all possible help and advice to complete this work, and bring it out like this

July 2021 Abdulrasul Rahaif Radhi OGAILI

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ABBREVATIONS

Asymp. Sig	: Asymptotic Significance
CPM	: Critical Path Method
df	: Degree of freedom
NASA	: National Aeronautics and Space Administration.
PERT	: Program Evaluation Review Technique
PMO	: Project Management Office
SDLC	: Software Development Life Cycle
SPSS	: Statistical Package for the Social Sciences
WHO	: World Health Organization

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PROJECT MANAGEMENT PROCEDURE FOR THE CONSTRUCTION OF COOLED STORES FOR DRUGS AND MEDICINE IN IRAQ

ABSTRACT

Iraq is one of the countries that fluctuates in the climate greatly, as well as is characterized by a very hot summer, so the cold storage sector is very important in this country, especially medicine and medical supplies stores. One of the most important foundation areas is the warehousing sector. It includes many facilities, the most important of which are cold stores.After researching and investigating the necessary data in managing this type of project, it was found that there is a great shortage in that data, and this deficiency may be one of the reasons for the lag of this sector in Iraq.In order to evaluate the information and available data related to the management of cold store projects, a questionnaire was asked to take the opinion of engineers and specialists in this field. The questionnaire included several axes, and each axis included a group of questions. The questions were divided depending on their relationship to each other. The questions included gender, age, specialization, experience and the fact that the engineer previously worked in project management and other questions.

The analysis of the results of the questionnaire proved that the hypothesis of the study is correct, which is that the amount of available information and data is not sufficient for the development of the cold storage projects sector. Therefore, it is necessary to collect information, instructions and data related to this sector in a booklet and the rest of the documents included in the project since the beginning of the project. Aspreferredthat this booklet, be studied by every engineer assigned to manage projects before he begins his duties entrusted to him.

Based on the results of this study, which shows that there is a dearth of information related to the field of project management, a WaterFall framework was proposed because it is easy to learn and is compatible with the Iraqi administrative system. Where the study proposes to prepare the proposed framework in a way that suits the nature of construction projects in Iraq and focuses in particular on cold storage projects, as they are the subject of research.

Keywords: *Cold storage, Management, Medical and drags, Waterfall, Framework*

IRAK'TA SOĞUTMALI İLAÇ VE İLAÇ MAĞAZASI İNŞAATI İÇİN PROJE YÖNETİM PROSEDÜRÜ

ÖZET

Irak, iklimi büyük dalgalanan ülkelerden biridir. Ayrıca yazın aşırı yüksek sıcaklıktan muzdariptir. Bu yüzden hava soğutma sistemleri ve soğuk hava depoları sektörü bu ülkede çok önemli. Özellikle eczaneler ve tıbbi malzemeler depoları. Depo sektörü en önemli inşaat sektörlerinden biridir. İçerisinde en önemlisi hava soğutma depolar olmak üzere birçok tesisi bünyesinde bulundurmakta ve bu tür projelerin yönetiminde gerekli verilerin araştırılması ve araştırılmasından sonra bu verilerin önemli bir eksikliğinin olduğu ve bu eksikliğin bazı sebeplerden kaynaklıdır. Irak'ta bu sektörün başarısızlığı ile ilgili olarak, soğuk oda projelerinin yönetimi ile ilgili mevcut bilgi ve verilerin değerlendirilmesi amacıyla, bu alandaki mühendis ve uzmanların görüşlerinin alınması için bir anket istenmiştir. Bu anket birkaç tema içeriyordu ve her eksen bir dizi soru içeriyordu. Sorular birbirleriyle olan ilişkilerine göre bölünmüştür. Sorular arasında cinsiyet, yaş, uzmanlık, deneyim, mühendisin daha önce proje yönetiminde çalışmış olması ve diğer sorular yer aldı.

Anket sonuçlarının analizi, çalışmanın hipotezinin geçerliliğini kanıtladı, bu da mevcut bilgi ve veri miktarının soğuk hava deposu projeleri sektörünü geliştirmek için yetersiz olduğunu kanıtladı.Bu nedenle, bu sektörle ilgili bilgi, talimat ve verilerin bir kitapçıkta toplanması ve işin başlangıcından itibaren projede yer alan diğer belgelerin toplanması gerekmektedir.Bu kitapçığın, kendisine verilen görevlere başlamadan önce proje yönetiminden sorumlu her mühendis tarafından incelenmesi de tercih edilir.

Proje yönetimi alanıyla ilgili bilgi eksikliği olduğunu gösteren çalışmanın sonuçlarına göre, Waterfall çerçevesi, öğrenmesi kolay ve Irak idari sistemiyle uyumlu olduğu için önerilmiştir. Çalışmanın Irak'taki inşaat projelerinin doğasına uygun olarak önerilen çerçeveyi hazırlamayı önerdiği ve araştırma konusu olduğu için özellikle soğuk hava depoları projelerine odaklandığı yerler.

Anahtar kelimeler: *Soğuk hava deposu, Yönetim, Tıbbi malzemeler ve ilaçlar and drags, Waterfall, Yapı*

1. INTRODUCTION

Since ancient times, construction has been a basic need, and having a proper shelter is considered one of the most basic needs of man. Many cultures have built remarkable cities and buildings all over the world, and after thousands of years, some of them still stand. However, the environmental problem and human natures have never been more difficult for the global environment as they have been during this century. The world's population has been able to thrive at an incredible pace through developments in agriculture, commerce, manufacturing, and medicine.

In nearly every supply chain and sector, warehouses play a vital role. The increasing demand for warehouse and building areas has led to an expansion of the e-commerce business and mass adaptations, (Angel *et al.*, 2006).

Under the term project management, we mean a set of activities consisting in planning, organizing, managing and controlling the company's resources with a short-term goal, which was designed to meet specific goals and objectives. In order to fulfill the project's requirements, project management applies experience, expertise, resources, and technology to project activities, (Alena, 2011).Within the framework of project management, various analyzes are used, the aim of which is to assess and monitor deviations from the original plan, the course of budget execution and compliance with the set deadlines. Inefficiency, overdraft and non-compliance with the project completion deadline are the result of non-use of project management methods. A successful and high-quality project is considered to be one in which the balance of three factors of time, cost and resources is balanced.

1.1 Overview

Project management in construction industry helps in increasing outcomes of the project within to the scheduled budget and time. The role of project management become complex when the working culture is complexities. Recently, new technologies in construction industry increased which leads to productivity increase and improve the performance of all construction processes. On the other hand, the

construction industry faces many obstacles such as the increase in investment costs due to the delay in completing the project. New regulations or new rules issued by local governments and the increases in the building materials. All these obstacles are affecting the project quality. The approach of project management is very important to get set of techniques and tools with many types of risks associated with it. Furthermore, there is no a general rule are available for managers of the project to use as a guide for the suitable technique in each situation or to suggest the solution of any problems. So, managers of the project are the successful key to reach the project requirements. The managers of the project should be using their experiences to select the best technique of project.

Each project has life cycle which consists from collection of phases, in each project different techniques and tools are used. The project management stands on the most essential elements which are composed of quality, time and cost. In additional to that there are number partnersor stakeholders who are involved within a project managing process. The successful of any project depending on the teamwork between all these partners or stakeholders. This research aims to propose a framework for managing cold storage projects for storing medicines and medical materials in Iraq in an attempt to reduce construction costs and time while improving the quality of the final product. The study is based on analyzing the results of a questionnaire that was presented to specialists in this field. It also aims to choose a framework that is compatible with the administrative system adopted in Iraq.The term refrigeration' or refrigeration equipment' refers to any device that reduces air and product temperatures while also controlling relative humidity. A series of guidelines with the power of the Directive encompassing the features of the operations which are subject to a certain or standardized procedure without any loss of efficiency. Significant drivers for efficiency and organizational results might be standard operational policies and practices. The stock analysis tool categorizes goods by volume and value of use over a particular period, typically one year. Objects in Class A High-volume, fast-moving drugs account for 10 to 20% of products and 75 to 80 percent of expenses. Class B products make up 10 to 20% of total items and 15 to 20% of total expenses. Class C items account for 60 to 80 percent of gross expenses but just 5 to 10% of total spending; these are low-volume, slow-moving items. Thus, class C is an excellent place to look for items that might always not be needed in stock. The

project management framework for building projects is a framework to explain from the beginning to the conclusion procedures, methods, resources, tools and activities employed to create the project. Depending on the type and size of the project, several different frameworks are used in project management. one of the project management framework in Waterfall (Ajam, 2018).

1.2 Projects Managements Frameworks

Project management consists in the structured planning, organization and management of resources allotted to achieve project goals and results. A project management system is a series of traditional project management procedures, models and techniques for starting, planning, executing, controlling and concluding a project. The establishment of such a structure promotes decision-making, collaboration and teamwork across all portfolio projects and leads in turn to governance and management rigour. In the end, the use of corporate resources has been made more effective.

A project is defined by certain parameters. An activity or series of activities with a fixed beginning and end are defined as a project. A project needs to generate specified results and achieve particular outcomes in a consistent strategy and resource plan to support public policy objectives. In the scope, time, expensive and output criteria should be administered.

Many people misinterpret the approaches and frameworks of project management. However, the two approaches differ greatly. Table 1.1 ulutrate the difference between the two approaches.

Table 1.1: Project management methodologies vs frameworks

Methodology	Framework
• Rigid standards and techniques are supplied to complete a project.	• Give an outline of the implementation of guidelines.
• Is pretty rigid and prescriptive	• Allows for creative adaptation.
• Beginners preferred it	• experts preferred it
• All performance guidelines are spelled out in granular detail	• Performance metrices development and implementation is hard
• Cannot be incorporated into other activities and instruments	• Other practices and tools have room to be included

Source:(Best Project Management Methodologies and Frameworks Explained', no date)

The structure and guidance of a project are provided by the project management system. But, with the exception of project management approaches, it's neither excessively informative or static. Frameworks aim at initiatives aiming at their objectives while being agile enough to address changing situations.

1.2.1 The most famous methodologies and frameworks

1. Waterfall framework

Advantages:

- Documentation is extensive.
- Establishes simple client requirements
- Minimal client involvement is needed.
- Complete and easy to quantify.
- Methodological disadvantages of waterfall:
- Expensive and difficult Changes
- Unacceptable error in requirements(Best Project Management Methodologies and Frameworks Explained', no date)

2. Critical Chain Project Management (CCPM), (Leach, 2014)

Critical project chain management (CCPM) helps the project team to project's time projects and cost-effective projects, taking account of resource and mission dependencies. It finds and inserts reserves to ensure that each project milestone is reached on time, despite restricted resources and project uncertainty.

Benefits of this methodology are:

- CCPM is most often used in multi-project environments that necessitate a large amount of capital.
- It can be used on any project, no matter how big or small.
- Resources that do not have the full potential are utilized.

3. Agile Project Management, (Highsmith, 2009)

An iterative approach to project management that focuses on people and prioritizes the response to change over meticulous preparation. Agile project management techniques

It reduces the complexity of the project by breaking down the project cycle into smaller sections that allow for further modifications. It must comply with central ideals and key concepts defined in the Agile Manifesto in order to be called an agile project.

4. Kanban Methodology

The Kanban methodology is a means for firms to graphically plan and coordinate project activity through priority management tasks.

It is one of the simplest, most simple and powerful solutions accessible for project management. Kanban in short helps project managers with a single guide to manage their projects, records, lists and data, (Wakode, Raut and Talmale, 2015).

5. Scrum Methodology

The word Scrum came from Rugby. Scrum refers to the rugby method by which a team sweeps around the ball and attempts to push it around to win. The scrum system allows all team members to work together and complete a project effectively (Mahalakshmi and Sundararajan, 2013).

The Project methodology is the most commonly used Agile technique, enabling small, intimate teams to gradually build complicated products. From the imaginative and strategic levels, the Scrum process brings together instantly consumable, operable tasks for which all members of the team will work in the course of a sprin, (Mahalakshmi and Sundararajan, 2013).

6. Lean Project Management

The lean project management approach arose from Toyota's manufacturing units, which revolutionized physical products production in the 1950s. It later found applications in information practice, assisting companies in eliminating lean wastes, improving operations, and working with tighter budgets and shorter deadlines, (Ballard and Howell, 2003).

7. PRINCE2 Methodology

PRINCE2 is a complex process-based method which fully covers all aspect of project management. PRINCE2 provides a complete, process-oriented approach. It states how each step should be taken, explains deliveries in great depth, describes roles and responsibilities accurately, and much more. This is the right approach for large businesses, (Mousaei and Javdani, 2018).

1.2.2 Selection of the right framework for project management

Only if they are implemented in a practical way can approaches and methods for project management be helpful. It fails poorly when a structure or technique is forced upon a project.

If, on the other hand, you continue to learn the complications of a methodology or framework and adapt it to your particular business demands, a successful project will take place.

As there are so many tactics for project management on the market, choosing the right one could be tough. Outlines the concepts of framework selection

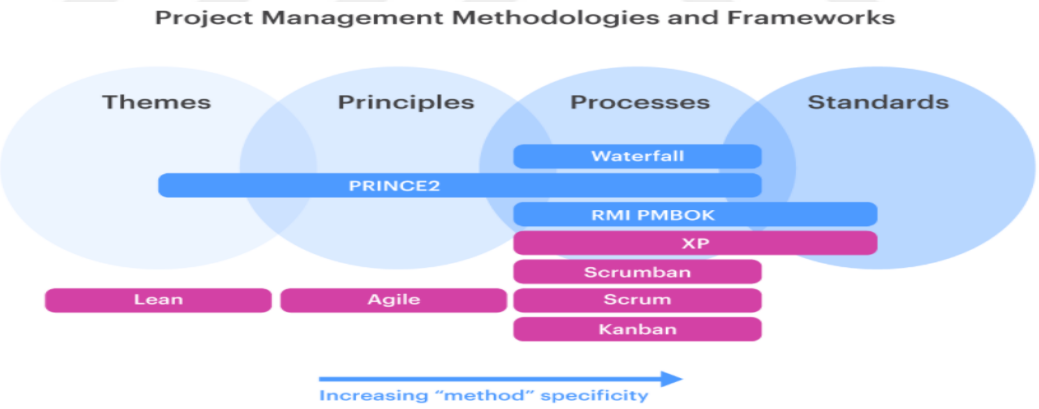

Figure 1.1: Framework selection principles

Source: (Best Project Management Methodologies and Frameworks Explained', no date)

1.3 Research Problem and Objective

The scarcity of information and the lack of specialized cadres in managing cold storage projects, especially those that are used in storing medical materials and medicines, make it necessary to put forward an appropriate framework for managing these projects.

This study aims to suggest a framework for the construction process. This framework will be easy to learn and is being used as an organizational project manager tool. The proposed framework is selected to be as a reference for projects managers and engineers in cooled storsin hot enviroments.

1.4 Thesis Limitations

This study focuses at the roles of the project manager and other engineers in the construction industry, with the project manager's job being to take overall responsibility for the project's execution, as well as budget and accountability, and the other engineers' roles being determined by their specialization and responsibility. The thesis is based on a case study of the construction of drug and medicine cooling stores in Iraq, and the concluding recommendations are thus appropriate. A good waterfall management framework is recommended as a solution for this type of project management.

1.5 Thesis Outlines

This thesis contains five chapters. Chapter one is an introduction, the literature review is in chapter tow. The methodology of the proposed framewark is disscused in chapter three. Chapter four contains results and discussion. While the conclusions and recomodations are in chapter five.

2. LITERATURE REVIEW

As the project management focuses on people's jobs, the aspects of harmony are extremely important to consider. This chapter emphasizes the value of advocating within the company a harmonized community for the proper application of the project management strategy. In addition, this chapter analyzes the role of stakeholders in the approach to project management and how they have shaped its implementation. Project management helps to produce efficient outcomes within the time needed and maintains the organization's growth by maintaining clients and ensuring their satisfaction, (Bodea, Dascalu and Coman, 2010).A further part of the chapter explores the different methods and strategies used to carry out project management effectively. It was however found that no tool can carry out all duties and no strategy for a specific problem is further recommended. It is upon the discretion of the project manager to implement a technique that he thinks fits into the particular situation.

2.1 Project Definition Concepts

The project concept helps to achieve realistic and derivable project management goals. The project process does not occur during the entire project management but during the initial time when performance criteria are obtained and before the final and full planning permits are granted, (Kähkönen, 1999).The concept of concepts is the beginning and starting point for the definition and interpretation of project management qualifications. Various factors contribute significantly to the design phase growth, such as external participants, internal stakeholders, project team and customer end-users. Most of the conceptual process consists of factors such as encouragement and coordination to ensure that correct concepts for project definitions are defined, (Munk-Madsen, no date). Various concepts related to project definitions are shown in figure 2.1.

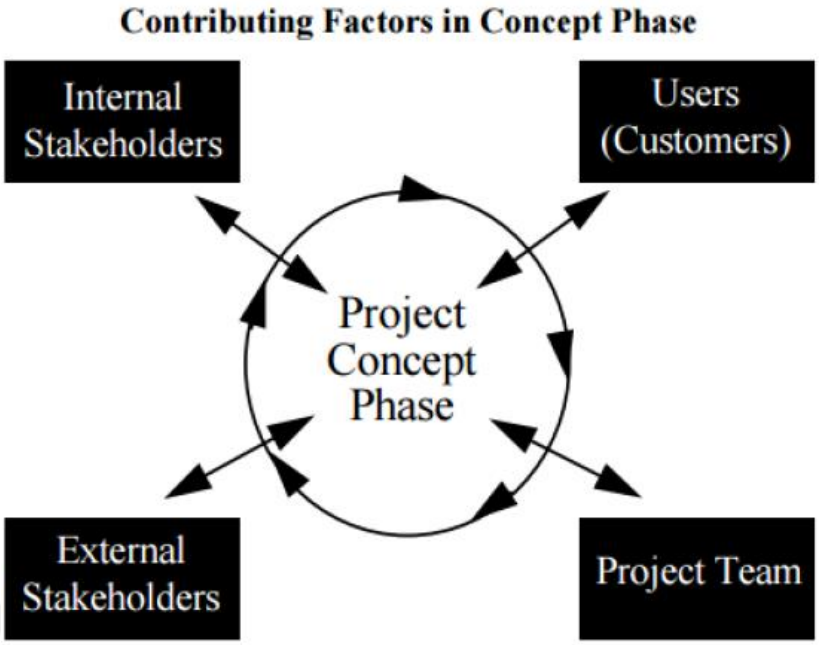

Figure 2.1: Stakeholders contributing in Concept Phase

The project definition stages are explained in figure 2.2, (Fewings and Henjewele, 2019). The stage in figure 2.2 are:

1- Step A: Beginning - it requires an identification of the customer's evaluation in terms of its criteria and potential constraints. It helps to create a correct procurement path.

2- Stage B: Feasibility- it includes preparing strategic briefs either on the part of the client or on behalf of the client. It helps in clearly identifying the organizational culture along with appointments of apt consultants, (Artto *et al.*, 2008).

3- Step C: Outline Proposals-includes study and examination of feasibility studies with regard to cost estimate, review of the procurement path, etc.

4- Step D: Scheme Design-includes the plan in depth with the completion of the brief. It also contains applications for development control approvals, (Fewings and Henjewele, 2019).

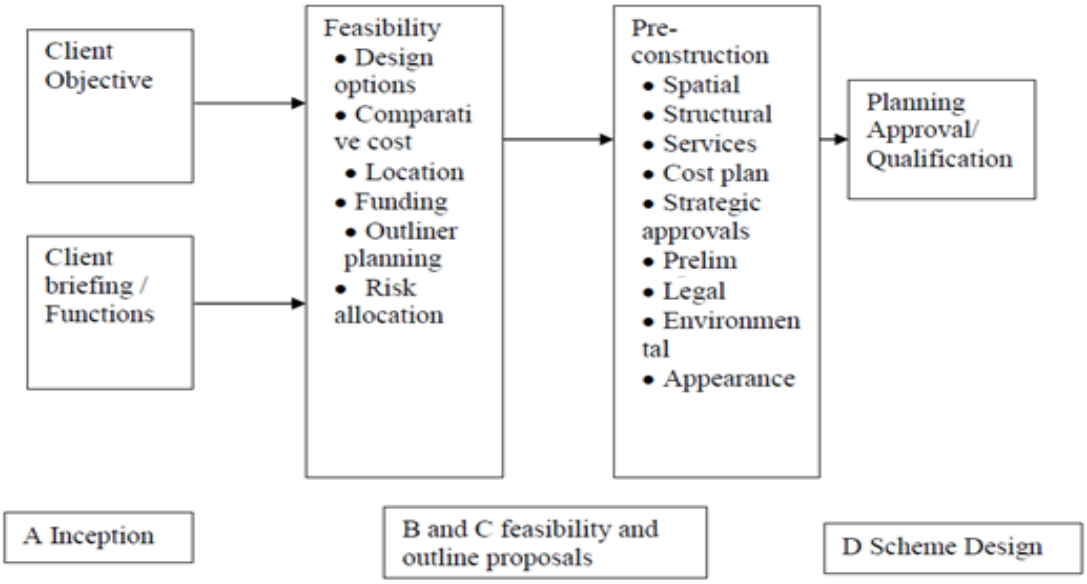

Figure 2.2: Stages of project definitions

2.2 Project Management Definition

It is vital first to understand the meaning of the term project to understand the notion of project management. "Project" is described as an endeavor to build a new product or service in a temporary manner. A project can be characterized as a process that has a specific start and end; there is also a clear resource requirement. Examples of projects include building a building or implementing a new program or application that will improve corporate operations. The project management principle has been created to handle these tasks, (Gray *et al.*, 2008).The application of expertise, specialist expertise, tools and processes to meet the project's requirements is therefore termed as project management. By applying the project management concept, the project carried out by specialists may be guaranteed on time and that the output is good and the best possible result. The project management principle can be implemented. The project management process has five responsibilities. The roles are the project start, adequate planning, implementation of the planned phase, process monitoring and monitoring, and project conclusion, (Oberlender, 2014).

The application of skills, experience, methods and tools to the different project activities designed to satisfy the needs of the project is termed project management, (Pinto, 2002).The implementation of Project Management shall be carried out by implementing and incorporating within it the preparation, initiation, execution, supervision, monitoring and finalization processes. The project manager is the person

in charge of ensuring that all of the project's objectives are met. Project management is also characterized as the process of identifying, planning, tracking, managing and implementing projects with the goal of achieving common and agreed benefits. Projects are a temporary and special effort that starts with a willingness to accomplish a certain result. The shift that is brought about by the project is most easily realized through the project management approach, (Kerzner, 2017).

Project management has different meanings, but can generally be characterized as an academic area devoted to certain planning techniques. These methods may be used to refine the theory or engineering sciences, (Turner, 2016).The project performance is accountable for various generic variables. In the last decade, other disciplines have increasingly drawn attention to the academic topic of project management. In the field of project management and project organization, there are various fresh perspectives. These views differ from the management of stakeholders to project costs, quality and time management, (Subramanyan, Sawant and Bhatt, 2012).

The area of project management has grown to organize, schedule and monitor the activities of manufacturing, commercial and IT ventures. These programs involve a diverse collection of tasks that need to be handled effectively. Projects in various fields have a similar trait, i.e., their innovations as well as their activities are entering into new activities. Risk elements that remain in a project become an impediment to the project's successful completion. Activities require specificity and risk reduction techniques, (Schwalbe, 2009).The project management process is highly complex and makes use of the proper and appropriate resources available to the company in a manner that ensures organized and managed achievement.The project management process is very complex, and it makes use of the proper and adequate tools available to the organization in such a way that the goals are coordinated and handled according to the organization's needs. Project management takes place within a distinct set of variables and constraints,(Young, 2016).The project's effectiveness is determined by how well it is handled in terms of expense and time. The necessary components for the success of the project are shown in figure2.3,(Artto *et al.*, 2008):

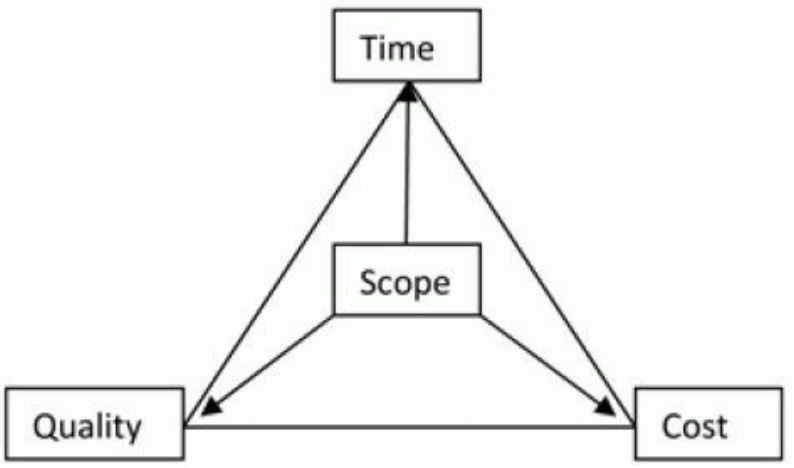

Figure 2.3: Components of Project Success

The success of the project is often measured on the basis of how well the team has handled it. Team management is a very critical part of the project success. The goal of the principle of project management is to achieve and achieve the goals of the proper management of the separate work packages, (Reid, 1999).The concepts listed earlier help to define the different viewpoints, complexity and importance of project management in the current context. It helps to recognize the features of project management that have evolved over the time of development and hence the improvements that have been acquired in this discipline. In particular, a management discipline, the project management methodology is now applicable to all ways in which it meets goals in accordance with its concepts.

2.3 Historical Overview of Project Management

It is essential to investigate the evolution and historical roots of project management in order to comprehend its various aspects. The art of project management dates back to the Egyptian period, although there was a lack of adequate project management at the time, (Chiu, 2010).Also, complex tasks were then handled by unorganized project management. In 1950, the Navy first applied new project management methodologies to its Polaris programs. Then, in the 1960s and 1970s, NASA and the Defense Department, along with major construction and engineering firms, implemented the concepts of project management. It can be analyzed that informal project management has existed since prehistoric times, but has now been transformed into formally structured project management, (Mishra, 2007).In 80ies, in the production and software development industries innovative project management

methodologies were adopted. In the 1990s, various sectors and organisations began to implement project management tools and techniques, (Morris, 2011).

After the Second World War, however, a new viewpoint of project management arose in relation to social practice. Project management methods and strategies have existed for decades, (Engwall, 2003).The practical development of a variety of projects, such as the Manhattan project, began in the 1940s. The chemical and oil sector in the Middle East has also led to project management growth as an occupation, ('Production Management Techniques', no date).The essence of project management has now changed as informal and unorganized project management has become more formal and organized. Progress and development in project management are still ongoing. New methods and strategies for project management are emerging. These project management strategies have been applied to schedule and monitor the costs, time and efficiency of construction projects, (Cicmil and Hodgson, 2006).

There are a series of paths and facets of project management that broaden the reach of the conceptual foundation of project management. Criticisms of project management theories and methods are growing, ('5 Techniques of Production Control | Production Management', no date).

2.4 Project Management in Developing Countries

Low levels of human and economic growth are main features of emerging economies around the world. The underdevelopment of these countries is contrasted with other developing or underdeveloped countries on the basis of capital revenue. The aspects of project management are heavily depended on by developed countries to ensure growth and progress in executing projects that are vital to the growth and development of the economy. Historical overview of project management in such developing countries can be listed as:

1- In the 1930s, the Soviet Union developed a project model aimed at handling growth in modern ways, while at the same time considering a centralized planning strategy. The model of centralized planning was eventually adopted by numerous developing countries after the Second World War, (Stuckenbruck and Zomorrodian, 1987).

2- In the 1960s, the Manhattan Project in the US was focused on centralized planning, ('Problems of project management in developing countries', no date).

3- Further support for centralized planning was provided during the period between the 1950s and the 1960s, when the Cold War took place. During this time, developing countries received high levels of funding, assistance and expertise from developed countries to construct centralized planning and effectively incorporate it within the planning system. This assistance from developed foreign countries, focused on projects, has been a medium by which development strategies of developing countries have been converted into real action, (Frimpong, Oluwoye and Crawford, 2003).

4- In the 1970s, developing countries began shifting towards project management models after analyzing the failure of the centralized planning model, which was replaced by the project management model. This model could be highly relied upon in the construction of highly complex structures. This paradigm also helped the matrix project and the pure organizational framework of the project. Under this model, a project manager was appointed who was solely responsible for the project from the start to the end, (Seymour and Hussein, 2014).

5- Project management has been highly relied upon to execute programs and strategies when establishing frameworks and initiatives in developing countries. Both private and public agencies have begun to rely heavily on aspects and execution of project management, making it a dominant concern. Foreign assistance was considered to be important in this respect, ('History of project management - Office Support', no date).

6- In developing countries, handling transition has not been encouraged by adopting a bureaucratic growth management model. As a result, the project management model has been widely relied on by developing countries to allow projects to be implemented and goals to be accomplished on a timely basis at both national and local level, (Burke, 2010).

Project management helps companies in developing in the following manner (figure 2.4), (Burke, 2010):

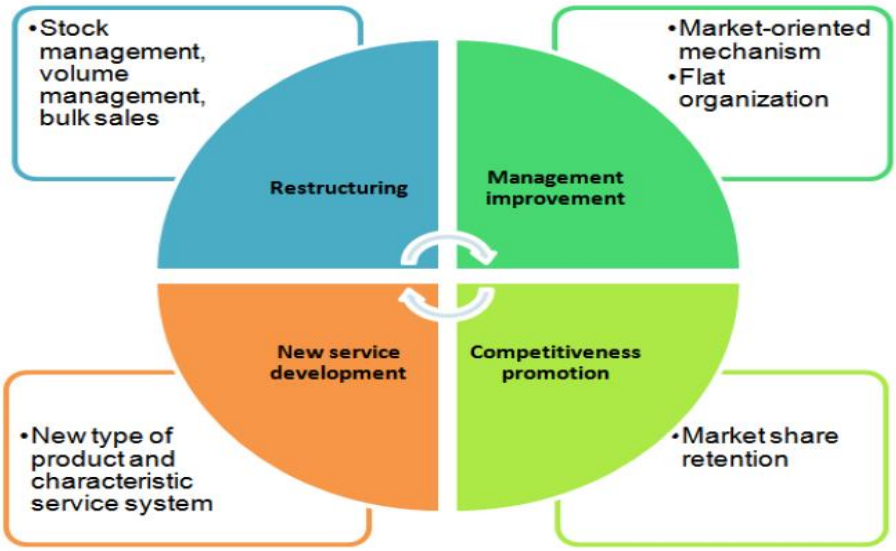

Figure 2.4: Development through Project Management

2.4.1 Development of project management theories

The origins of project management can be found in Egyptian pyramids, although this style of project management was informal and not well organized. Egyptian pyramids are considered to be early historical ventures. Modern projects were born in the 1950s. It was a time when tasks were handled with the aid of a range of methods and techniques, (Jugdev, 2008).After this time, the spread of modern tools and technology began with distinctive ventures. Those project management approaches were utilized to ensure that either the financial plan and the high project quality are maintained to make the project cost-effective. Strict timetables were also one of the key factors for implementing modern project management techniques. Since then, a variety of new ideas and methods have emerged in the academic area of project management, (Stretton, 2007).And though there were no project management institutions; the primary source for applying project management strategies was through books or manuals that helped to handle projects efficiently without any Gantt Charts, (Parker, Parsons and Isharyanto, 2015).Colossal ventures have been successfully completed and there is much evidence of them in history. The Great Wall of China, the Coliseum and the Pyramids of Giza are three of the most successfully run projects in history. Project management serves as a key to the development of an environment where shared goals can be accomplished by teamwork and high quality projects can be completed within a specific timeframe, (Mahadevan, 2015).Throughout history, society has worked together to improve and refine the ideas and methods of project management. The creation of more advanced

technologies and techniques would allow project managers to progress to the next level of project management in the future(Mahadevan, 2015).However, to date, the techniques to be used for each project management file are not specified and The project manager is consequently responsible for selecting the various possible ways. As a result, this sector is not yet completely established and needs study by researchers, educators, etc. to ensure that best practices are followed in every field of project management(Seymour and Hussein, 2014).

It was explicitly examined that there was no concrete theory of project management. The foundations for project management ideas have been best laid down (Project Management Institute, 2000) and are applied in the majority of projects. The basis of project management and its theories was understood by the bifurcation of project principles as well as the management and study of individual theories relevant to these concepts, (Drouin, Müller and Sankaran, 2013).Table 2.1 analyses various theories that are related to the individual aspects ofproject" andmanagement, (Koskela and Howell, 2002).

Table 2.1: Subject of Theory and Applicable Theories

Subject of Theory	Sub- Subject of Theory	Applicable Theories
Project	-	Transformation
=	-	Flow
=	-	Value Generation
Management	Control	Scientific Experimentation Model
=	=	Thermostat Model
=	Planning	Management as organizing
=	=	Management as Planning
=	Execution	Language/Action based
=	=	Classical Communication Theory

2.5 Benefits of Project Management

There are various benefits of adopting project management to address the needs of project management participants. project management is a roadmap containing the tools to assist managers in directing them during a project from one stage to the next, (Soriano, 2016).Improved productivity when providing services-helps steer the

project's deliverables in the right direction, ensuring smart work and integrating efficiency. Some of the benefits of project mangement:

1- Enhanced level of customer satisfaction-when projects is finished on schedule and without reaching the proposed budgets, the consumers of the project are satisfied and can easily be kept in the long run.

2- Improved effectiveness while delivering services- a planned and systematic approach with clear project deliverables helps in becoming effective.

3- Better competitive edge and market standing-project management helps ensure superior results and keeps consumers happy and pleased, has an over-arching impact on the company's overall standing and helps to achieve competitive edge over other competitive firms, (‘The Value of Project Management’, no date).

4- Improved levels of growth and development for the whole team – positive work helps to ensure greater teamwork between the members of the team, making them more productive and improving their personality as a whole(‘The Value of Project Management’, no date).

5- Enhanced job versatility-project management aims to incorporate flexibility into the project structure. It helps to discover the smarter action or course needed for a better outcome, (Wouter, 2020).

6- Better opportunities to expand the business and project- it is a by-product of enhanced market standing as great performance ensures exposure of new and better opportunities.

7- Better risk assessment: Potential risk elements can be easily detected when the approach works as expected. Project management helps to recognize risk elements before they ultimately meet project results, (Wells, 2012).

8- Improved quality: quality is improved by increasing the performance of work and operations, (Kerzner, 2002).

2.6 Challenges of Project Management

Project management is also not a task for one person, but requires several individuals to make efforts simultaneous. The entire team, including project managers, chief

financial officers, professional services directors and other team members, has therefore several problems while implementing the strategy and discipline of projects administration. These problems are:

1- Project teams that are geographically scattered: when teams that are part of the same project are geographically dispersed, it becomes impossible to follow a structured approach to project management. This challenge is new to project management and has come as new outsourcing and offshore construction work continues to evolve. It is impossible for a team living in distant continents to hold meetings at regular intervals, (Kerzner, 2002).

2- Misuse of resources: typically, there has been insufficient information on the availability of resources in the project management team. Teams are demanding more tasks even though there is a small number of project team members working with them and this leads to mismanagement or over-use of resources.

3- Implementation of the wrong task completion tool: many companies use local tools to handle work under project management. This leads to poor governance. It is therefore very critical that the project manager is well aware of sophisticated and innovative technology and resources, as well as of when they should be implemented to ensure the desired outcome. If inaccurate or outdated tools are placed in place, the whole purpose of introducing project management would be lost, ('Five Common Challenges with Managing a Project', no date).

4- Wasting time while searching for assets or documents: project scope documents such as issues lists, risk lists, emails, files and deliverables are included in project assets. Indeed, for the project manager it is impossible to safely track all these documents, and much of the time is lost in identifying and searching documents even though they are stored in highly advanced software systems. In addition, files for project management purposes may also be accessible to members of the other project team, which may lead to leakage of important information, ('Five Common Challenges with Managing a Project', no date).

5- Overspending time on the organisation of status meetings: updating the status of programs, meetings are held. However, it is complained that these meetings waste a lot of time and money and serve as an obstacle in executing and achieving the goals of project management. The model for updating the status of the project should therefore be updated and made virtual in order to address this obstacle, (Bittner and Gregorc, 2010).

2.7 Stakeholders of Project Management

The coordination of stakeholders when running a construction project is one of the most critical factors in project management. Stakeholders are an essential component of project management and should not be ignored at any stage of the process, (Cicmil and Hodgson, 2006).The regional or local planning process of a construction project includes different stakeholders and coordination among them is an integral part of successful project management, (Yang *et al.*, 2009).In order to improve this collaboration, a stakeholder review must be carried out first and foremost so that various groups of stakeholders can be identified. It will also help to define processes that will, in turn, help to include various groups of stakeholders. The collaboration strategy can be used to successfully carry out the planning process along with the identification of barriers. For this reason, the stakeholder analysis can be conducted with the aid of a matrix (figure 2.5).

Figure 2.5: Stakeholders of Project Management

In addition, stakeholders have a particular significance in the management of projects. There are several contemporary hypotheses explaining the value of stakeholder research. Various employee, vendor, finance, contractors and subcontractor stakeholder groups must take part in the participatory decisions in order to suit customers and consumers' needs, ('Project Stakeholders, their Roles and Contribution (Project Management free Business e-Coach)', no date).The organization and participation of stakeholders in the management of construction projects also relies on the investment of these stakeholders. Stakeholder mapping is a methodology that can help to improve collaboration between stakeholders. This helps to map the groups of stakeholders from which the priorities of the different stakeholders can be defined, (Newcombe, 2003).The stakeholders to the project management may be understood well from figure 2.6, ('Who are Stakeholders ? | Project Management, PMP - What is it all about ?', no date).

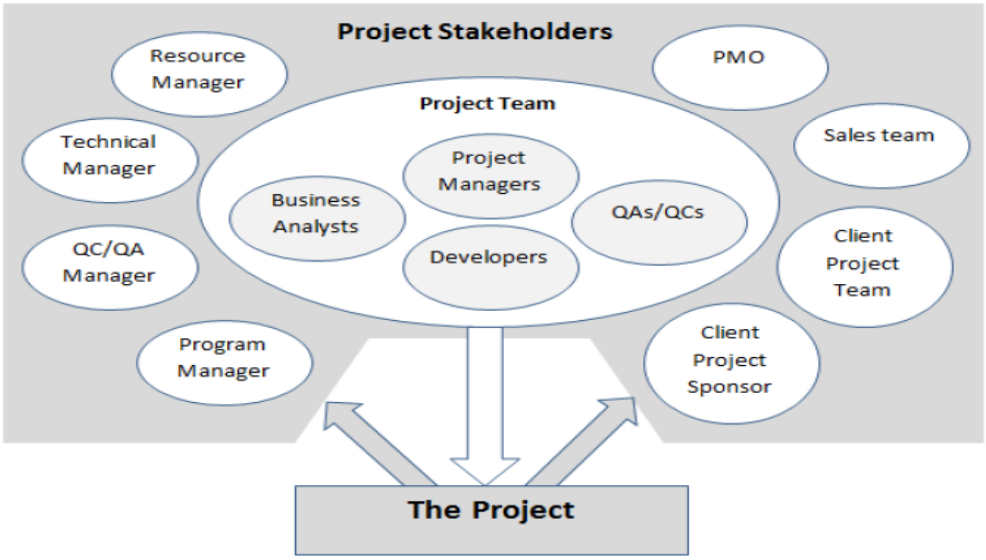

Figure 2.6: Project Management Stakeholders

2.8 Projectmanagementtechniques

The role of project management is demanding and requires a number of diverse responsibilities. Fortunately, project management provides a range of strategies that can allow project managers and team members to carry out projects and fulfill their roles effectively, (King and Cleland, 1988).Project managers must select a strategy that complements the management style embraced by the company. A single methodology cannot solve all the problems and satisfy all the requirements of project management, ('Project Management Software 2021 - Best Application Comparison |

GetApp®', no date).The most widely used methods for project management include Gantt Charts and Program Assessment Analysis Technique (PERT). Both strategies can either be purchased manually or as software programs that are readily accessible on the market. PERT is a strategy that ensures efficient preparation and monitoring and helps to clearly identify the activities that need to be done for the project. PERT maps can be used interchangeably with Critical Path Approaches or CPM charts, ('PERT/CPM - Difference Between PERT and CPM', no date).The time estimation for each task is the only difference between the two approaches. Both charts show a sequential list of scheduled activities for the entire project. The interrelationship of project components can be graphically illustrated using "CPM Diagram" or "Project Network;" it helps to clearly demonstrate the tasks that need to be carried out in a sequential order, (Maserang, 2020).

Simulation methods are helpful in calculating project completion time in order to complete stochastic networks. A number of studies have been done to analyze an efficient project management methodology, but the best technique out of a variety of techniques is simulation techniques that can be conducted using the Monte Carlo or GERT network techniques, (Burt Jr and Garman, 1971).

3. METHODOLOGY

The project manager's goal is to complete the project on schedule and on budget, while maintaining a high level of quality. Adjustments that take more time and money (sometimes even after the project is completed) are needed when the output is poor. To achieve these goals, project management must perform the following roles and responsibilities:

- Planning,
- Organizing,
- Staffing,
- Controlling,
- Directing.

Medicines designed to be used in food or in the form of a finished dose of veterinary animal that may be marketed to patients without a prescription, biologics and vaccides subject to exporting and importing country pharmaceutical legislation, including products requiring a prescription. Not including medical equipment. Systems with or without a thermostatic regulator maintaining a temperature-controlled environment within an adjoined structure, using a finite amount of preconditioned coolant as chilled or confined gel, phase-change goods, ice dry or other materials, (Sanchez and Terlizzi, 2017)(Team, 2014).

Construction project management framework is a framework used to describe processes, methods, resources, tools, and tasks used to construct the project from beginning to end. There are various sorts of frameworks applied in project management, depending on the type and size of the project. Waterfall is one of the foundation for project management in construction, (Ajam, 2018).

3.1 Waterfall Model Phases

The system analytical and design approach from Waterfall was the first modern approach to system construction to be built. In 1970 Winston W. Royce represented

this method, (Royce, 1987).It was easily gained administrators' approval because everything works logically from start to finish. Sources vary as regards the fundamental steps in the waterfall process, and the next paragraph details some of these variations. In each interpretation the fundamental reason and the fundamental steps are discussed, (Eriksson *et al.*, 2013).The first process model to be introduced was the Waterfall Model. You can easily understand and apply it. Before the next phase begins, every stage should be finished in the Waterfall model and there is no overlap between the stages. The first SDLC technique is the waterfall model for applications,(Adorno and Horkheimer, 2007).The whole software creation process is separated into different stages in the "Waterfall" technique. The result of a procedure will be used progressively as input for the next phase. Therefore, every stage can only begin when the previous phase has been completed. The waterfall model is a sequence design process that shows improvement in design, initiation, study, design, development, testing, manufacture/application and maintainance phases to be progressively downward (like waterfall). The medications and drug refrigeration stores will construct according to the WHO Technical Report Series No. 961, 2011 model storage guidelines. The waterfall model consists of four phases, Initiation; Planning (Design); Construction (Implementation); Management (Verification), and Deployment following section describes each phase in detail. The proposed waterfall model is shown in figure 3.1, (Negus and Pickering, 2004).

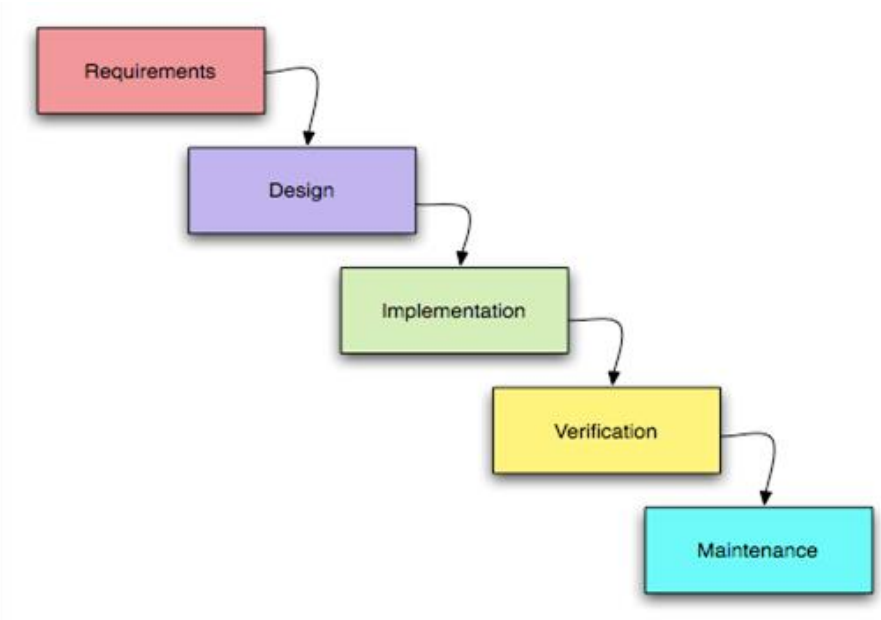

Figure 3.1: Waterfall model stages

Figure 3.1 illustrates the original waterfall process, created by Royce. Steps involve defining, designing, implementing, verifying and maintaining requirements. Other models move the process to the idea stage or divide the planning and analysis phasing step between the requirements, (Lang and Fitzgerald, 2006).

During the phase of requirements, Waterfall assumes that all requirements should be obtained in advance. There is now easy contact with the client since the project manager makes every effort to take the demands of the user into account. The process will go "downhill" once this step is over, (Leckenby and Li, 1997).The simplest way to comprehensively separate the design process into the physical and logical design subphases. System analysts utilize the knowledge obtained during the initialization step for developing the system in the logical design stage independently of hardware or software systems (Hoffer et al., 2008). After a higher level of logic, a structural layout based on specific hardware and software technology specifications will begin to be converted, (Ross and Schoman, 1977).

When all actual code is written, the implementation process takes place. This process is part of Waterfall's programmers because they comply with the project requirements and specifications and code the applications, (Reader, T. W., Flin, R., Mearns, K., & Cuthbertson, 2009).

In order to ensure the project meets customer expectations, Royce initially needed the verification process. In real world research and design, however, this stage is sometimes ignored. The project is implemented for the client and the maintenance process starts, (Brady, Davies and Gann, 2005).The customer uses the built application during the maintenance process. Since issues are identified because of incorrect specifications or other design errors or adjustments to user requirements, changes to the system will be made during the process, (Curtis, Krasner and Iscoe, 1988).

3.1.1 Waterfall method advantages

- Before any program is written, design errors are detected and time is saved during implementation.
- The deliverables provide excellent technical documentation, and new programmers are easier to keep up with speed during the maintenance stage.

- The method is highly organized and more accessible by comparison to established milestones to assess progress.
- After setting the criteria, the entire project costs may be determined precisely (via the functional and user interface specifications).
- Testing is more relaxed since the scenarios described in the functional specification can be referenced.

3.1.2 Waterfall methoddisadvantages

- Customers also find it hard to state their specifications at a practical specification's abstract level and fully understand what is required in the application. The re-engineering of the application then becomes difficult (and costly).
- The model does not address the potential for changes in requirements in the development cycle.
- A project can sometimes take far longer than when an incremental strategy such as an agile approach is used.

3.2 Project Phases

3.2.1 Initiation phase

The start of the project is the start of the project phase. It gives a summary of the design and the necessary procedures to achieve the intended goals. This is the most significant project document in that it incorporates this project's viability and market worth, (Chua, Kog and Loh, 1999):

- Business aims and objectives.
- Project objectives and advantages.
- Mention of parties involved.
- Scope of the project.
- Supplyable projects.
- Threats of the project.
- Plan and tools for the project.

The project initiation phase comprises the steps shown in figure 3.2,(Shostack, 1982):

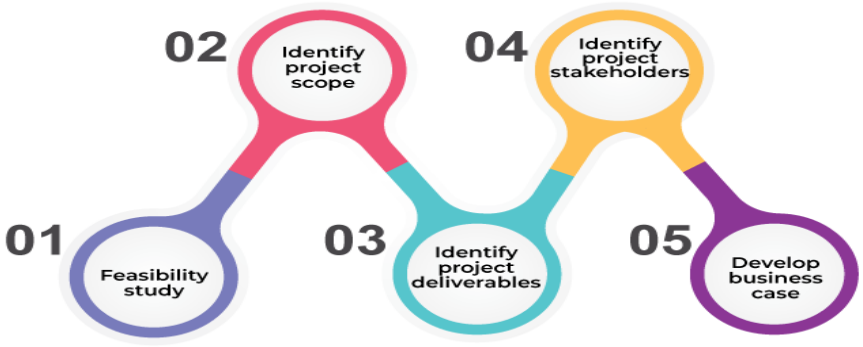

Figure 3.2: Intiationstagesteps

- **Feasibility Study:** In the initial stage, the workability of the project is crucial. See if the project is cost-effective, legal, operational and technical. Issues should be defined to determine whether the problems with appropriate solutions can be solved.
- **Identify the Project Scope:** The project scope must be determined by determining the project functions, delays, assignments, functionality and resources should be outlined in the same way.
- **Identify the Project Deliverables:** The following step is to characterize the project results when the project scope is determined. Project deliverables include the definition of the goods or services required.
- **Identification of Project Stakeholders:** The participants in the project must be thoroughly recognized. Teams and experts' meetings are easy for project stakeholders to recognize. The stakeholder input and impact on project progress need to be recorded.
- **Develop a Business Case:** Check if important foundations, such as feasibility, reach and recognition of stakeholders are in place before a business case is established. The next assignment is a complete business case.

The intiation phase activities are listed in table 3.1

Table 3.1: Initiation Phase activities

Initiation Phase	ACTIVITIES	DELIVERABLES
	• Requirement's documentation • Team agreements • Risk register • Risk related contractor • Cost estimates of activity. • Baseline of profitability. • Process Assets Organizational	• Configuration files for purchasing. • Work declaration on procurement. • Make – or- buy decisions • Records of procurement. • Change requests • Criteria for source selection

3.2.1.1 Conceptual design

A significant number of decisions need to be taken during the next phase, including the design stage; in this phase, the project manager should be collecting tasks to list all the necessary tasks to obtain the project. Saenz (2012) concludes however that "project" as a term belongs to the same organisation, as does project management. Therefore, it must not be tagged itself as a science. The paradigms for administrative science and organizational theory should instead be studied. No matter its unpredictable, dynamic and multidisciplinary existence, many of its conceptual foundation factors are based on social and group aspects. The studies conducted before in the conventional organization serve an important part in project management, however its significance should be regarded as transient.

Moreover, the majority of projects also suffer in the absence of project management, costs overruns, delays in project selection and start-up, project delivery delays, failures to co-ordinate, etc. Management and organizational factors such as project design, lack of stakeholder management, etc, (AlNasseri, AlNuaimi and Aulin, 2015).

3.2.1.2Detailed design

The second phase in the model involves the creation of a comprehensive design in order to identify the components and to display the project schedule with the aid of a Gantt diagram in order to measure time and costs for each task in the plan. The design has an effect on the project management practice more profoundly than in subsequent stages or during operation or construction, (Tribelsky and Sacks, 2010).

3.2.1.3Construction

In the construction phase, all team members should be responsible for completing their tasks according to the time plan in the project schedule. The project manager is responsible for overseeing and monitor the progress of the assignment to verify that the project is planned. Project managers should be reallocating resources and balancing the workload to avoid bottlenecks. Throughout the project progress, Stakeholders must be updated to demonstrate progress. So, the project manager should be organizing a regular meeting with them to discuss the project progress. After the team has delivered a working application, extensive testing must be conducted to ensure that everything works as designed. Table 3.2contains the main tasks during this phase. The project manager should be assuring from all required administrative tasks to finish the construction project. During the management, the obligations to all team members and all contractors should be pay.

Table 3.2: Main tasks during construction (Implementation) Phase

Construction Phase	Activities	Deliverables
	• Procurement files. • planforProject management • Contract • Reports ofPerformance • Modification application approved. • Information on work performance	• Documentation of procurement. • Process Assets Organizational. • Updates • Request for Change. • Updates to the project management plan

3.2.2 Project planning

During this point, planning is extensive in connection with the project. It's time to create a project plan for us to implement while determining project goals.

The preparation process provides the team with a collection of proposals into the execution and closing phases. Price, efficiency, risk, improvements and time would certainly help with the program. All essential information relating to project priorities, objectives and details on how to accomplish this should be incorporated into the developed project plan. Project managers struggle with operational constraints, design constraints and functional requirements in the most complicated process (Lamb and Kallal, 1992).The project planning phase includes the components shown in figure 3.3, (Jeong *et al.*, 2015):

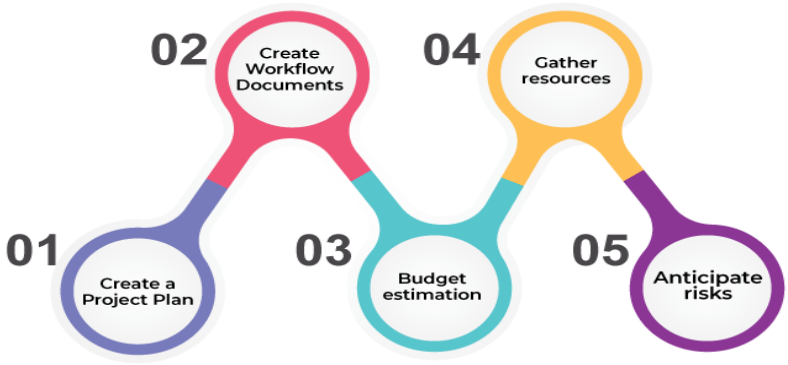

Figure 3.3: Project planning phase

3.2.2.1 Creating a project plan

For the entire project, a planning process is a copy. The list of activities, timescales, limitations and potential dangers should be identified in a well-structured project plan. It helps the project management simplify operations to reach the final goal and to monitor progress through proper decision-making at the right moment. A project plan takes into account the team approach to documents choices on the aim, scope, program, resources and deliverables for both teams and stakeholders. It is necessary to include usability in the project plan, so that time and resources are developed to do these operations, (Press *et al.*, 2005).

3.2.2.2 Creating a resource plan (Workflow documents)

The resource plan provides information on the different resource levels needed to finish a project. In a well-documented timing, the work and materials for a project are described. The services employed should be provided with specific project management experience. Experience is an objective in this sector. Resource planning lets you structure your team to know exactly on which tasks you work. Above all, a Ressource Manager who monitors your resource capabilities reliably guarantees that you control the time and burn nobody,(Umble, Haft and Umble, 2003).

3.2.2.3 Budget estimation

Preparing a financial strategy helps to develop a budget without overcoming it and to generate project results. The final budget covers stock, work and equipment costs. The draft budget will help the team and project management to track and control expenses throughout the life cycle of the project. It's down to finance for every project. If you have a larger budget, you will have more workers to accomplish the

project more quickly and more. Therefore, until a budget has been granted, no project plan will be completed. If the project is enormous or little, however, it still remains the same approach, regardless of the amount of cash and activities involved. All project costs are significantly estimated in detail. Until this is obtained, you include your forecasts into a budget plan. During the project work the budget can now be tracked, (Wen, Wang and Wang, 2005).

3.2.2.4 Gathering resources

The selection of resources is a significant part of project planning as it contributes to the quality monitoring of the project. There is not enough equilibrium, both internally and externally. It's not sufficient. Resources like computers, money, software solutions and the workplace should be given to complete the tasks.

3.2.2.5 Anticipating risks and potential quality roadblocks

The risk strategy will assist in identifying and mitigating risks. It includes all possible threats, the order of seriousness and preventive measures for monitoring them. Once risks are regulated, the project can be delivered promptly and quality-based. At this point, all specifications and documents necessary to begin building process should be determined by the Project Manager, (Futrell, Shafer and Shafer, 2002).

3.2.3 Project execution

The implementation of the plan is a project-related stage, task allocation and allocation of resources. The plan is important on providers to develop and satisfy themselves. The challenge can be achieved by the distribution of resources and the focused team members. The team will start producing project outcomes and attempt to achieve project objectives and objectives set out in the project plan. The decision in this stage is whether the project will succeed or not. The progress of the project mostly depends on the project's implementation procedure. The final project deliverable will also take shape throughout project execution, (Tatikonda and Rosenthal, 2000).Project execution phase details shown in figure 3.4.

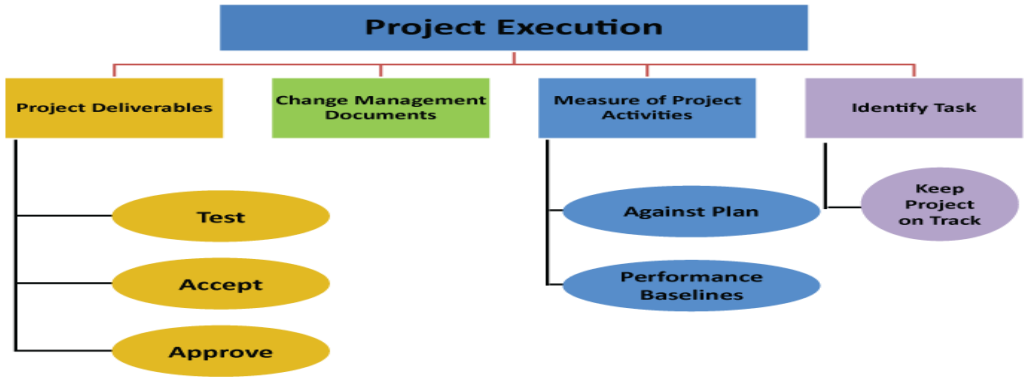

Figure 3.4: Project execution phase details

During the execution stage there are a number of important items. Some of them are:

3.2.3.1 Reporting progress of a project

Daily project updates during the project execution process are important because they provide the necessary information and also identify problems. A progress report is a document showing how the team is progressing towards a project completion. A summary of progress reports may be provided either by a boss, a manager, a team manager, a colleague or a client:

- The project's status.
- The Measured Steps.
- The functions of each team member or employee

Stuff confronted by personnel and other critical aspects influencing project completion. The Report is essentially a project management tool that eliminates difficulty prior to the completion of the project in good time and provides the participants with information on the status of the project. How far the progress report is to be submitted will depend on the project's scope and complexity (e.g., regular, weekly, monthly etc.). In general, you want to have meaningful insights into your progress reports. Setting a regular reporting schedule will provide progress reports with surface responses for a long-term project. Therefore, a fair timetable and a progress report template with standardized questions on project progress and important questions may be required. Given these questions in advance, the team members will be encouraged to think more about their answers before delivering the report, (Hockings *et al.*, 2003).

3.2.3.2 Hold regular meetings

Explain the agenda and let the team know well in advance before you start a project meeting. The competitiveness of current pipeline projects will not be affected if touch is timely and direct.

3.2.3.3 Manage problems

Inside the project, problems would likely occur. A project is prohibited in terms of sustainability with difficulties such as time management, quality management and the loss of team moral standards. Therefore, make sure all problems are addressed first, (‘scholar (37)’, no date).

3.2.4 Project monitoring and control

The performance of the project is evaluated and progress is monitored throughout the project monitoring and control stage. During the implementation phase it is implemented. The primary objective of this phase is to verify that all project parameters and deadlines are met by the Management Plan. The project manager is to make the necessary adjustments to the distribution of the resources and verify that everything is on track. A project manager should convene and regularly report on examination meetings,(Lee, Wang and Chen, 2008).

The project manager will be able to take corrective steps to track project operation during the implementation process of the project. In the meantime, it will also lead to improving the quality of work. Taking a look at the budget would prevent excessive money for expenditure.

3.2.5 Project closure

The last phase of the project is often disregarded if time and money are spent on the preparation of the project. The last part of the project is the completion phase and is referred to as the 'followup.' The finished product is available for delivery immediately. The manager and personnel of the project should concentrate on the delivery and distribution of the goods. All project work is finished at this time. The closing procedure is typically not the only phase following completion. A project may be closed due to a project failure. The project manager is responsible for identifying strengths and takeovers of the project and for identifying ambiguities and

how these can be corrected for future projects, after the project is completed and delivered immediately to the clients. When you take time to recognize the strengths and limitations, you spend more time on project management; in turn, this builds on the credibility of the project manager. The documents are completed, the project group dissolves and the project is closed after delivery to the consumers. The detailed steps taken during the closing phase of the project-management cycle are shown in figure 3.5.(‘5 Phases of Project Management Life Cycle You Need to Know’, no date).

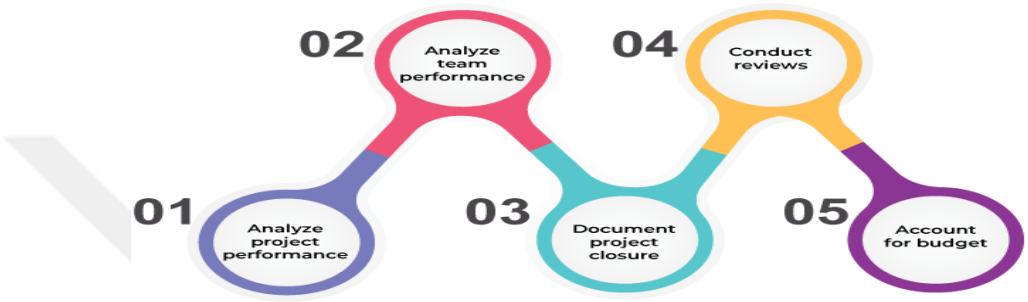

Figure 3.5: Project closure Phase

3.2.5.1 Analyzing project performance

This project management approach examines the achievement of the project objectives. If the project is finished within the stipulated budget and time period, the project progress will be recorded and the problem remedied, (‘5 Phases of Project Management Life Cycle You Need to Know’, no date).

3.2.5.2 Performance analysis of teams

The next move is to assess the performance of team members. Criteria such as work efficiency and schedules for the quality control will offer a clear picture of team performance.

3.2.5.3 Project closure document

This is the most critical step in the project management process as a project from the stage of idea to implementation would be systematically addressed. At the completion, a nicely prepared project document without any loose end will be delivered to customers/parties, (Sarfraz, 2009).

3.2.5.4 Reviews of post-implementation

The final examination would provide vital insights into the entire process immediately after the project is completed. These assessments offer lessons learnt for future initiatives.

3.2.5.5 Used and unused budget accounting

Relevant resources and budget that are left over at the end of the project can be redeployed for future projects. It contributes to reducing waste of resources and costs. Unfortunately, many businesses often underestimate this step. Whether or not this project is successful, and without further assessment several project managers deliver to customers. It should be remembered, however, that the completion of a project is not enough, but more significant, as expected. In view of its cohesive nature a project also can be difficult to manage.

The above-mentioned steps of the project management do not overlap every time, Figure 3.6 illustrates the same thing.

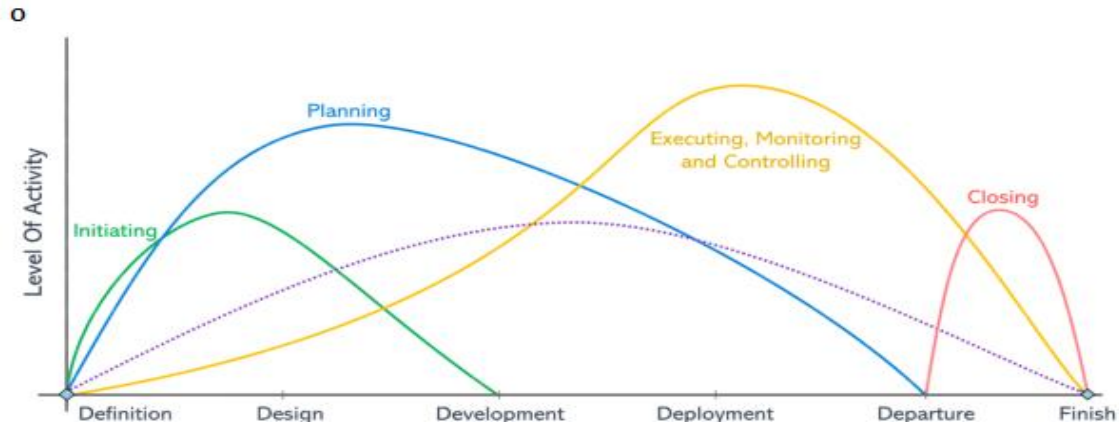

Figure 3.6: Project management stages

3.3 Project Description

The following section discusses in detail the construction of cooling stores for drugs and medicine.

3.3.1 Storage layout

The storage arrangement is depicted in Figure 3.7. The chosen distribution method will be made easier with this style. The cross-dock center was found to be the best distribution system in the current analysis. The storage would act as a local hub for a

radial distribution arrangement in this method. Individual packets of medications and medicines are already labelled and arranged by end destination, such as a health facility or pharmacy, when they come in bulk from a transshipment center. A flow structure will be used to organize the goods. This layout was used to provide 400 m^2 of available storage space for storage drags over the shelf's and includes the following features:

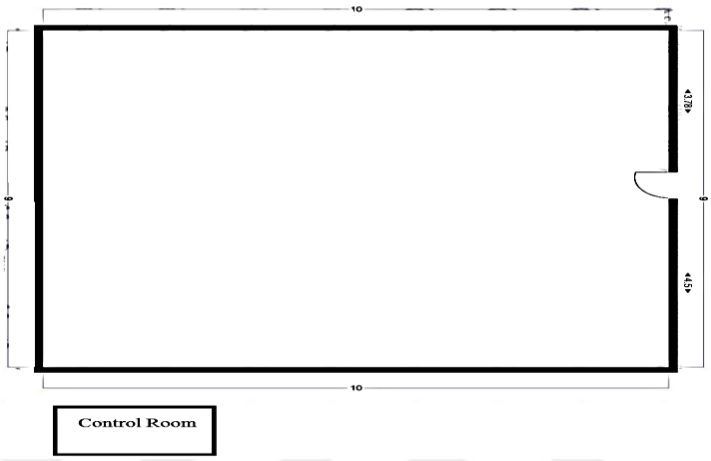

Figure 3.7: The storage arrangement

- Spaces between shelves at each side are enough for the person to move freely in the warehouse.
- Storage space is available to store different shapes of drag packages.
- No obstacles for cold airflow are available on one or more sides of the warehouse.
- Isolating wall and roof are provided to provide suitable thermal isolation.
- Zone lighting is provided to give a unified vision for each package inside the warehouse.

3.3.2 Storage facilities

3.3.2.1 Cooling system

The temperature range for pharmaceutical products is usually +15°C to +25°C. This method of shop is used to control the temperature with a balanced combination of active and passive techniques. The use of a specific de stratification system which preserves an even temperature distribution may be used depending on environmental conditions, thermal insulation, close control of air penetration and control of the

thermal loss and recovery from opening doors and the control of thermal stratification. Prefabricated insulated panels would be used to install a cold or freezer area inside the main building envelope to store sub-zero and +2.0°C labeled items.

In a pharmaceutical factory, unregulated temperature stratification is a big concern. Summer temperatures in high-bay warehouses exceeding 35°C will occur even in temperate climates if de-stratification steps are not taken; temperatures this high put pharmaceuticals and medical devices at risk of heat damage. Some circumstances, particularly in humid climates, where dew points may be within the controlated temperature range, may require active monitoring of relatively high humidity. The stored product can be affected in these conditions by high humidity and condensation.

3.3.2.2 Shelving system

Since the storage area is 100 m^3, the shelves are set up as walk-in rooms (see figure 3.8). The figure indicates that the temporary storage area will be in the middle of the warehouse, and slatted shelving will be on three sides of the storage, with two refrigeration areas on the front side. The bottom shelf is 20 centimeters above the groundRfid-based intelligent bookcs shelving system, (Shamsudin, Salami and Martono, 2007).

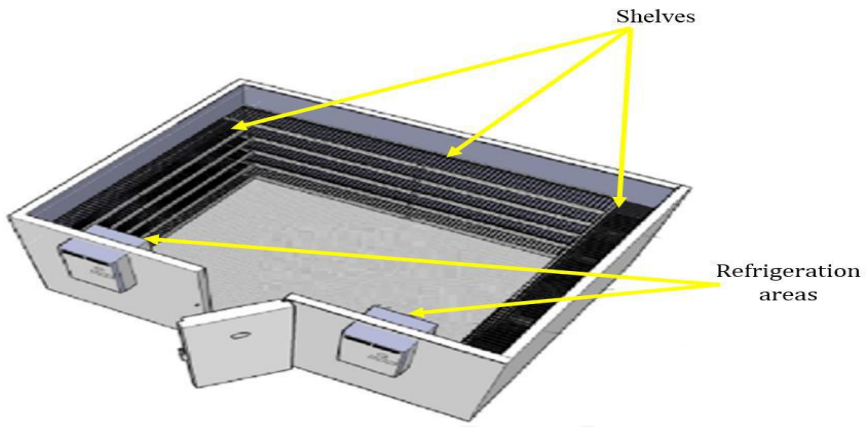

Figure 3.8: Shelving system

3.4 Time plan

Building drags warehouses have a variety of activities that are interdependent. A time schedule should be prepared by the project manager to ensure that projects are finished on time and that no tasks are postponed. The time schedule covers all

projects to complete the project and maintains track of start and completion dates and approximate lengths. Figure 3.4displays the Gantt map used to plan the drags warehouse construction activities. All project team members need to receive a copy of the project time charter in order to understand its role in the project.

depicts the construction activities in the proper sequence, describes all of the tasks involved, and establishes relationships between tasks. Each task is a distinct unit of work, and almost all of them would have some connection to the tasks that come before or after it. That means the first coat of paint must be applied after the electrical wiring has been installed, and the second coat must be applied after the first has dried. To complete the project, all tests were specified in a logically sequential order.

3.5 Proposed Framework Checking

To chech the proposed framework a questionnaire was asked, the questionnaire includes many questions related to the gender, age, educational level, specialist, experience, and some questions related to the proposed constraction framework. The answers of all questionare analyzed in chapter four so as to be used as an indicator about the knowldegment among the project manager and engineers about cooled stores constraction process. Figures 3.9-3.12 show the first axis questions.

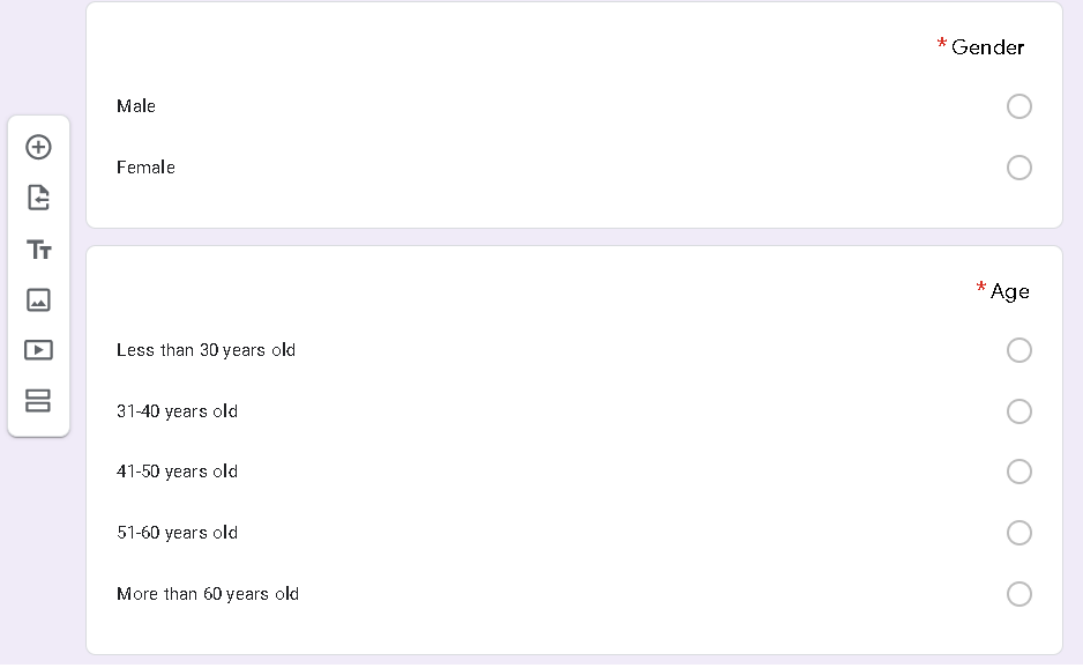

Figure 3.9: First axis questions – personal information

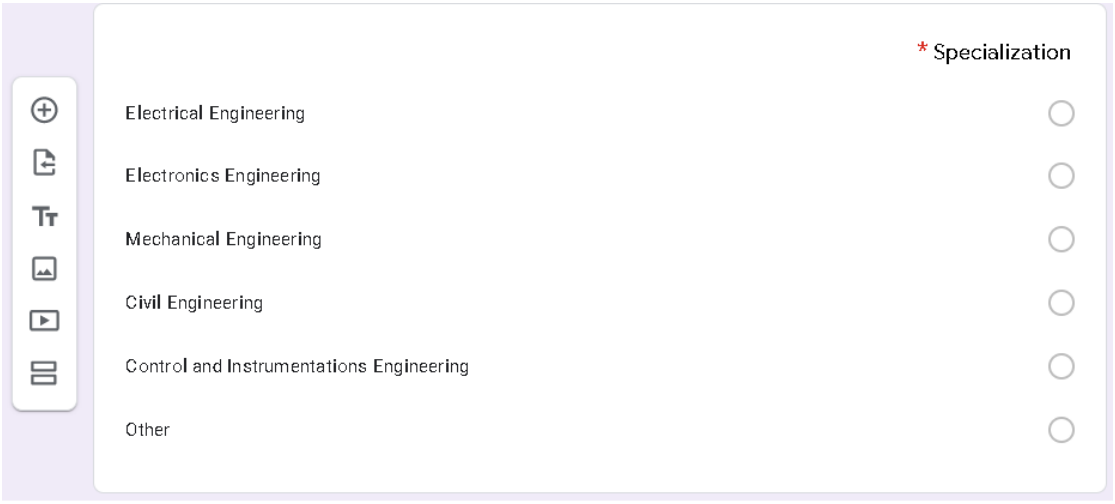

Figure 3.10: First axis questions – specialization

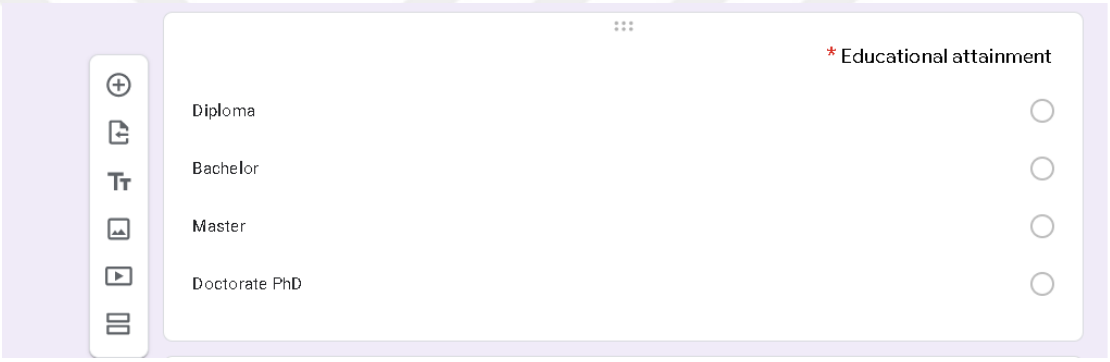

Figure 3.11: First axis questions - eduction

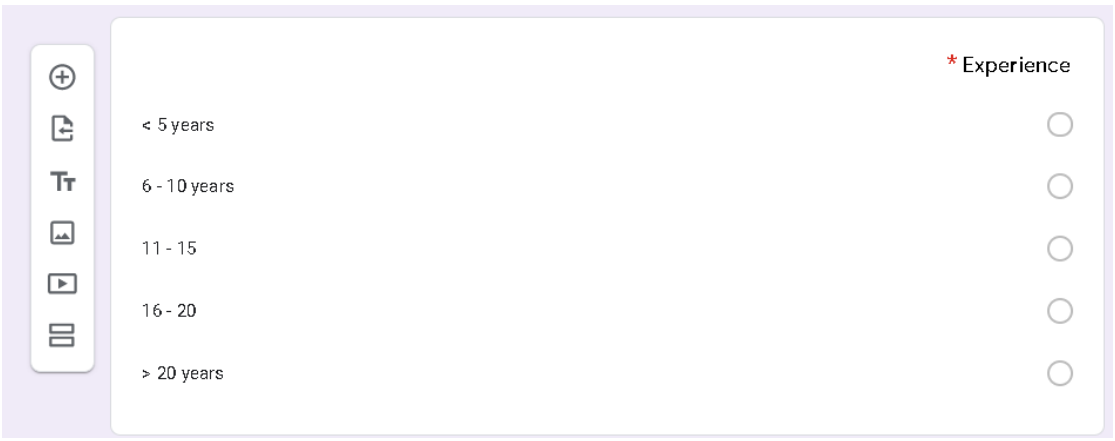

Figure 3.12: First axis questions – experience

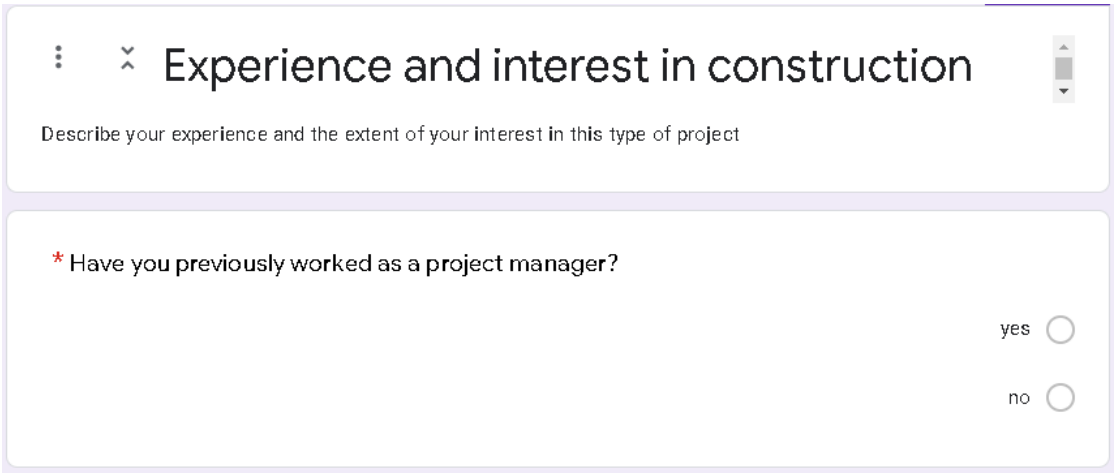

Figure 3.13: Section three questions

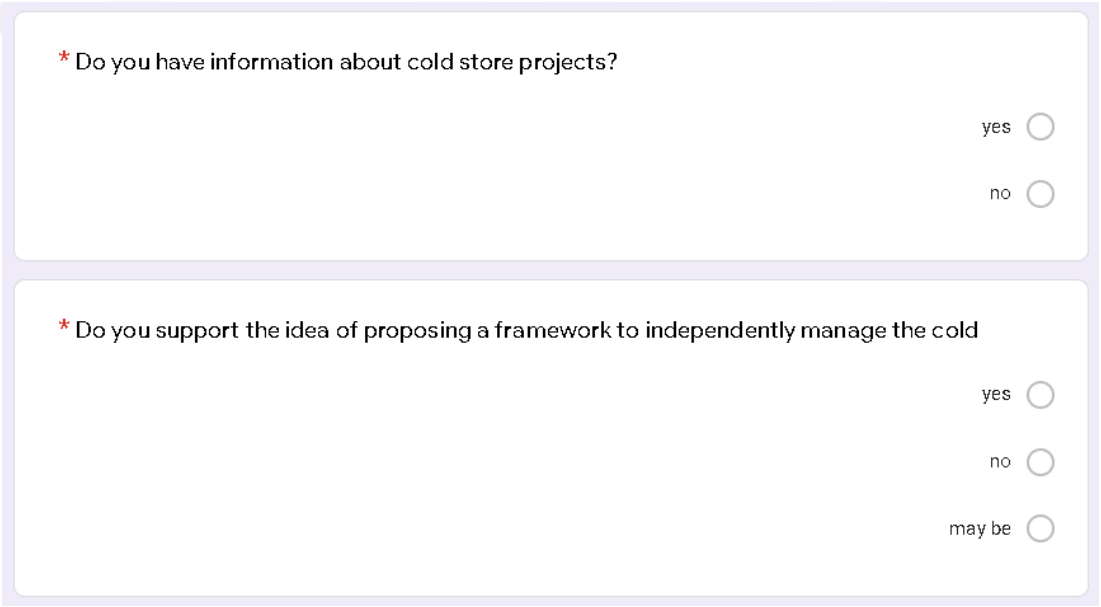

Figure 3.14: Section three 1st and 2nd questions

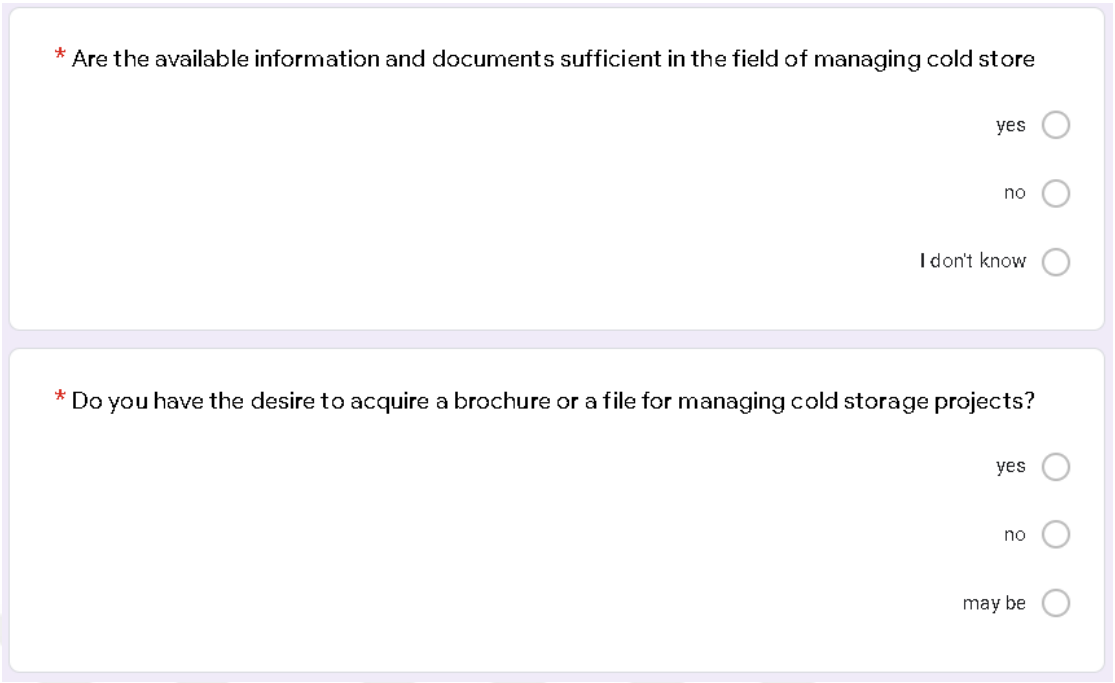

Figure 3.15: Section three 3rd and 4th questions

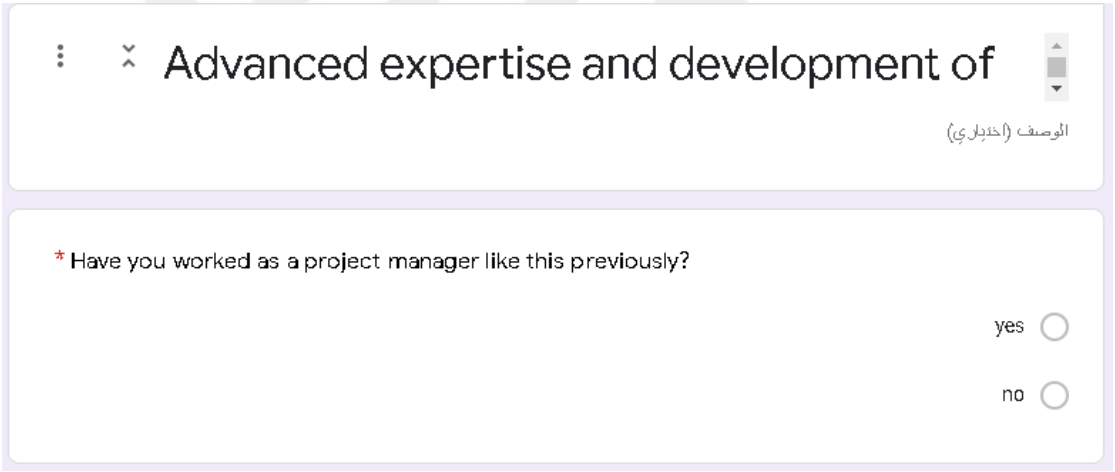

Figure 3.16: Section four questions

Figure 3.17: Section five 1st and 2ndquestions

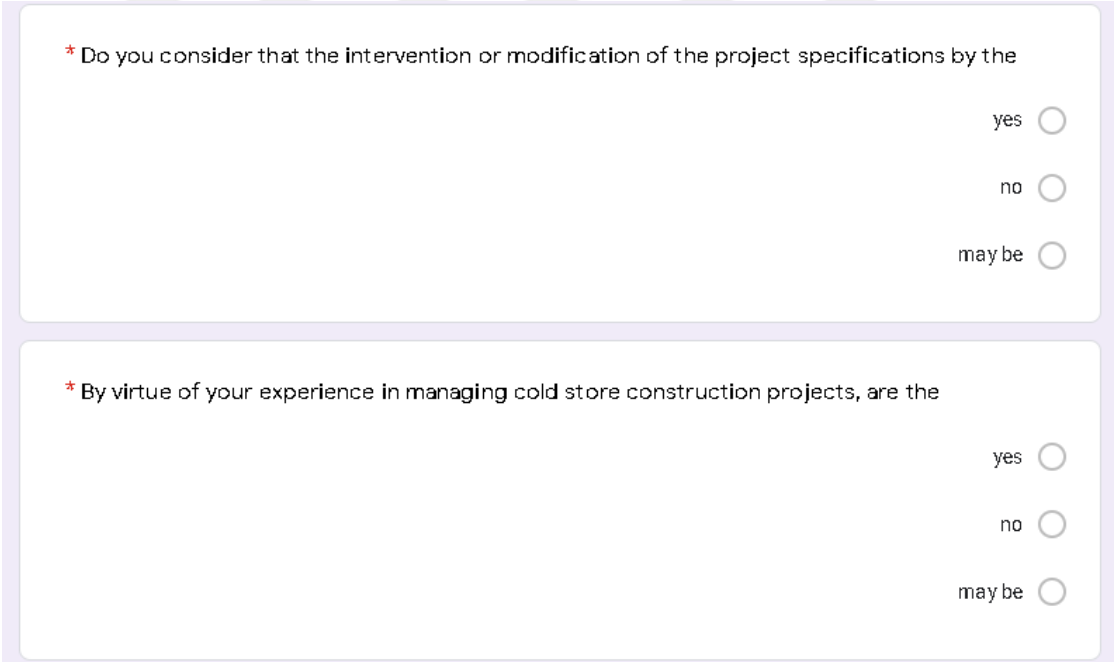

Figure 3.18: Section five 3rd and 4th questions

4. RESULTS AND DISCUSSION

4.1 Answers Statics

The results of the quesetitire analyzed using SPSS program due to its ability to analyze such data. The questions are divided into three axises depending on the type of information needed. First static process was the "Frequencies", this process gives the percentage for each question answer.

Table 4.1 contains the the percentage of answers for the question about the person gender: male or female, while figure 4.1 also shows the graphical representation for the same answers.

Table 4.1: Percentage for gender question

Gender					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Male	105	67.7	67.7	67.7
	Female	50	32.3	32.3	100.0
	Total	155	100.0	100.0	

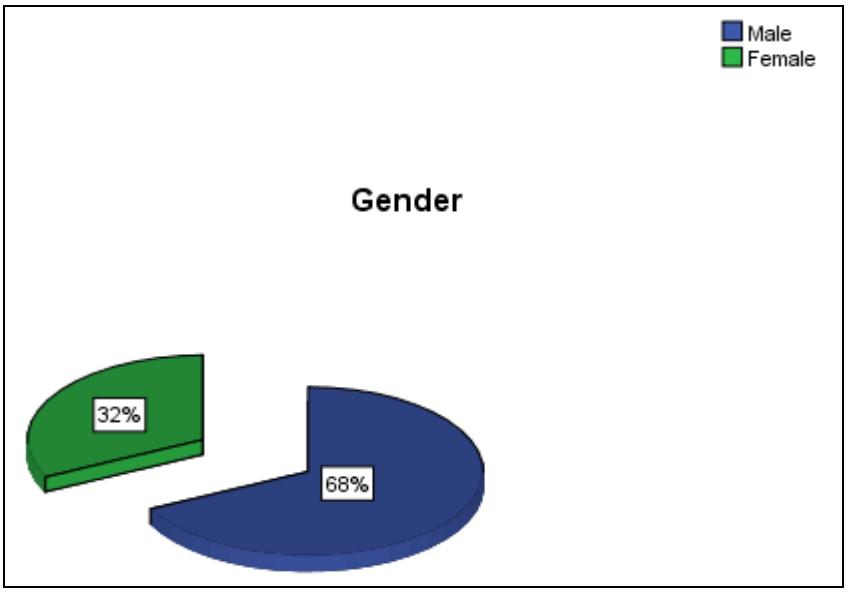

Figure 4.1: Percentage for gender question

The question about the age gives the person four groups to select which one that his age within it. Also, the answers represented as a percentage for each group, the representation is done using both tables and graphical method. Table 4.2 and figure 4.2 refred to this question answers.

Table 4.2: Answers for age question

Age					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	(21 to 30) years	20	12.9	12.9	12.9
	(31 to 45) years	87	56.1	56.1	69.0
	>45 years	48	31.0	31.0	100.0
	Total	155	100.0	100.0	

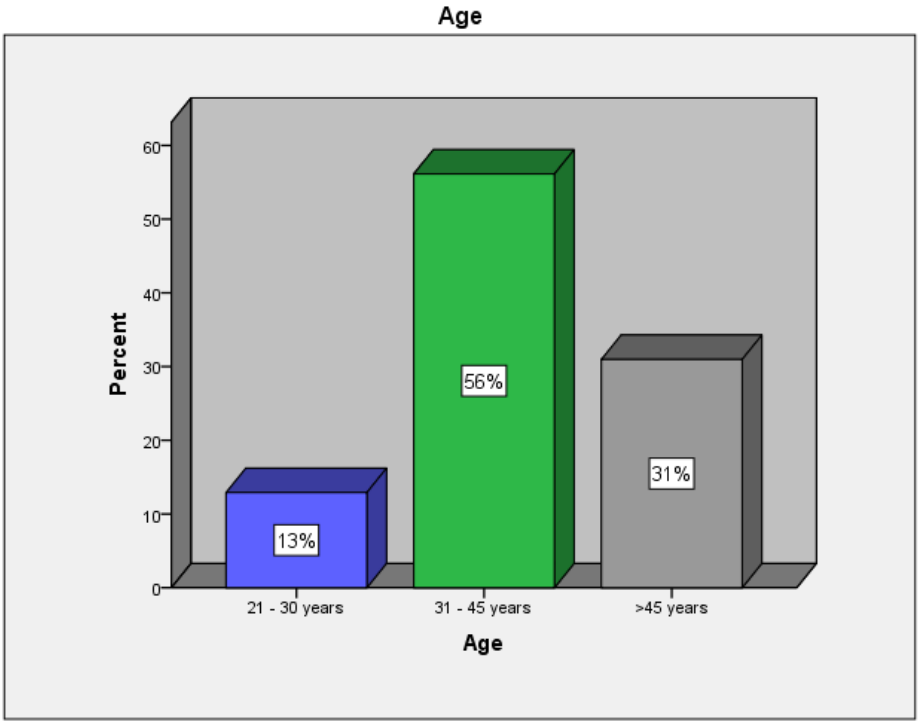

Figure 4.2: Second question (age)

Specialization is one of the important information they can be used in answer accuracy, so that the third question is focused on the person specialization. Six specializations are listed in this question, four of them are in engineering (Civil Engineering, Electrical Engineering. Mechanical Engineering, Air conditioning and Refrigeration Engineering), the other two are "Adminstration and Economics" and

"Medical". The answers for this question are listed as a percentage in table 4.3 and as a graipgical in figure 4.3.

It is clear that the most persons how answer these questions are civil engineers (88%) and that give the the result more accurate and powerful.

Table 4.3: Specialization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Civil Engineering	137	88.4	88.4	88.4
	Electrical Engineering	5	3.2	3.2	91.6
	Mechanical Engineering	6	3.9	3.9	95.5
	Air conditioning and Refrigeration Engineering	2	1.3	1.3	96.8
	Adminstration and Economics	4	2.6	2.6	99.4
	Medical	1	.6	.6	100.0
	Total	155	100.0	100.0	

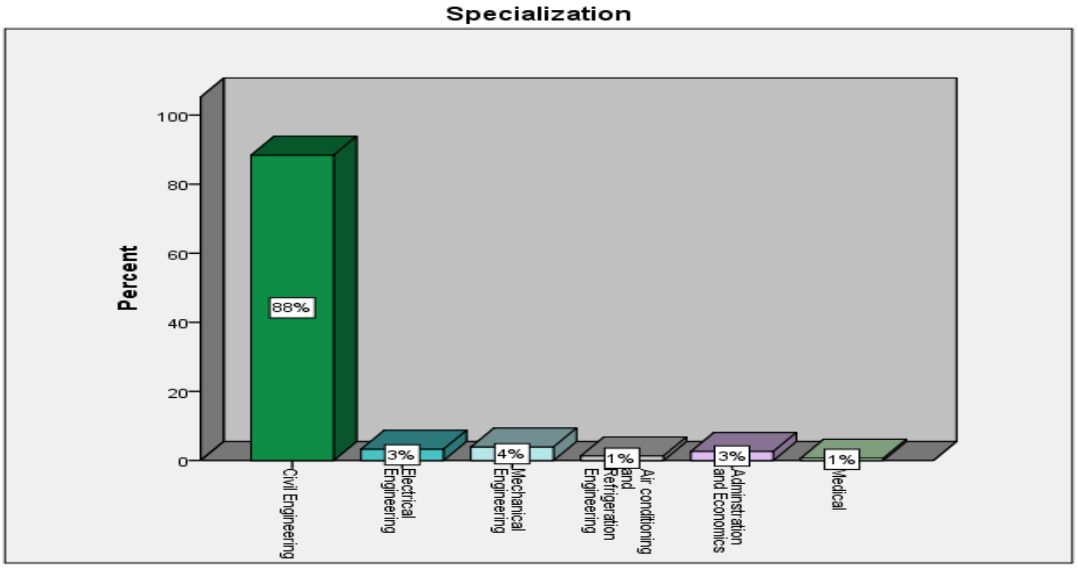

Figure 4.3: Specialization

The experience also other indicator for the accuracy of the results, table 4.4 contains the percentage of the answers while figure 4.4 shows the graphical representation for the answers.

Table 4.4: Theexperience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<(5 years)	4	2.6	2.6	2.6
	(6 – 15) years	57	36.8	36.8	39.4
	(16 – 25) years	54	34.8	34.8	74.2
	>(25 years)	40	25.8	25.8	100.0
	Total	155	100.0	100.0	

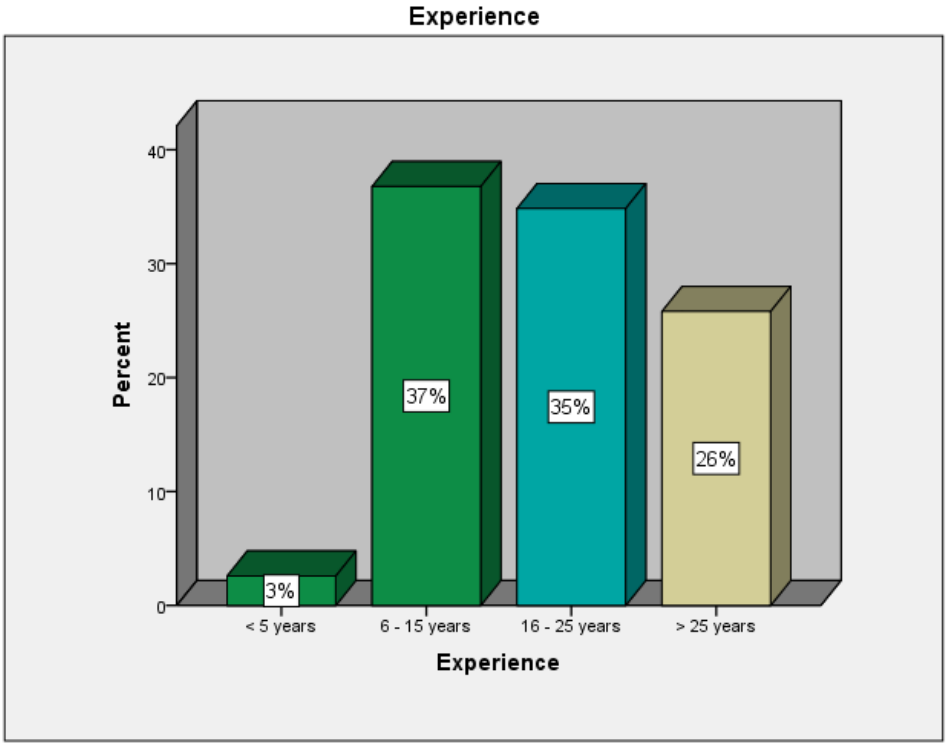

Figure 4.4: Experience

The second axis in the questionnaire is depending on the experience in project management and the engineer's information about cold projects management. The first question in this axis is about if the engineer was work as a project manager before?

Table 4.5 contains the answers for this question as a percentage, while the same results are expressed in a graphical form is shown in figure 4.5.

Table 4.5: Have you previously worked as a project manager?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes.	136	87.7	87.7	87.7
	No.	19	12.3	12.3	100.0
	Total.	155	100.0	100.0	

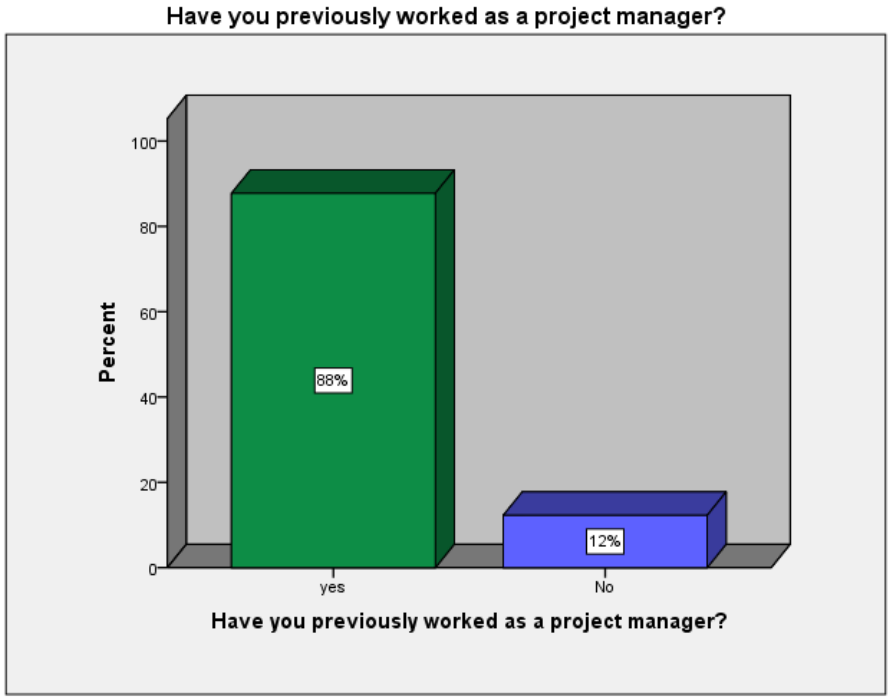

Figure 4.5: Have you previously worked as a project manager?

As shown in figure 4.5 about 88% of the persons who answered the question were worked as a project manager, that also is a good indicator that give the study hypothesis more acceptance. The second question in this axis is about if the project manger has any information about cold storage projects managements. The answers for this question are listed in table 4.6 and shown in figure 4.6 in graphical representation.

Table 4.6: Do you have information about cold store projects?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes.	142	91.6	91.6	91.6
	No.	13	8.4	8.4	100.0
	Total.	155	100.0	100.0	

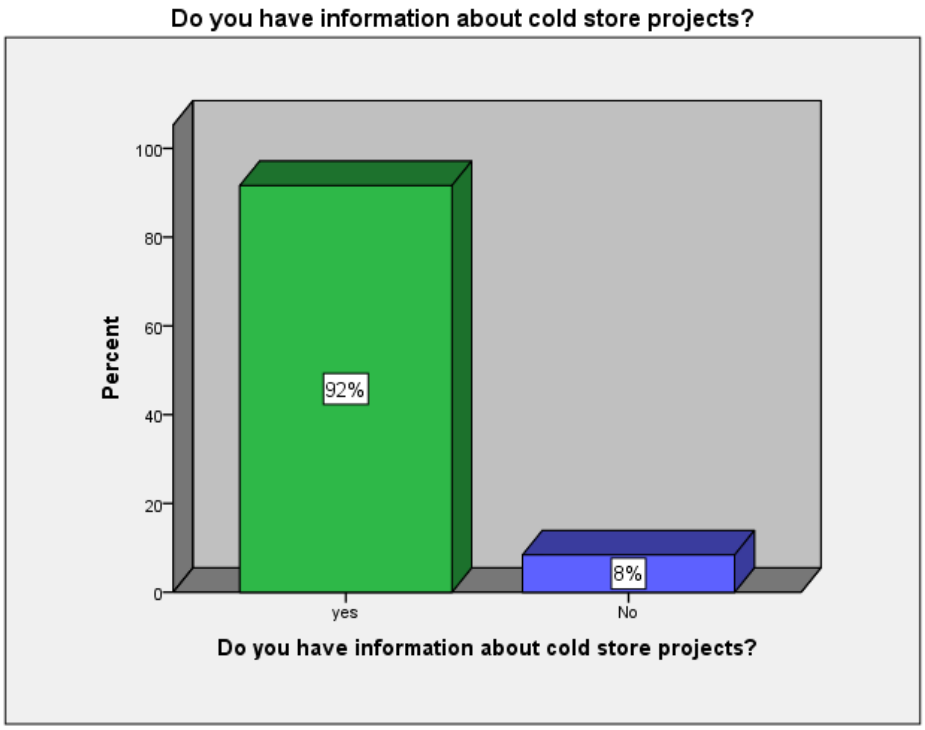

Figure 4.6: Do you have information about cold store projects?

As shown in figure 4.6 a very haigh ratio (92%) of the project mangers are have information about cold storage project management.

The third question in this section may be the most important question because it is about the main hypothesis of this work. The question is "**Do you support the idea of proposing a framework for managing cold storage projects independently?**" as supposed in the work hypothesis a very high percentage of the samples who answered the question are agreed with supporting the idea in the question, Table 4.7 and Figure 4.7 indicate this.

Table 4.7: Do you support the idea of proposing a framework for managing cold storage projects

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes.	146	94.2	94.2	94.2
	No.	1	.6	.6	94.8
	may be.	8	5.2	5.2	100.0
	Total	155	100.0	100.0	

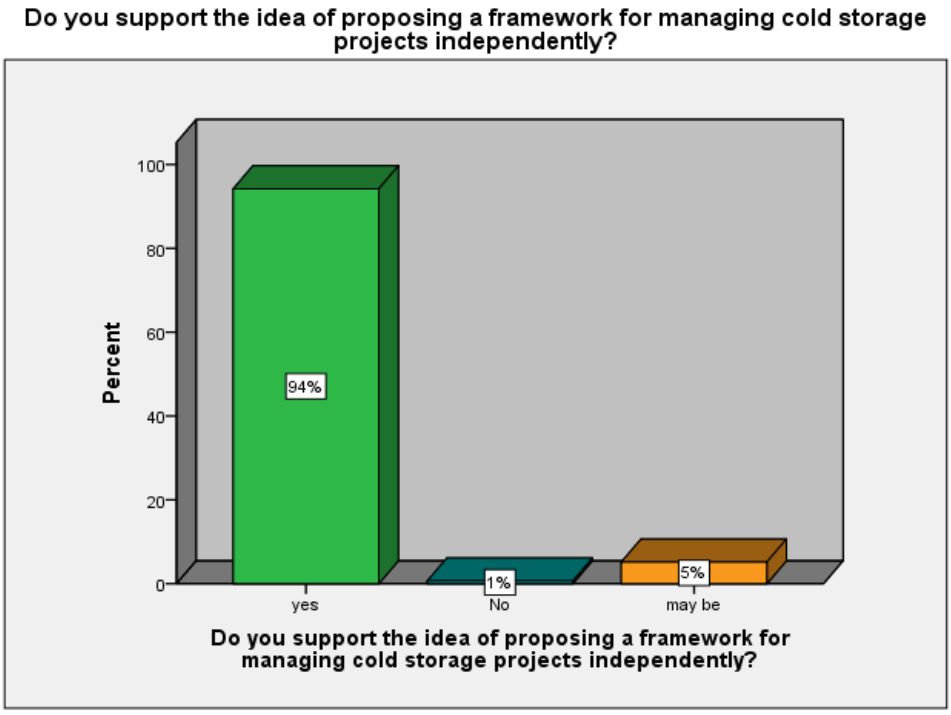

Figure 4.7: Proposing a framework for managing cold storage projects

Another question was used to prove the results for the previous question is the fourth question:**"Are the available information and documents sufficient in the field of managing cold store construction projects?**" The answers of this question are listed in table 4.8 and presented as graphical in figure 4.8.

Table 4.8: Are the available information and documents sufficient in the field of managing cold store construction projects?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	9	5.8	5.8	5.8
	No	135	87.1	87.1	92.9
	may be	11	7.1	7.1	100.0
	Total	155	100.0	100.0	

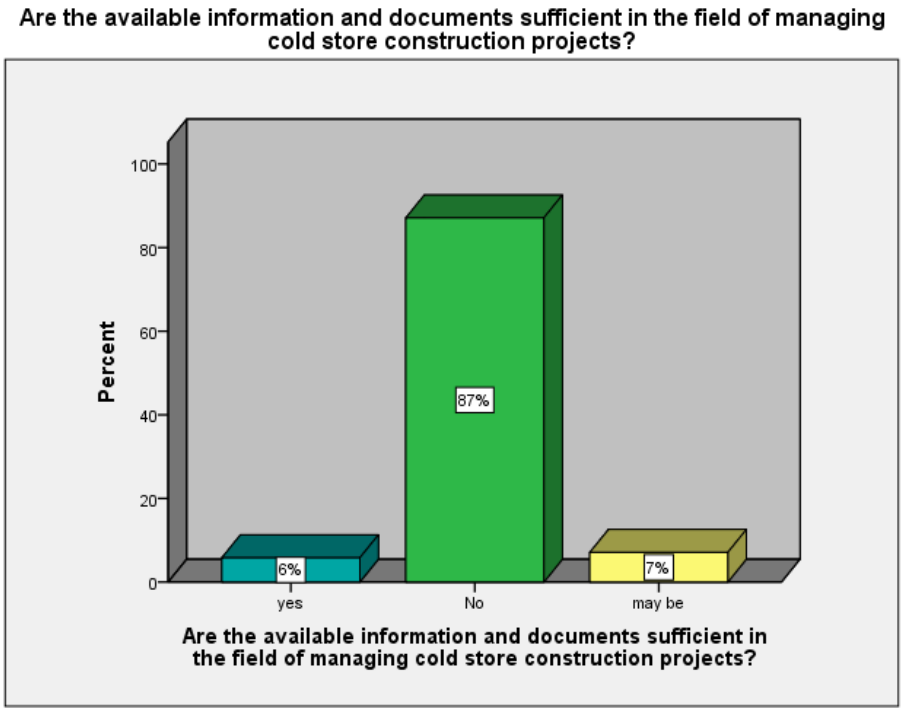

Figure 4.8: Are the available information and documents sufficient in the field of managing cold store construction projects?

The fifth question is " **Do you have the desire to acquire a brochure or file for managing cold storage projects?**", about 91% of the samples how answered the question agreed with this hypothesis, the statics of the answers are listed in both table 4.7 and figure 4.7.

Table 4.9: Do you have the desire to acquire a brochure or file for managing cold storage projects?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	141	91.0	91.0	91.0
	No	3	1.9	1.9	92.9
	may be	11	7.1	7.1	100.0
	Total	155	100.0	100.0	

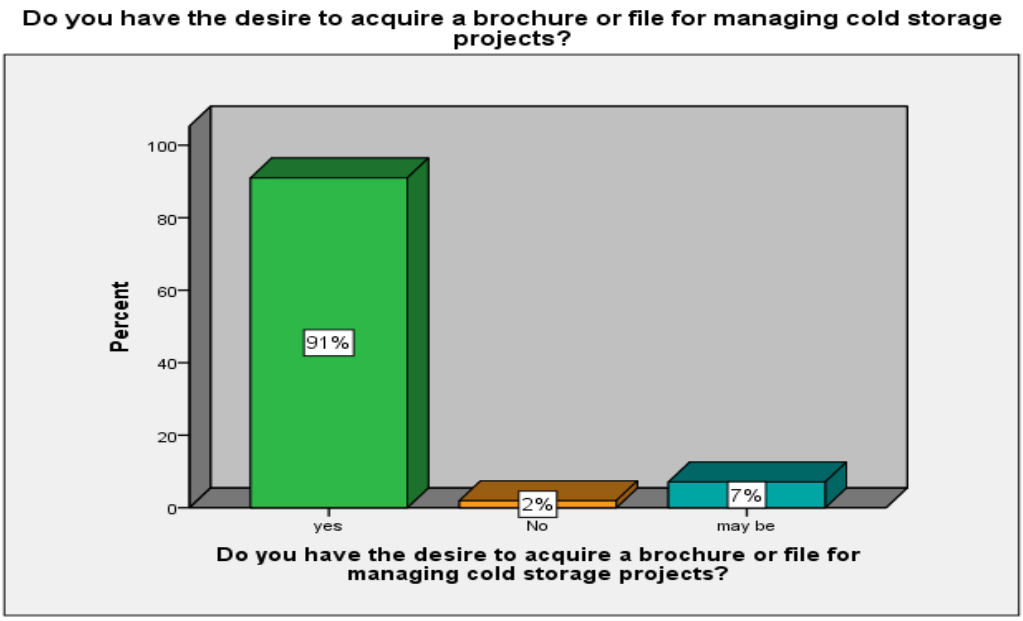

Figure 4.9: Do you have the desire to acquire a brochure or file for managing cold storage projects?

There are other questions were used to verify the persons information, the answers for those questions are shown in figures 4.10 – 4.12respectiviliy.

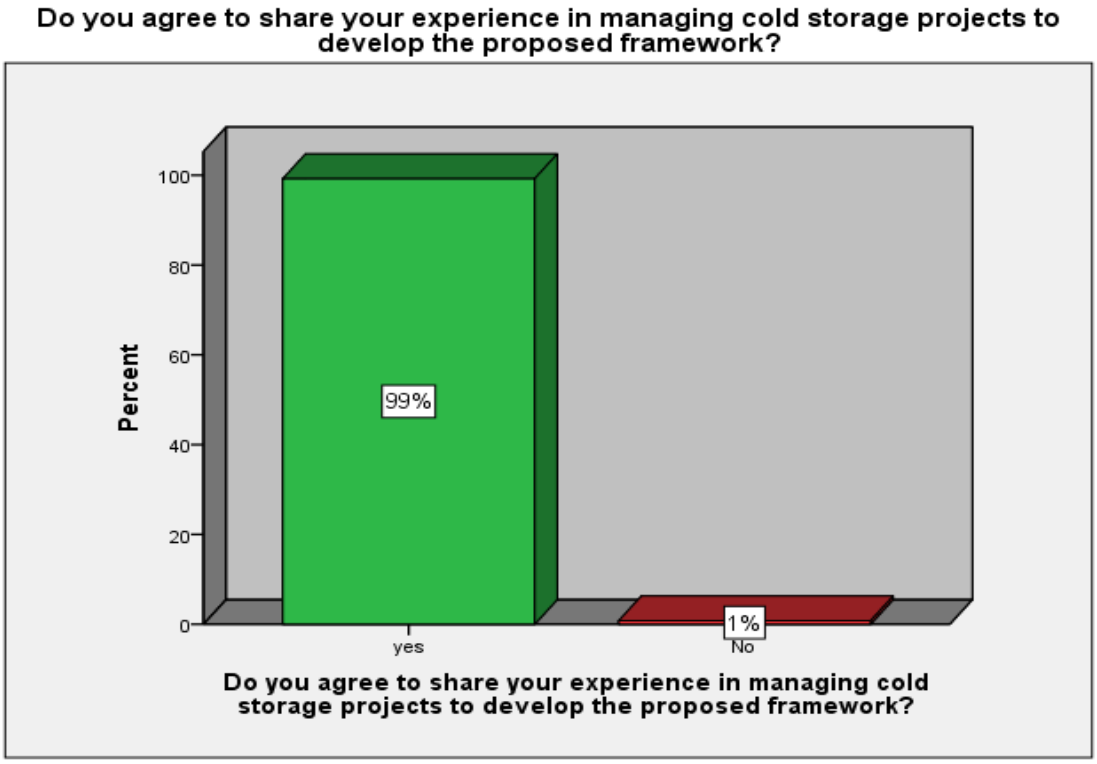

Figure 4.10: Do you agree to share your experience in managing cold storage projects to develop the proposed framework?

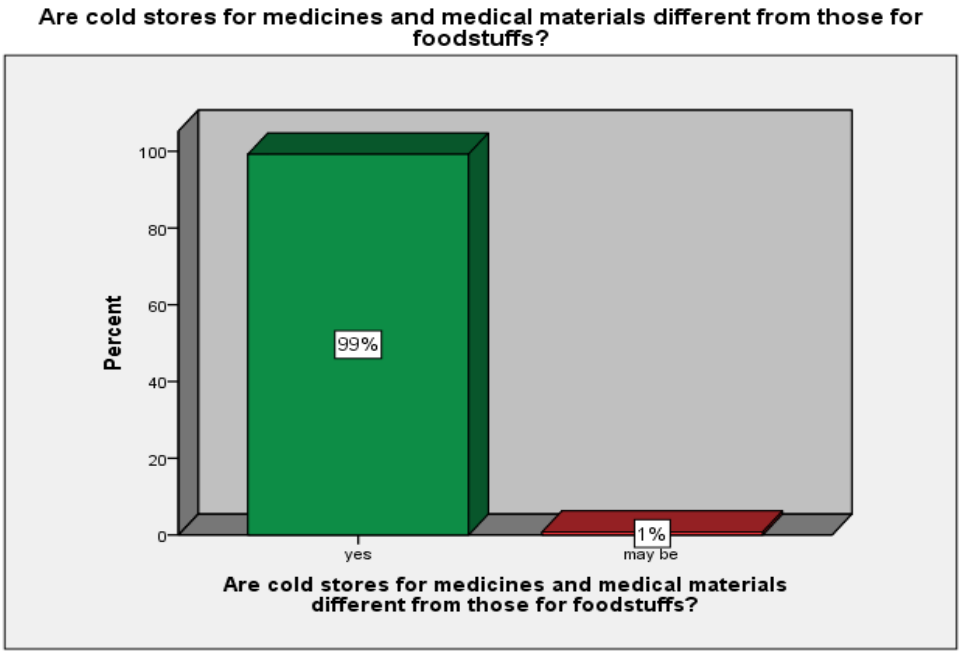

Figure 4.11: Are cold stores for medicines and medical materials different from those for foodstuffs?

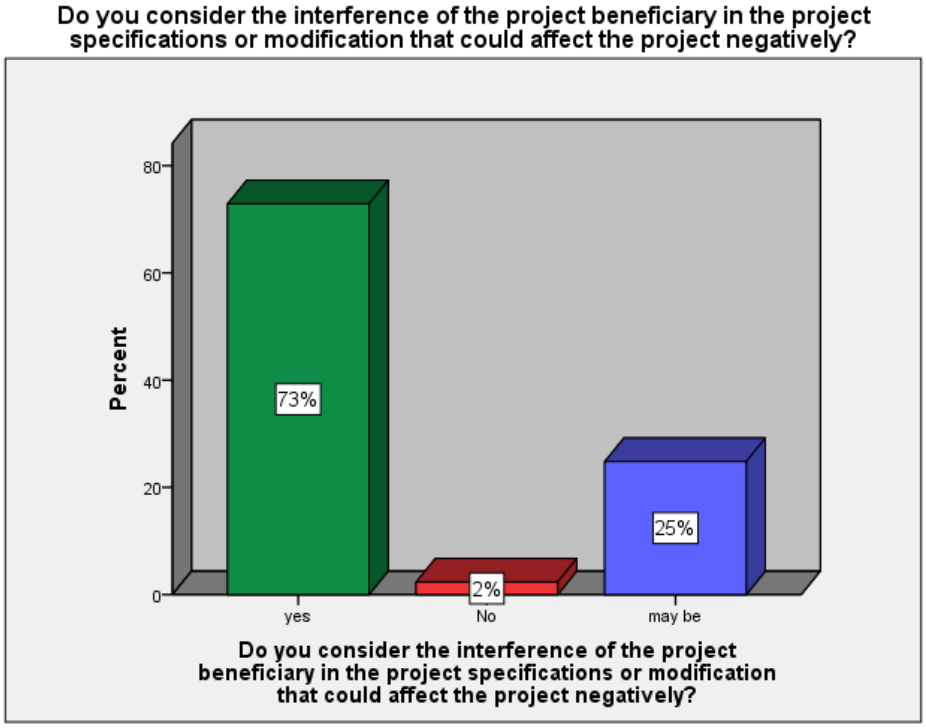

Figure 4.12: Do you consider the interference of the project beneficiary in the project specifications or modification that could affect the project negatively?

4.2 Hypothesis proof

To show if the work hypothesis is true or not, Chi-Square Test is used to show that. Table 4.10 contains the result of chi-square analysis for the question"

Are the available information and documents sufficient in the field of managing cold store construction projects?

Table 4.10: Statistics descriptive

	N	Minimum	Maximum	Mean	Std. Deviation
Are the available information and documents sufficient in the field of managing cold store construction projects?	155	1	3	2.01	.360
Valid N (listwise)	155				

Table 4.11: Are the available information and documents sufficient in the field of managing cold store construction projects?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	9	5.8	5.8	5.8
	No	135	87.1	87.1	92.9
	may be	11	7.1	7.1	100.0
	Total	155	100.0	100.0	

Table 4.12: Test Statistics

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	75.146[a]	10	.000
Likelihood Ratio	41.687	10	.000
Linear-by-Linear Association	1.935	1	.164
N of Valid Cases	155		

a. 14 cells (77.8%) have expected count less than 5. The minimum expected count is .06.

The test Statistics as in table 4.12 shows that there is a statical indication for the result analysis and therefore, the hypothesis can be considered acceptable.

The second test done between the dependent variable**" Do you support the idea of proposing a framework for managing cold storage projects independently?**The result is listed in table 4.13.

Table 4.13: Test Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Do you support the idea of proposing a framework for managing cold storage projects independently?	155	1.11	.450	1	3

Table 4.14: Do you support the idea of proposing a framework for managing cold storage projects independently?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	146	94.2	94.2	94.2
	No	1	.6	.6	94.8
	may be	8	5.2	5.2	100.0
	Total	155	100.0	100.0	

Table 4.15: Test Statistics

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	85.102[a]	2	.000
Likelihood Ratio	57.411	2	.000
Linear-by-Linear Association	3.510	1	.061
N of Valid Cases	155		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 1.10.

The test Statistics as in table 4.15 shows that there is a statical indication for the result analysis and therefore, the hypothesis can be considered acceptable.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Because of the rising volatility in budgets, development processes, and technology, project management has become increasingly dynamic. There are numerous aspects that influence project management. Some aspects are under the organization's control, while others are outside of the organization's control. This study focuses on the problems of a limited knowledge and know-how in cold storage management projects.

Because projects are viewed as one of the most important components of the transformation process, the implementation of new business prospects, and the achievement of the organization's strategic objectives, and not merely a limited application of something worthless. As a result, the importance of project management in the change process has resulted in a consistent focus on project manager learning and development.

This work objective is to promote theoretical and practical awareness in the field of cold storage project management by suggesting a comprehensive integrative project management framework. Several project management methodologies and frameworks are discussed in the introduction, and the Waterfall framework was selected because it is suitable for managing a construction project in Iraq. The waterfall framework in terms of its design is the closest to the hierarchical administrative system in Iraq, which makes this framework more suitable for learning and easier to implement.

The methods used in this work are based on an interpretive philosophy that uses the construction of theory in the context of system thought. This study focuses on a qualitative approach that results in a comprehensive review of the proposed data via questionnaire. The data collected and analyzed in this work reveals the complexity and variety of this method of project management, since the limited availability of data.

The questionnaire designed in such away to cover more than one engineering field so as to check which specialist is close to this type of project manegment. Also, the questions contain very clear expresions in each part of project management stages. The experience in general and in cold storage project management is a switch question, depending on its answer the project manager can give his opinion on the following questions. The data collected and analyzed using SPSS program. The data analysis results proof the hypothesis proposed in this work.

5.2 Recommendations

Depending on the study results it is recommened that a cold storage project for medical and drags proposed frame work must be designed and printed in such way that makes each engineer or project manager can depends on it. The project magaement must cover each phase in the project clearly.

Project management field in Iraq need to be updated and categorized depending on project type so that the project manager must have enough information to deal with the project in each phase.

The teaching of project management was structured around an explanatory model, followed by activities that required students to apply a certain methodology or tool. Nonetheless, due to a lack of involvement, these exercises fail to provide the needed amount of stimulus for students, resulting in ineffective learning. Furthermore, Iraqi project management education faces obstacles such as a lack of expertise in too many areas of project management and the inability to deliver instruction to professionals with diverse backgrounds and learning styles. As a result, Iraq project management education and training should result in a more active/practical approach.

Smart technology offers huge potential to automate construction companies' systems and processes, deliver better data/information to managers, and assist them in accomplishing more tasks and activities while remaining visible to their communities. As a result, additional smart technology projects in the Iraqi construction sector are required. It is suggested that legislation be put in place to encourage major organizations to incorporate smart devices into their projects, as well as to subsidize its implementation in small and micro businesses.

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