

Project Name: The Construction of Kindergarten in Mutrafiah - Jubail

Group No.

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Abstract

The objective of this project is to study the project management of construction projects in educational facilities for the Early Childhood (ECH) Program. Project management finds a wide application area in construction educational facilities. In this project, a case study of the construction of a kindergarten was carried out to determine the importance of project management success using The Project Excellence Baseline (IPMA PEB®), and to find out how to manage design and construction throughout the life cycle of the project. As construction projects involve a number of participants and stakeholders, their participation and commitment can have a major influence on the goals of construction development. The project research provides a basis for the construction of a kindergarten based on project management best practices that emphasize the necessity and significance of tailoring the project management approach to the unique characteristics of the project and its context. Also, it implicates (25) competencies following the IPMA (International Project Management Association) individuals' competencies standard.

Keywords: Project management, construction, communication, and teams.

Introduction

Education has played an essential role for individuals in societies. It enables communities to succeed and thrive economically and socially as it helps in developing common culture and values. Therefore, countries governments' pay great attention to education to step ahead in the ranks of nations. The Saudi Arabia leadership has realized that education is one of the significant pillars that lead societies in achieving leadership and excellence. The government has observed that the kingdom is behind the international benchmarks where there is a lag in the enrolment in early childhood education compared to the rapid and massive enrolment in primary and secondary school.

Practical implementation of the project management processes is essential to ensure the achievement of a clear understanding of project management's central concepts, tools, and approaches. This project provides in detail a practical implementation of the project management processes in a construction project; all project management process groups are covered and considered. By completing this project, the reader will be capable of applying a structured project management approach to real-life projects.

The Project Excellence Baseline (IPMA PEB®) outlines the concept of excellence in managing projects and programs. It also serves as a guide to organizations and practitioners in assessing the ability of their projects and programs to achieve project excellence. IPMA defined a project as, "A project is a unique, temporary, multidisciplinary, and organized endeavor to realize agreed deliverables within predefined requirements and constraints". Project management is the best use of organizational resources to ensure project success by ensuring the needs of the project are met in an organized way. This report consists of the project management plan, including scope, resource, time, risk, and quality management plans.

1. Strategy

The programming of capital projects is shaped by the strategic plan of an organization, which is influenced by market demands and resource constraints. The ECH Program is one of the main governmental programs of the NTPs related to the 2030 Saudi Arabia Vision. The program aims to achieve and align the NTPs' mission with the governmental operational excellence of the educational sector. In addition, it aims to improve the economic enablers of the private and public education sectors and enhance

living standards for all related stakeholders. One of the sub-programs is the construction of educational facilities with high standards and quality that will serve Saudi Arabia's younger generation.

Pearce & Robinson (as cited in Walt, Kroon, & Fourie, 2004) contended that various factors such as political priorities, competitive demands, economic conditions, social needs, and technological developments play a critical role in running enterprises in line with the rapidly changing environment. Such varying factors require enterprises to monitor their strategy and continuously adjust their strategies by implementing the necessary course of actions among various opportunities and threats

1.1. Mission & Vision

Mission and vision statements offer a leading directional potential for integrating and managing activities and decisions to ensure best resources utilization (Walt, Kroon, & Fourie, 2004). Both statements are typically communicated statements that relate to an organization's goal in some written form. They deliver answers to questions about who the organization is, what does the organization value, and where the organization is going. Figure1 shows the interdependency of the vision, mission, value, and strategy. An enterprise's vision and mission statements play an essential role in drawing an organization's strategic directions (Walt, Kroon, & Fourie, 2004). Both statements are two mutual elements as the vision statement defines the best guiding philosophy and the future positions whereas the mission statement is the vehicle that maintains an organization orientation to the desired destination.



Figure 1: Mission, vision, values, and strategy interdependency.

Reprinted from Natural Resources Research Institute. Retrieved from <https://www.nrri.umn.edu/about/welcome-nrri/mission-vision>.

Due to the significance of the vision, mission statements, organizations' top management spends a much time drafting and word designing those statements in addition to value statements, goals, and objectives so on and forth to align them in one horizon (Hattangadi, 2015). Thus, developing well-defined

objectives and strategies constitute the strategic planning process to achieve an organizational mission. Below are the vision and vision statements for the construction of the kindergarten project:

1.1.1. Vision

To be universally recognized by industry and government as one of the s leaders in constructing high-quality educational facilities to serve qualified educational cadars to build proud citizens and global competitors.

1.1.2. Mission

Building educational facilities that meet the best international standards to create a safe environment and help develop innovative generations that can compete internationally and communicate positively with this era's challenges, which lead to sustainable development in the nation.

1.2. Project Objective

To provide an educational facility for young children in a growing community in Mutrafiah district, Jubail City. In this research project, the main benefits are to be realized through the construction project for the development and nationwide expansion of kindergartens aiming to achieve the strategic objectives of ensuring quality, equitable and inclusive education for all, and increasing opportunities for lifelong learning for all.

1.3. SMART Goals

There is common agreement and a strong belief that plans in the absence of well-formulated goals lack rationale, strategies lack relevance, actions lack direction, projects lack accountability, and organizations lack purpose (Mullins, 1999 & Bratton, et al, 2007). Furthermore, goals have to be properly formulated to serve as credible, reasonable, and applicable benchmarks by which the outcome can be monitored and assessed through immediate outputs, intermediate outcomes either in the short term or terminal impacts in the long term (Bipp and Kleingeld, 2011). Hence, the objective statements must be well-formulated using a clear and logical structure or framework as a fundamental requirement of effective goal setting.

The Smart Goal setting framework is a great dignified way to bring structure and trackability for managing progress against objectives. The acronym SMART stands for Specific, Measurable, Attainable,

Realistic, and Time-Based. Therefore, the goal needs to meet all five of these criteria to be a SMART goal.

1.4. Performance Measurement Indicators

Business communities are increasingly interested in developing and implementing sound, proactive sustainability strategies, including increased stakeholder engagement (Epstein et al., 2014). The strategic objectives of constructing a kindergarten include various objectives such as social-emotional, physical, language, cognitive, literacy, and social studies (Teaching Strategies, n.d.).

In general, the ultimate goals of constructing a kindergarten may include:

1. Developing education and learning methods and materials
2. Preparing students in an integrated way to compete locally and overseas.
3. Improving quality competence for teachers and administrators.
4. Fostering community partnership.
5. Accomplishing quality in education.

1.5. Strategic Objectives

Kindergarten education establishes the groundwork for the lifelong learning process. It strengthens the learning fundamentals of the childhood stage, which helps in developing well-educated future generations. In order to establish a successful educational system, a set of measures known as Key Performance Indicators (KPIs) has to be taken into consideration to assess performance and ensure achieving high-quality education.

KPI tool is a quantifiable measure of performance over time for a specific objective. It helps organizations to have self-assessment and external evaluation to move ahead toward achieving high-quality standards. KPIs can come into many types: Strategic, Operational, Functional, and Leading vs Lagging. Leading KPIs help in predicting future outcomes, whereas, lagging KPIs track what has already happened.

The below set of tables demonstrates the strategic objectives and measures of constructing a kindergarten in Mutrafiah district, Sector F4, Jubail city:

Strategic Objective (1)	Developing education and learning methods and materials.
How to achieve it?	- Assessing learning materials. - Aligning Textbooks with curriculums. - Benchmarking with other educational institutions.
How to measure it? (Lead / Lag)	- Licensed from the Ministry of Education (Lead). - Consistency between course objectives and deliverables (Lag). - Number of sessions, workshops, and interactions with educational institutions (Lead).

Strategic Objective (2)	Preparing students to compete locally and overseas.
How to achieve it?	- Easing access for various resources. - Participating in local events and competitions. - Engaging students in well-known global programs.
How to measure it? (Lead / Lag)	- Availability of resources and adequacy to students' age (Lead). - Number of awards and recognitions obtained by students (Lag). - Number of participants & Quality of programs attended (Lead).

Strategic Objective (3)	Improving quality competence for teachers and administrators.
How to achieve it?	- Setting relevant goals. - Establishing a clear career path. - Maintaining high performance. - Providing training and development.
How to measure it? (Lead / Lag)	- Accomplishing Tasks efficiently and effectively (Lag). - Identification of responsibilities and future job ladder (Lead). - Level of productivity (Lag). - Availability of training matrix (Lead).

Strategic Objective (4)	Accomplishing quality in education.
How to achieve it?	- Assigning qualified teachers. - Adding more resources in the library. - Subjecting the educational programs to review by global accreditation entities.
How to measure it? (Lead / Lag)	- Student's feedback (Lag). - The percentage of students' satisfaction (Lag). - Licenses, Certifications and Recognitions (Lead).

Strategic Objective (5)	Fostering community partnership.
How to achieve it?	- Volunteering in participating in community activities. - Proposing innovative ideas to solve community problems.
How to measure it? (Lead / Lag)	- Number of volunteers (Lead). - Possibility of an application according to teaching objectives (Lag).

Table 1: Strategic Objectives

1.6. Project Charter

Project Title	Construction of Kindergarten in Mutrafiah	Project Number	XXX-CXX
		Revision Date	
Project Objective		Project Scope	
To provide education facilities for children in a growing community in Mutrafiah district in Jubail		<u>Work to include the following:</u> • Construction of Kindergarten in Mutrafiah district in Jubail - Sector F4: - Approximate Site Area (each) = 4,260 m2 - Approximate Building Area (each) = 1,500 m2 • All sites are to be developed by filling, compaction, and grading to the required elevation. • All buildings are to be provided with services such as potable water supply, sewage, storm water drainage system, power and lighting, telecommunication, CATV, CCTV, LAN, public address, HVAC, fire detection, fire protection system and building management system.	
Project Justification			
It is part of the city development master plan with reference to the Integrated Schedule for Housing Development. To align school facilities with the complete schedule of a residential unit in Mutrafiah district in Jubail.			
Stakeholders (External and Internal)			
Engineering Department. Construction Department. Education Department. O&M Department. Procurements Department. Project Department. Jubail Community Parents Utility Companies (SEC, Marafiq, .. STC)		<u>Studies:</u> <u>Surveys:</u> Existing condition as-built survey will be carried out during design task <u>Standards:</u> SBC	
Schedule/ Cost Estimate			
Organization Breakdown	Projectized		
Structure (OBS)			
Starting Design:	01 – Jan - 2022		
Complete Design:	28 – Feb - 2022		

Award:	01 – May - 2022	Project Constraints:
Construction Complete:	15 – Dec – 2023	Availability of infrastructure IFC Designs Sector F4
Preliminary Cost Estimate (±25%) in SAR:	16,000,000	Project Risk Assessment:
Project Interfaces:		Timely Construction commencement of
Private Sector Projects in Sector F4.		Infrastructure by Private Sector in Sector F4
Project Sponsor :		Third-Party Approvals
Royal Commission in Mutrafiah district in Jubail		As-built information of existing utilities; waterline, power lines in the area not available (delays the design)

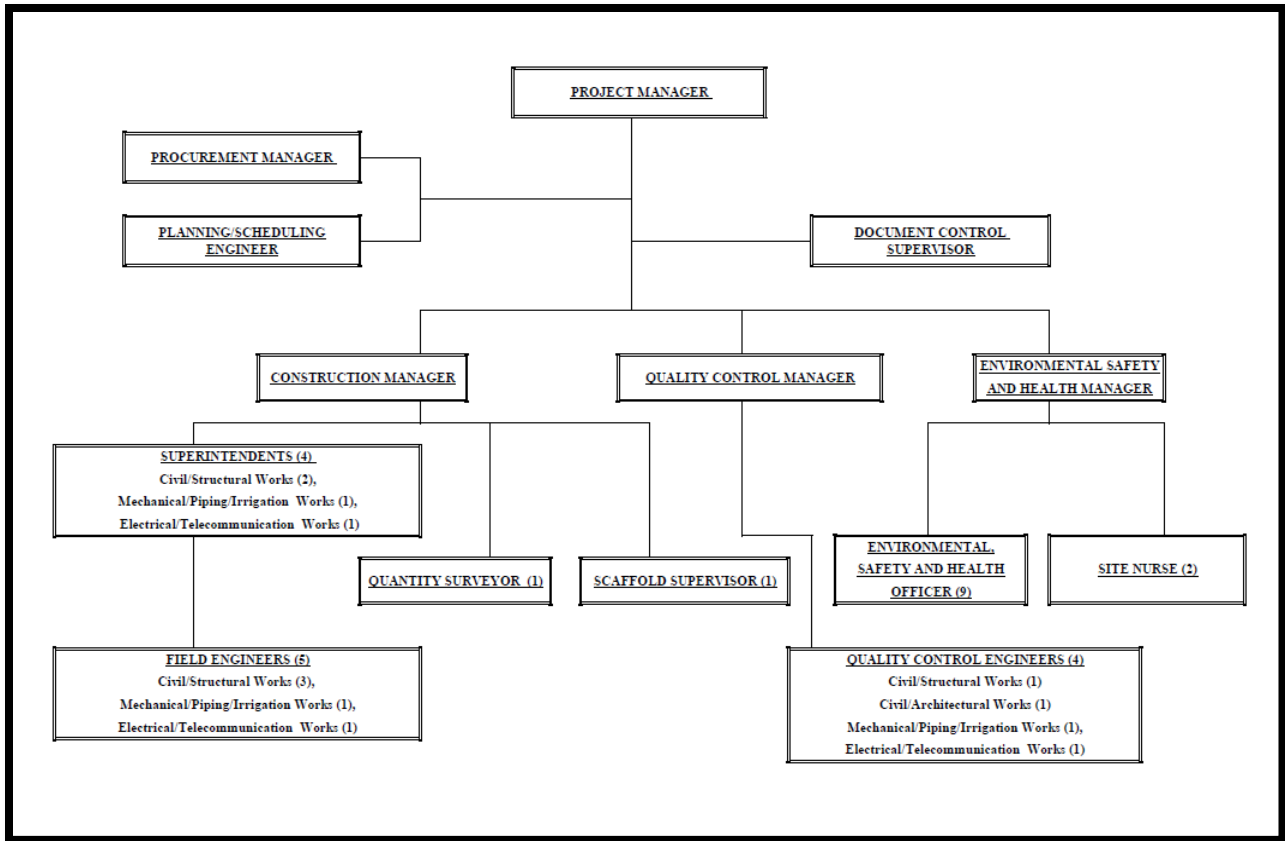


2. Governance, Structure, and Process

A uniform hierarchy of operations refers to an organizational structure. It specifies how groups should be divided, coordinated, and directed. It also identifies the roles and responsibilities necessary to realize an organization's goals and vision. Organizational structures are not fixed in stone; they change depending on the size, demands, and philosophy of the company.

2.1. Organizational Structure

In the Field of Construction, the functional type of organizational structure is the most effective in the fulfillment of the project. We need key personnel to execute the task and below are the proposed



organizational structure necessary in the performance of the Work, including lines of authority, responsibility and communication, and division of responsibilities.

2.2. Practical and Scientific Bases

When choosing an organizational structure, certain features should not be overlooked. The key elements that contribute to a proper organizational structure are as follows:

- Degree of alignment with organizational objectives
- Accountability assignment
- Delegation of Capabilities
- Simplicity of Design
- Physical locations

In the design of an organizational structure, it is important to know the specifics of the organization before formulating the structure. Organizational structure may be centralized or decentralized. Traditionally, structures of the organization have been designed with a centralized leadership thereby having a defined chain of command. In the development of an organizational structure, the practical basis to be considered is a common purpose, coordinated effort, division of labor, and the hierarchy of authority.

Its common purpose unifies members of the organization thru a common understanding of what is the vision and mission of the organization, its values, and strategies.

The coordinated efforts were brought about by the collaborative contribution of each of the members of the organization. The fair and equal distribution of labor among members of the organization in order to have a sound judgment and result from the members. This will also help in making different members of the organization with different tasks and functionalities perform and deliver results effectively and efficiently.

The hierarchy of authority is the area in which members and leaders of the organization will have a control mechanism making sure that the right people do the right things at the right time thereby enabling organization members to make a decision quickly when needed. Identified nature or line of business an organization will engage will be the basis in which the type or kind of structure will be adopted and implemented in an organization.

2.3. Project Management Office

As we are seeking more reliable monitoring or increasing the efficiency of construction across projects, we would consider opening a project management office (PMO). A PMO is a group, either an internal department or an external company that sets, maintains, and ensures project management methodology, best practices, and standards throughout an organization. It supports managing shared resources across all projects administered by the PMO and provides coaching, mentoring, training, and oversight. It keeps best practices, project direction, and project direction all from a central location. It ensures that company procedures, practices, and activities are carried out correctly on schedule, on budget, and in the same manner. A PMO exists to assure project and program success, which is crucial because projects and programs are how enterprises provide value.

In the execution of the Kindergarten Project as a Project Manager, the best model to be used is Supportive Project Management. I believed this type is very effective to carry out the project in a human and professional manner as the project manager oversees the team members in the project management office and takes responsibility for the quality and value of each project under its care. This involves collaboration with project managers and reporting to the executive staff of the organization. It collects all projects in an organization, supplies best practices, templates, training, but with a low degree of control. As a Project Manager, it is necessary to provide support even to the lowest member of the organization.

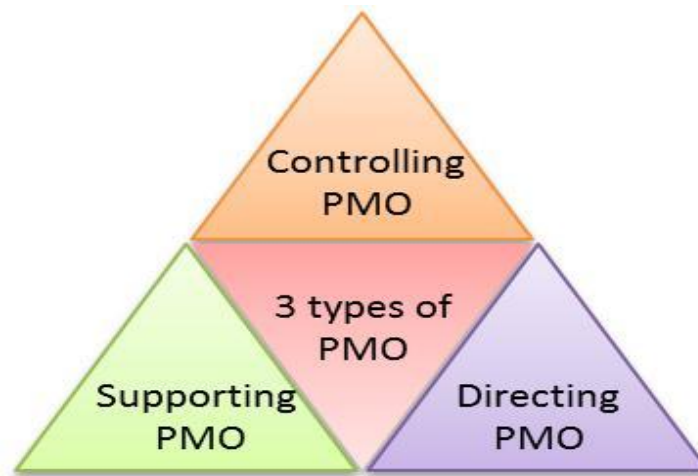


Figure 3: Controlling PMO

3. Compliance, standards, and Regulation

The purpose of this section is to describe the contractual obligation against the project requirements and objectives for delivering the kindergarten to meet the minimum standards.

The contractor responsibilities to make sure meeting not only limited to the following:

- Conduct QC/QA for all requirements as described
- Administering the construction works
- Provide submittals of the standards, requirements and specifications, and got written approval to proceed.
- Being available for a site inspection by the third party inspection agent
- Completing the standard construction forms and providing submittal as part of project handover.

3.1. Check Compliance Model

Project Name: Construction of Kindergarten	Owner	XXX	Main Contractor	XXX
	Date		Ref.	
	Requirements		Compliance	
	Goals	Details	Compliant (Y,N,NA)	Remarks

Developing Smart educational facilities	Provide smart board in all classrooms and carpets		
	The areas of the class should comply with international standards for smart classroom		
	The chairs should be comfortable for a long seating period		
	The lighting should comply with the Saudi Building code and with three lighting controls in each classroom		
	The air condition should comply with the SBC standards and regulation		
	Each table should have four students for collaboration interaction and with the educator		
	The education resources should be accessed by the students		
	The cabinets should be available for each student for storing educational materials		
	The kindergarten should have activity areas like an art center		
Developing supporting facilities	The kindergarten should be equipped with an auditorium as per design requirements and the Saudi Building code.		
	The kindergarten should have resource rooms like sports equipment and customs to support the learning outcome		
	The kindergarten should have a library that contains different levels to support a variety of intelligence.		
	The library should have access to the internet		

Developing general utilities	There should be enough rooms for the staff for class preparation that comply with the Saudi Building code and company requirements and regulation		
	The meeting rooms should have IT equipment and furnished items to support the long hours meeting. This should be designed and approved by the expert designers and vendor		
	The building should be south facing so that sunlight can enter the room in the winter and cannot directly in the summer		
	The building should be planted with hygienic laws and the O&M manuals should be part of the handover		
	Educate space should have been provided with the staff room, office room and comply with standard regulation		
Fostering community partnership.	Suitable place for parent's meetings according to international project standards.		
	Donating center, chairs and area should be provided with suitable hospitality equipment.		
	Kindergarten should have an auditorium to spread the causes and to host exhibitions.		

Table 2: Check compliance table

3.2. Check List Model

3.2.1. Start Phase

The following checklist serves as of the start of the project and must be completed as the phase closed by the Project Manager. This document emphasizes that the output of the section will allow the project to start smoothly.

Start Phase			
Description	Yes	No	Comments
Have project objectives been defined and are they clear?			
Has a project sponsor been identified?			
Has a project customer been identified who will sign off the requirement and accept the delivery?			
Has an issues escalation mechanism been identified?			
Has an ultimate authority been identified who can make the final say on project continuation?			
Has the Project Manager been identified?			
Has a Business Analyst been identified?			
Has Core Team been identified?			
Has a Business Case been developed and approved by the authority?			
Has the project been prioritized?			
Have Business Requirements been completed and sign-off?			
Have Deliverables been defined clearly?			
Has Acceptance Criteria been established for each Deliverable?			
Has Project Management Methodology been identified?			
Has Risk been assessed?			
Have Risk Mitigation Strategies been defined?			
Has a Contingency Reserve been established?			
Have business functions been identified?			
Has the Project interface been identified/documented?			
Have business processes impacted by the project been identified?			
Has the Project Budget been approved?			
Has a Project Deadline (Completion Date) been established?			
Have interdependencies between other projects been identified?			

Table 3: Starting Phase

3.2.2 Plan Phase

The planning phase shows the road map to construct the kindergarten. This includes the development of the scope, schedule, and time of the entire project. The planning team must complete this phase and make sure that all the below checklists are completed on time to allow the project to start construction.

Planning Phase			
Description	Yes	No	Comments
Have you organized a project kick-off meeting			
Does the project team need any training?			
Are you comfortable with the skill level of the project team?			
Do you need a project management plan?			
Do you have enough contingency or buffer in the budget and schedule?			
Is there a vendor contract involved in the project?			
Have all the project components been estimated?			
Do you have a detailed project schedule drafted?			
Do you need a work breakdown structure?			
Have you created a baseline for the project plan?			
Is the project team comfortable with the project schedule?			
Do you have clearly defined the milestones for the project?			
How do you plan to track project progress?			
Have the team left plans and public holidays been factored into the project plan?			
Do you have a resource plan for the duration of the project?			
Do you need to hire additional resources for the project? If yes, has the hiring process been kicked off?			
Have you factored in the resourcing costs in the plan?			

Are you aware of the SMEs required for the project?			
Is your project schedule detailed enough for the project team to understand the tasks?			
Is there a quality assurance plan for the project?			

Table 4: Planning Phase

3.2.3 Achieve phase

This phase is where the deliverables of the project are realized by the project constructing team. The project manager will need to communicate the deliverable in a proper way to get support from the stakeholders.

Achieve Phase			
Description	Yes	No	Comments
Has the project scope been finalized by the stakeholders?			
Have the business requirements been finalized and signed off?			
Is the team aware of the project deliverables?			
Have all the hardware and infrastructure requirements been finalized and addressed?			
Does the project team need to be co-located?			
Is everyone in the team aware of roles and responsibilities for everyone, including themselves?			
Is the team aware of the benefits and business value of the project?			
Is everyone in the team fully allocated to the project?			
Is the project team comfortable with the requirements and their details?			
Have you planned the resources required for the implementation?			
Is everyone in the project team aware of the project deadlines?			
Does the project team need to be co-located?			

Is everyone aware of the defect management process?			
Are you aware of the impact of systems shut down for implementation?			
Do you have a commitment from a business for testing resources?			
Do you have a list of housekeeping tasks for the project?			
Will the system need a User Manual?			
Do you have a list of critical tasks?			
Do you have a plan to update the system documentation after the project is complete?			
Does everyone in the project team have the required hardware and software?			
Is there a mechanism to track scope creeps and change requests?			
Have you created a project change management plan?			
Do you have a change request log and change request template?			
Do you have a communication plan?			
Is there a set of standard templates for project artifacts available?			
How often do you review your project budget?			
Do you have a detailed project schedule where the largest task is less than 5 days?			
Do you have a defect management process in place?			
What is the frequency of status reporting?			
Do you have a project status report for weekly and/or monthly reporting?			
Do you plan to conduct a monthly project team meeting?			
How will you track resource utilization in the project?			
How do you plan to manage ongoing leave management for the team?			
Was a risk assessment conducted for the project?			
Have you created a project risk and issue register?			
What is your stakeholder management plan?			
Do you have the required tools to capture timesheets?			

Table 5: Achieve Phase

3.2.4 Close Phase

This phase serves as a sign of the deliverables by the stakeholders. This needs to close by the project manager and do the proper handover to the occupants' team.

Planning Phase			
Description	Yes	No	Comments
Was an implementation review conducted?			
Are all the project benefits still on track?			
Will there be a closure document?			
Have all the stakeholders authorized the project closure?			
Are there any pending or open issues because of the project?			
Do you have a list of lessons learned?			
Have adequate arrangements been made for the handover of the new or updated systems/processes?			
Has the project budget been finalized?			
Are all the project resources released?			
Have all the post-project activities been complete?			
Handover is complete for all deliverables?			
All deliverables are accepted and signed off by the client?			
Final project status reports are complete?			
All financial processes and reports are complete?			
Staff performance evaluations and reports completed?			
All supply contracts and processes are terminated?			
Site operations and facilities used for the project closed down?			
Disposal of all equipment and materials is done?			
Completion of storage for all the project files?			

Communication: Announcement of completion of a project (internal, external, and public relations contacts)?			
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Table 6: Planning Phase 2

3.3. Stakeholder Register

Project Name	_____	Date	_____
Project Number	_____	Document Number	_____
Project Manager	_____	Project	_____
	_____	Owner/Client	_____

Project Role	Category	Contact Information	Group
Sponsor	Internal	Ceo@rcjubail.gov.sa	Owner
Project Manager	Internal	pm@rcjubail.gov.sa	Direct Management
Project Management Team	Internal	team@rcjubail.gov.sa	Direct Management
Project Department	Internal	project@rcjubail.gov.sa	Direct Management
Engineering Department	Internal	Eng@rcjubail.gov.sa	Functional Management
Procurements Department	Internal	Pro@rcjubail.gov.sa	Functional Management
O&M Departments	Internal	OM@rcjubail.gov.sa	Functional Management
Education Department	Internal	Edu@rcjubail.gov.sa	Functional Management
Jubail Community	External	comm@rcjubail.gov.sa	Community
Transportation Department	Internal	Trans@rcjubail.gov.sa	Functional Management
Jubail Governor	External	govenor@rcjubail.gov.sa	Governments

Construction Contractors	External	Cont@rcjubail.gov.sa	Special Interest Group
Saudi Electrical Company	External	sec@rcjubail.gov.sa	Utilities
Marafiq	External	marafiq@rcjubail.gov.sa	Utilities
Saudi Telecom Company	External	stc@rcjubail.gov.sa	Utilities
Childcare Facilities	External	facilities@rcjubail.gov.sa	Competitors
Material Suppliers	External	supplier@rcjubail.gov.sa	Suppliers
Local residents	External	citizins@rcjubail.gov.sa	Citizens

Table 7: Project Phase

4. Strength/Interest and Influence/ Strength Networks

4.1 Stakeholder Analysis:

Stakeholder management is a critical skill that successful people use to gain the support of others. It assists them in ensuring that their projects succeed where others have failed. Stakeholder analysis is a technique for identifying the key people who must be persuaded. Then you use Stakeholder Planning to build the support you need to succeed.

The following are the advantages of using a stakeholder-based approach:

- You can use the opinions of the most powerful stakeholders to shape your projects early on, and their feedback can also improve the quality of your project.
- Gaining the support of powerful stakeholders can help you win more resources, increasing the likelihood that your projects will be successful.

4.1.1 Stakeholders Strength/Interest Network

Once stakeholders have been listed in the stakeholder register. Some of them may be able to either block or advance. others may be interested in what you're doing, while the rest may not be. This is where the Strength-Interest network comes in handy for categorizing/prioritizing stakeholders.

This aids in the identification of stakeholders based on their strengths and interest in the project. When you plot your stakeholders on a strength/interest network, you can see who has a lot of power and

who has a lot of interest in your project. People in positions of power must be kept satisfied, while those with vested interests must be kept informed. When a stakeholder has both, make sure you manage her expectations very closely

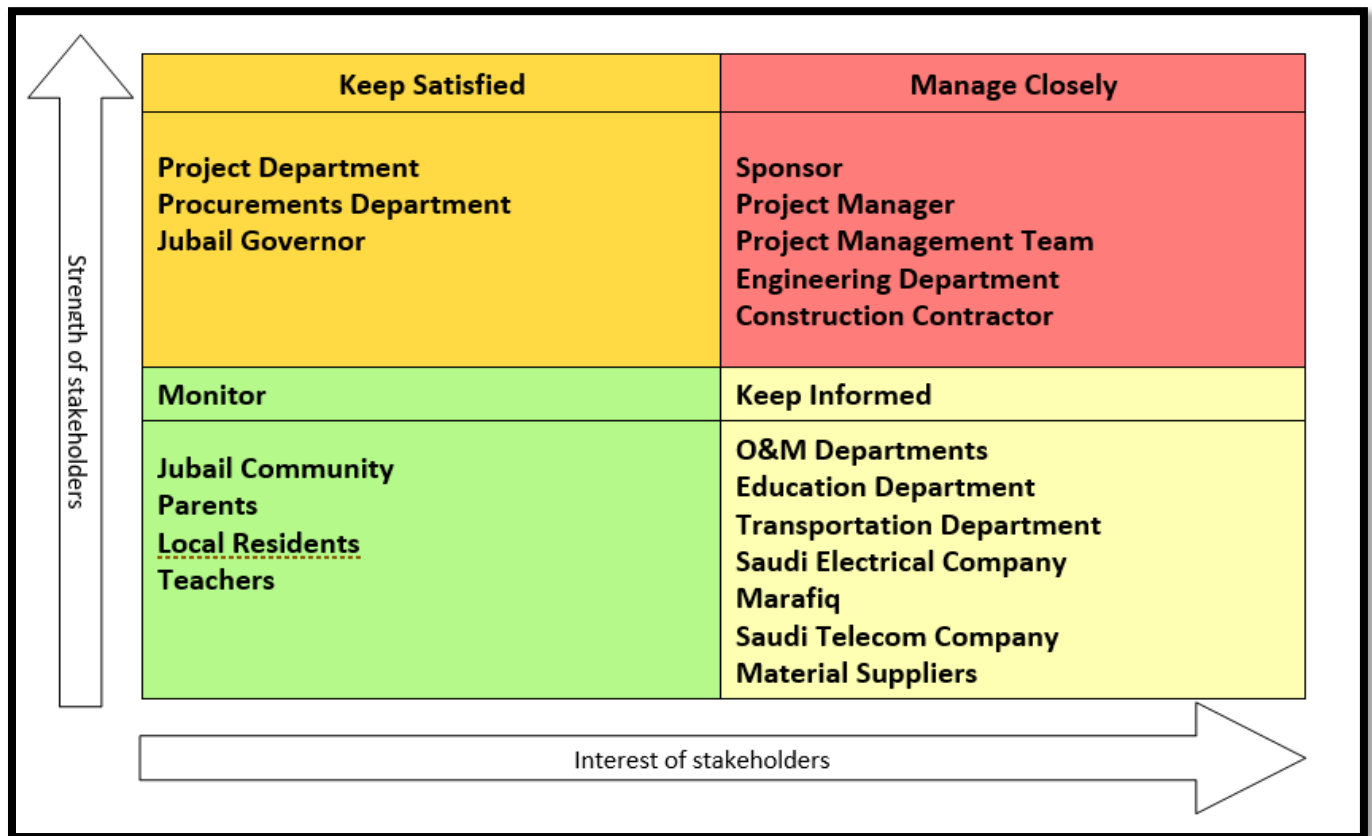


Figure 4: Analysis of strength and interest of stakeholders

4.2 Logical Diagrams for the Register of the Stakeholder

To be considered a stakeholder, a person or group must have an interest in or influence over the project. We would benefit from understanding not only their interests but also the potential project impact if a need were not met.

The first effort should be a brainstorming session with appropriately selected members and, if possible, a facilitator. All stakeholders should be considered at the outset and possibly dropped later in the analysis. It is frequently difficult to force classifications into groups and determine who is truly inside and

outside of the stakeholder's register logical diagram. Despite it is usually preferable to identify these stakeholders by name rather than generic terms such as customer, owner, sponsor, and so on, in order to gain a more powerful understanding of their needs and expectations. This concept will not apply in the below logical diagram to avoid getting into the intricacies of details (Cleland, 1998).

Logical Diagram showing the register of Stakeholders in a figure is presented on the next page.

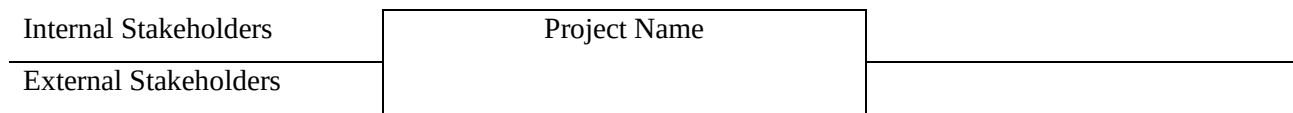
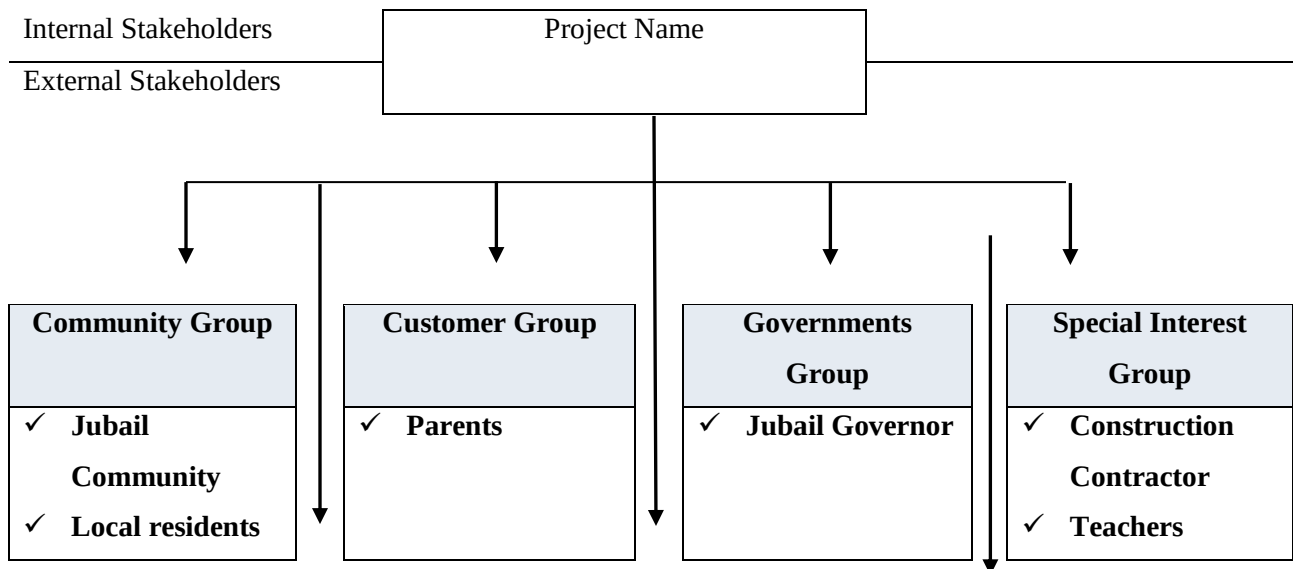
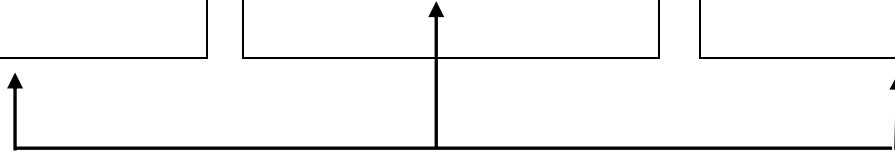
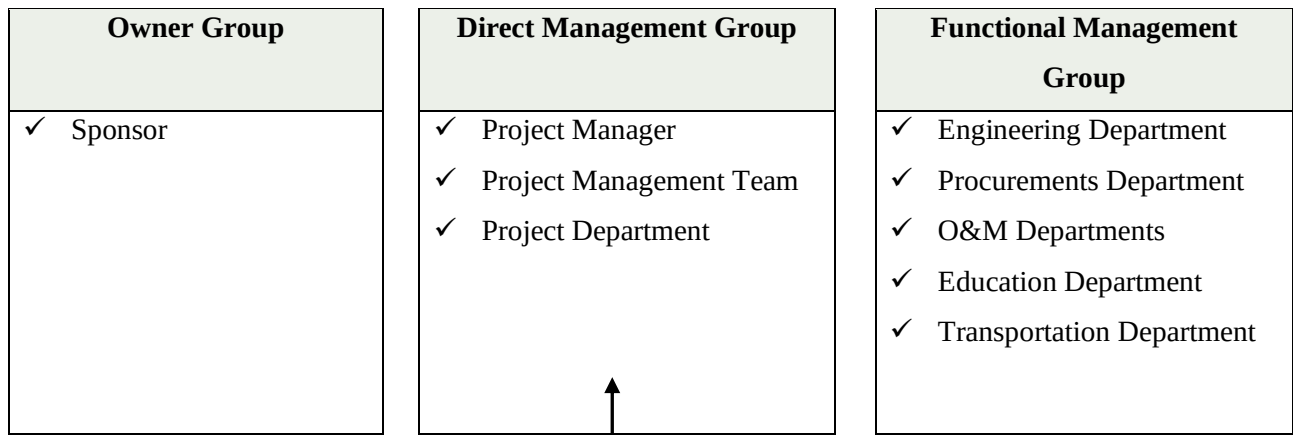


Table 8: Project of tree analysis

5. Culture & Values:

An organization with a strong culture is one where its employees know how to respond to any situation, know how they will be rewarded when demonstrating the organization's values, and understand and know how they will be held accountable.

A highly effective organization is based on a strong culture that is rooted in deeply held and widely shared beliefs which are then strengthened by a well-developed strategy and structure (SHRM, 2021). Epstein et al. (2014) argued that it is critical to implement sustainability in an organization that has a shared culture that is based on sustainability. According to empirical studies, sustainability-integrated firms are more likely to integrate sustainability messaging into mainstream marketing and advertising.

5.1 Culture

Kindergarten Culture is defined as “those achievements of an organized community that can be recognized in the typical and commonly-held views and beliefs of the educators, principals, professional associates, administrative and other staff and parents involved with an educational institution” (Vujičić, 2013).

5.2 Values

During the past few decades, studies have shown the growing paybacks of early childhood education. Early childhood education goes through kindergarten programs that help children transition into primary school (Ameri Schools, n.d.). In other words, kindergartens are designed to foster academic, social and individual growth. The curriculum Development council (n.d.) addresses that in the context of the development and characteristics of children, kindergarten can emphasize the positive values and attitudes that align with their kindergarten mission and context, such as persistence, care for others, responsibility, when planning their school-based moral education. kindergarten can let children examine and apply positive values and attitudes in the daily learning environment, which has various opportunities for interpersonal interactions. The construction of kindergartens carries the following values:

Citizenship: to accomplish loyalty as well as belonging to our homeland via driving all future goals and visions that result in achieving citizenship's values.

Creativity: to shed the light on visions coming from outstanding thoughts and creative ideas along with supporting creators' initiatives that enable to get the best result in the matter of building a knowledge society.

Accuracy: to guarantee accuracy and uniqueness in our business and strive for progressive improvement which allows us to hold the best result.

Fairness: to apply equity and equality between our staff as they are our essential and precious resources.

Transparency: to promise transparency in our attitudes, deals, and behaviors. To share both information and knowledge within us and ensure better communication with current partners.

Responsibility: to support and advance our society passionately through a fruitful partnership with relevant authorities.

Teamwork: to create a teamwork spirit that allows us to work calmly as there is applying of constructive collaboration and mutual trust among team's members and leaders that aim to educational growth, investing in building up creativity and abilities for future generations.

6. Self-reflection and self-management

We all know that a project is considered successful if it is completed within the scope, time, cost, and quality constraints. Poor project management is expensive and difficult to deal with, especially when large projects with large sums of money are involved. Only small fractions of the many projects that are attempted around the world are truly successful. Projects are completed and closed, but they are not always regarded as successful due to cost or schedule overruns, with the most prevalent cause of project failure being cost overrun. As a result, firms must apply improved concepts, creative approaches, and frameworks in project management.

6.1 Personal Behaviors Impacting the Project

One of the most important factors influencing project success is people's behavior. In the remote work environment of today, managers must understand the emotions and culture of their work team to give employees a chance at succeeding in the long run and completing projects in the manner that they should be handled. Project management revolves around people, and their actions have a direct impact on the project's success. All processes revolve around people, which is why projects cannot thrive without their input and ideas.

In this research, we will discuss three project manager personal behaviors that might have an impact on the project, as well as how project managers can manage people without jeopardizing the project's success. The following is a list of three personal behaviors of project manager that can influence the project:

- Understanding Culture
- Engaging Team Members
- Good Communication

Understanding Culture

For humans, culture is one of the most significant and sensitive variables. To different people, the term culture can signify different things. From the standpoint of a project manager, culture could simply mean "how projects are managed here." People bring their culture along with them as luggage. Project managers must interpret and comprehend the significance of workplace culture.

At a global level, managers may find it challenging to comprehend cultural variations. While project management teams' global reach has resulted in an infusion of bright individuals, it has also resulted in a situation where project managers aren't always in control of how their team's culture is seen and what they can do about it.

Employees are frequently required to work in environments that aren't supportive of their efforts or the job they produce. Employee morale can be harmed by a lack of acknowledgment and praise where it is due, as well as a lack of confidence to attempt new things at work. In the kindergarten construction project, PM should encourage everyone to communicate in short clear sentences and discourage, as much as possible, the use of idiom, slang, or words with multiple meanings.

Engaging Team Members

After you've figured out what culture is, the next step is to engage team members and make sure they're paying attention. Successful project management necessitates involving team members and harvesting communication between them. The level of engagement should be the same for both team members and stakeholders so that everyone is on board with the development and ready to pitch in where it's needed.

Throughout the course of a typical project's lifecycle, engagement levels should be assessed, and employees' feelings should be closely tracked. The way the project team interacts and performs as a whole can have a big impact on productivity. In the kindergarten construction project, PM should Start with setting a clear vision and specific project goals before you provide challenging but exciting assignments. Empower your team to make independent decisions and share the project's progress on an ongoing basis. Provide social and structural resources for the team and work to remove any obstacles that are hindering team success.

Good Communication

People management issues aren't about the technical aspects of day-to-day interactions with people; rather, they're about a lack of communication among stakeholders. Employees will be able to communicate with one another through a variety of channels at any given time. Make sure that the communication is consistent and that it aids in the achievement of beneficial outcomes.

If project managers want to get the best results on their new initiatives, they'll have to go beyond what's written in the books. People's emotional bonds as individuals and as members of teams must be recognized to effectively manage them and reduce difficulties. In the kindergarten construction project, PM should make good communication by focusing on the way communication is delivered and received, project management teams will see their projects run smoothly and more efficiently.

6.2 Personal Behaviors Analysis

Team members should be acceptable communicators who advance clear, explicit data trade. It is PM work as an undertaking chief to keep many individuals educated. PM task groups must get what's generally anticipated of them, including what they should do, when they should do it, and what spending plan, time, and quality objectives they're focusing on. On the off chance that undertaking colleagues don't have the foggiest idea what their obligations are or how to finish them, the project will stop.

PM will not have the option to follow project progress in the event that PM doesn't have the foggiest idea of what the venture group is doing (or isn't doing). At last, on the off chance that PM doesn't have a clue what the client anticipates from PM, the task will not make headway. Subsequently, project correspondence can be summed up as deciding "who needs what data and when" and guaranteeing that they have it. All activities require viable communication plans, yet not all undertakings will utilize similar sorts of correspondence or spread data similarly.

The correspondence the board plan diagrams how the partners' correspondence needs will be met, including the kinds of data that will be conveyed, who will impart it, and who will get it; specialized techniques; correspondence timing and recurrence; the strategy for refreshing the arrangement as the venture advances, including the increasing system; and a glossary. The objective of the project manager is to finish things. Each association has its own arrangement of strategies, functional methodology, and hidden culture. Political traps, unique inspirations, contending interests, and force battles flourish.

A venture director should know about every one of the concealed powers at work in the association. The initiative is characterized as the capacity to spur and rouse others to accomplish explicit objectives. Pioneers impart a feeling of direction in their supporters and join them behind a shared

objective. A decent venture administrator can propel and move the undertaking group to comprehend the task's vision and worth. As a pioneer, the undertaking administrator can spur the task group to discover an answer for the apparent issue.

6.3 A self-professional assessment using SWOT Model

SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. A personal SWOT analysis is a self-introspection exercise that can help you better understand yourself and plan for future growth. It's a reliable technique for distinguishing inside and outer qualities and shortcomings, just as promising circumstances and dangers. The evaluation is remembered for any great business or promoting plan since it gives pivotal data to fostering a development system. People can profit from this significant exercise too.

An individual SWOT investigation can assist you with accomplishing your objectives, regardless of whether you're searching for a new position or attempting to progress up the professional bureaucracy. A novel technique for self-assessment can assist you with sorting out where your profession is currently and where it may go later on.

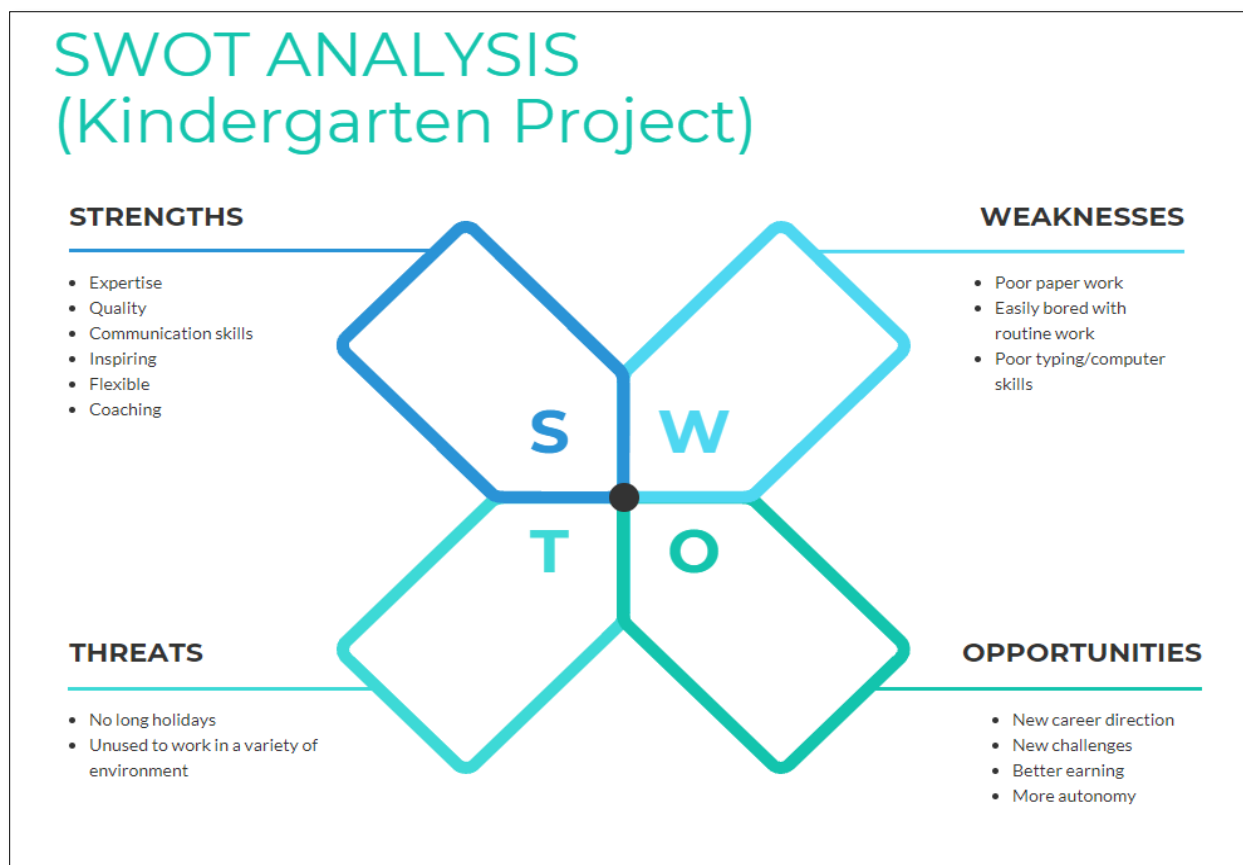


Figure 5: SWOT Analysis

The SWOT analysis process captures information about PM's internal strengths and weaknesses as well as external opportunities and threats. The key to completing your SWOT analysis is to treat your career as a business and yourself as a competitive product.

Strengths

To help you understand your strengths, picture yourself as a competitive product in the marketplace. Personal strength is an asset to you as a product and can be used as a way to differentiate PM from others when interviewing or trying to obtain your next promotion. Strengths such as strong expertise, inspiring, quality, coaching, project management skills, and ability to improve processes.

Weaknesses

Personal weakness is a liability or an area of opportunity for growth. These are characteristics PM could improve upon to increase future job opportunities. Weaknesses such as easily bored with routine work, poor typing skills, poor paperwork, and being a poor listener.

Opportunities & Threats

When thinking about opportunities and threats, PM always finds it easier, to begin with, the “threats.” Try comparing yourself to PMs, whom you will likely compete against for that next job or promotion. Then, as objectively as possible, judge your threats and determine possible ways to overcome them.

7. Personal Integrity and Reliability

The construction industry is a challenging and demanding business sector. Alqasmi (2019) discussed that construction projects include many stakeholders, often with varying views, and require various procedures and processes according to the context of each project. Between those procedures, gaps occur, and individuals are required to make decisions. Some of these decisions and practices may be considered unethical.

The Cambridge Business English Dictionary (2013) defines ethics as “a system of accepted rules about behavior, based on what is considered right and wrong”. On the other hand, unethical practices include “acts that have harmful effects on others and are either illegal or morally unacceptable to the larger community (Jones, 1991).

Ethical practice in the building and construction industry is the vital importance in the same way to other disciplines. Scholars that the unethical practice ranks top among the most severe ills affecting the

construction industry. The construction industry faces some ethical issues that are comprised of but are not restricted to: conflict of interest, inflation of bills, professional incompetence, poor work delivery, fraud, bribery, professional misconduct, intimidation and kickbacks among several other evils. The consequences of such unethical behaviors in such industry lead to confidence reduction in the profession, continuous insecure practices that risk lives and property, loss of income by clients and governments, needless and baseless expenditures.

Below are examples of behaviors that Contradict the Moral Integrity in the Construction Industry:

7.1 Overbilling

Cash flow is critical to the construction industry. Project work packages cannot be completed without acquiring materials and manpower payments. Therefore, contractors use billings in excess to manage their expenses and reduce their reliance on credit to pay for upfront costs (Sandage, 2021). Overbilling arises when a contractor bills for contracted labor and materials before that work is being finished. For instance, during a billing cycle, a contractor completes 40% of a project but bills their customer for 50%. That extra 10% is the overbilled amount.

Overbilling leads to situations where the estimated cash required to complete the project exceeds the amount that can still be billed before completion. Such practices lead to a negative cash flow for the remaining activities. Also, it results in an inaccurate monthly income (or profit-and-loss) statement. In other words, over-billing will reflect too much profit in the profit and loss financial statement for the contractor.

7.2 Late Payments or Unpaid Work

Nowadays, finances are a major issue facing the construction industry in 2020. It is significant to have a positive cash flow for the company with a responsibility to ensure the livelihood of the employees and their families. Latham (1994) stated that “the cascade system of payment starts from the financial institution to the main contractor to subcontractor and so on down the chain”. The insolvency of one party in the payment chain could cause severe impacts to parties down the contractual chain.

It is found in the construction of Al-Matrafiyah District kindergarten that the subcontractor is not receiving payment for its completed work in several instances. Consequently, subcontractor typically files claims against the general contractor and owners in several major projects. Also, subcontractors are front-loading costs on many projects and paying their suppliers and employees. However, they are patiently awaiting payment from the general contractor or owner who may be disputing the payments, although the work is completed. The impact of late payments or non-payment leads to:

1. Delay in project's progress
2. Extension of time for project
3. Low quality works due to contractor's uncertain financial condition
4. Abandonment of the project
5. Creates negative relationship among parties
6. Creates financial hardship for the company
7. Subcontractors refuse to continue works on the project

7.3 Corruption

The construction industry has an international reputation for corruption and bribery. Corrupt practices can be found at every phase in construction projects, such as the planning stage and the awarding of construction contracts (Rodriguez, Waite & Wolfe, 2005). Examples of corruption include bribes, fraud, and kickbacks. Examples of corruption in the design stage of the project cycle include but are not limited to the following:

- Corrupt selection of consultants for feasibility studies, preparation of specifications/bid documents.
- Over-designed and overpriced projects.

The global infrastructure Anti-corruption Center (n.d) states that such corrupt practices cause loss and damage including financial loss and property damage. For instance, financial loss may arise from inflation of project price, increased maintenance and repair costs, damage to reputation, and legal fees. Project funds may be wasted where there is corruption in project selection or project design resulting in non-viable projects or projects which are unsuitable for the intended purpose

8. Personal Communication

8.1 Register of Stakeholders

STAKEHOLDER REGISTER					
Project Name: Construction of Kindergarten in Mutrafiah					
Stakeholder Name	Role	Type	Influence	Group	Address
Sponsor		Internal	H	Owner	Ceo@rcjubail.gov.sa
Project Manager		Internal	H	Direct Management	pm@rcjubail.gov.sa

Project Management Team		Internal	H	Direct Management	team@rcjubail.gov.sa
Project Department		Internal	H	Direct Management	project@rcjubail.gov.sa
Engineering Department		Internal	H	Functional Management	Eng@rcjubail.gov.sa
Procurements Department		Internal	H	Functional Management	Pro@rcjubail.gov.sa
O&M Departments		Internal	M	Functional Management	OM@rcjubail.gov.sa
Education Department		Internal	M	Functional Management	Edu@rcjubail.gov.sa
Jubail Community		External	M	Community	comm@rcjubail.gov.sa
Transportation Department		Internal	L	Functional Management	Trans@rcjubail.gov.sa
Jubail Governor		External	H	Governments	govenor@rcjubail.gov.sa
Construction Contractors		External	H	Special Interest Group	Cont@rcjubail.gov.sa
Saudi Electrical Company		External	M	Utilities	sec@rcjubail.gov.sa
Marafiq		External	M	Utilities	marafiq@rcjubail.gov.sa
Saudi Telecom Company		External	M	Utilities	stc@rcjubail.gov.sa
Childcare Facilities		External	M	Competitors	facilities@rcjubail.gov.sa
Material Suppliers		External	H	Suppliers	supplier@rcjubail.gov.sa
Local residents		External	L	Citizens	citizins@rcjubail.gov.sa

Table 9: Stockholder Register

8.2 Personal communication and effective communications

For the better and smooth functioning of an organization, communication must be effective and efficient. Effective communication is defined as communication between two or more people in which the intended message:

- is correctly coded
- is transmitted through an appropriate channel
- is received
- is properly decoded and understood by the receiver(s).

In other words, communication is effective when all parties involved in the communication (sender and receiver) attach similar importance to the message and make the sender feel heard and understood. In a business, communication is considered effective when the information or data exchanged between employees effectively contributes to the business success of the company. In the words of R.W. Griffin, "Effective communication is the process of sending a message in such a way that the message received is as close as possible in meaning to the intended message".

The American Management Association (AMA) has defined effective communication in terms of the following ten points

- A clear idea of topics and recipients of the communication.
- Determination of the purpose.
- Understanding the environment of the communication.
- Planning the communication with advice from others.
- Considering the content of the message.
- Making the recipient aware of the value of the communication.
- There must be feedback from the receiver.
- Properly defining whether communication messages are of short-term or long-term importance.
- All actions must be aligned with the communication.
- Good listening skills.

Effective communication is defined as the ability to effectively and efficiently convey information to another. Managers with good verbal, nonverbal, and written communication skills help facilitate the exchange of information between people within an organization for its economic benefit.

Establish and maintain a sustainable and productive relationship

Effective communication should be at the heart of businesses as, without it, it is very difficult to build and maintain productive relationships.

Give room for innovation

Effective communication facilitates innovation in a business by allowing employees and management to come up with innovative ideas that can contribute to the overall development of the business.

Help build an effective team

A work environment that is enriched by effective or open communication helps in building a cohesive and effective team. Effective communication always boosts the morale of the employees. It arouses the zeal of the employees to work towards the common goals of the company. Regular internal communication can also lead to better morale when employees are reminded of their achievements and feel that they are working towards a common goal.

Effective management

Smooth and open communication between management and employees leads to a steady pace of progress in the organization. Effective communication thus leads to effective management. The managers get to know the attitude and grievances of the employees and the employees get to know the attitude of the managers towards them and the policies of the company.

Effective corporate communication

The success of a company largely depends on effective corporate communication. Effective communication skills are critical to building active and effective interactions among colleagues, customers, supervisors, and the media. It is of utmost importance to all employees at all stages of business in any organization. Although everyone employed in a business boasts of having acquired the skills of effective business communication, there is always a need to improve these skills.

Methods of effective business communication

The various methods of effective business communication in a nutshell.

- Web-based communication - For better and improved communication, anytime and anywhere.
- Video conferencing - This allows people in different locations to hold interactive meetings.
- Reports - This is important for documenting the activities of a department.

- Presentations - This is a popular method of communication in all types of organizations, usually involving audio-visual material such as copies of reports or material prepared in Microsoft PowerPoint or Adobe Flash.
- Conference calls - This method allows for long-distance conversations.
- Forums - This allows participants to post information instantly in a central location.
- Face-to-face meetings - The nature of such meetings is personal and should be supplemented by written follow-up.

Effective business communication primarily involves listening and speaking. Both the speaker and the listener share responsibility for ensuring that the message is clear and understandable. In addition, body language, tone of voice, word choice and phrasing, clarity of message, and communication style also play a role and influence the effectiveness of interpersonal transactions and interactions.

Techniques of effective oral business communication

We will discuss the various techniques of effective oral business communication. The techniques are described below:

- The speaker should know how to articulate his message in such a way that the listener can understand it well and deliver it in a manner that is consistent with the actual message.
- The speech or the words spoken should be properly worded and concise.
- The speech should be contextual because serious topics are best delivered in a serious tone.
- Knowing the listener(s) and their reaction is critical to conceptualizing the topic of the speech.
- A quiet place is very important for effective business communication. If one party is distracted by external and internal distractions such as noise, the communication will not produce the desired result.
- The involvement of all parties is crucial for effective communication. Involvement means full attention and dedication to the discussion or analysis.
- Effective or active listening is essential for participants in communication. It is practiced by both the speaker and the listener in effective communication.
- To become a better listener, it is necessary to eliminate all distractions during the conversation.
- Active listening involves eye contact, nodding, gestures, and brief comments to show that you have understood. Based on these gestures and comments, you can gauge the listener's

understanding and response. If the listener seems confused, the speaker needs to rethink the wording or delivery of the message.

- The listener can ask questions, confirm what is being said, and contribute if needed.
- When speaking or interacting with someone, do not just listen, pay attention and take notes.

8.3 Shapes, models, and channels of personal communications

Communication is an essential process in our daily lives, and the whole world revolves around it. Lasswell's Maxim defines communication as "who says what to whom in what channel with what effect". Communication is the exchange of information from one point of the project to another point in an efficient manner.

So, there are various definitions and concepts of communication in today's world. But how important is this communication in project management? We can say that it is "Project-Life Blood" as everything in a project depends on how efficiently we carry them out. Communication is an essential tool in the field of project management. It is gaining importance every day and will soon be at the heart of all management processes.

The success of a project largely depends on the efficiency of its communication network. It starts from the first day of the project and remains throughout the life of the project. It provides regular updates to communicate the status of the project and its performance. Surprisingly, however, it has been found that most projects are affected by a breakdown in communication.

It is said that 90% of a project manager's time is spent communicating what needs to be done. This paper will explain what communication means in a project, what steps are required for effective communication, what are the obstacles in communication, how to overcome these obstacles by communicating together, the importance of communication in different work groups, and how to get to effective communication in four steps.

One can never assume that the receiver will interpret the message as the sender meant it. Communication is not an absolute, finite thing. To do so effectively, the project manager must consider all factors, such as the different realities, the space in which the communication takes place, verbal and nonverbal messages, intended meaning versus perceived meaning, etc.

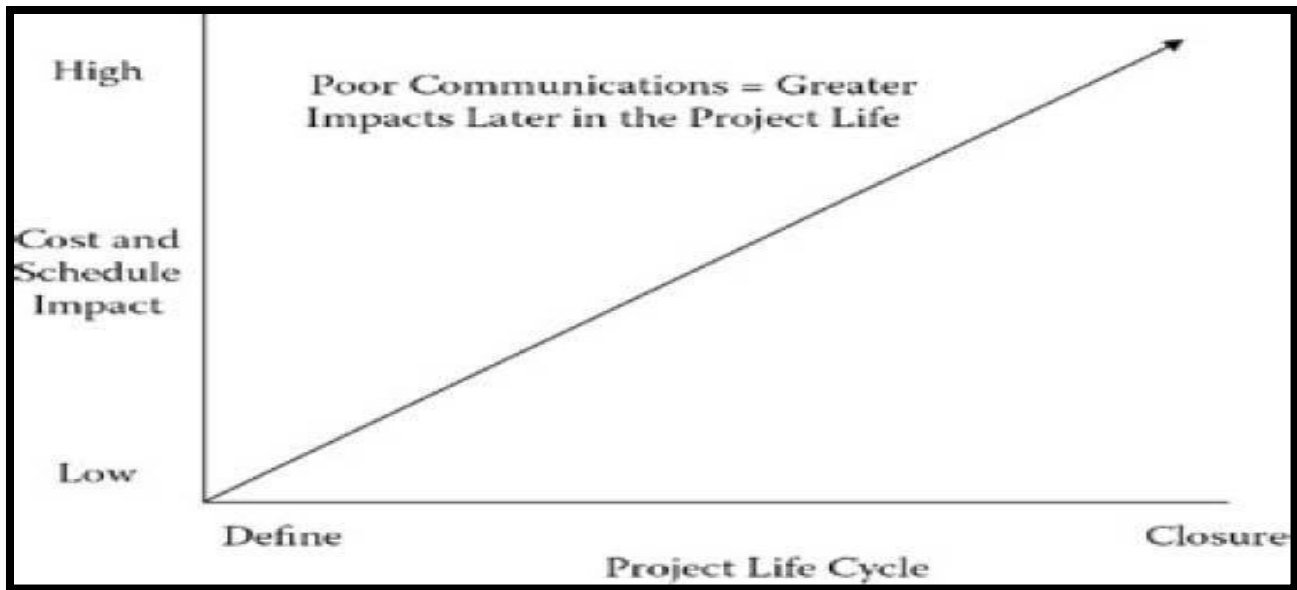


Figure 6: Analysis By Chart

The basic communication model is explained here using fax machine as an example,

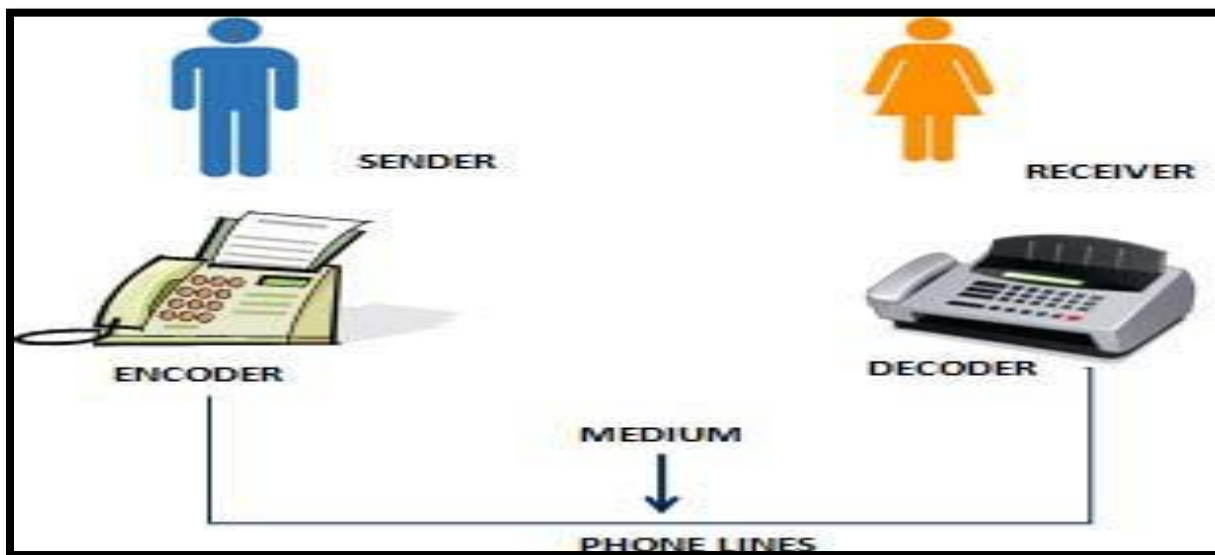


Figure 7: Basic process

Understanding the Communications Process

To communicate effectively, project managers must have a good understanding of the communications process.

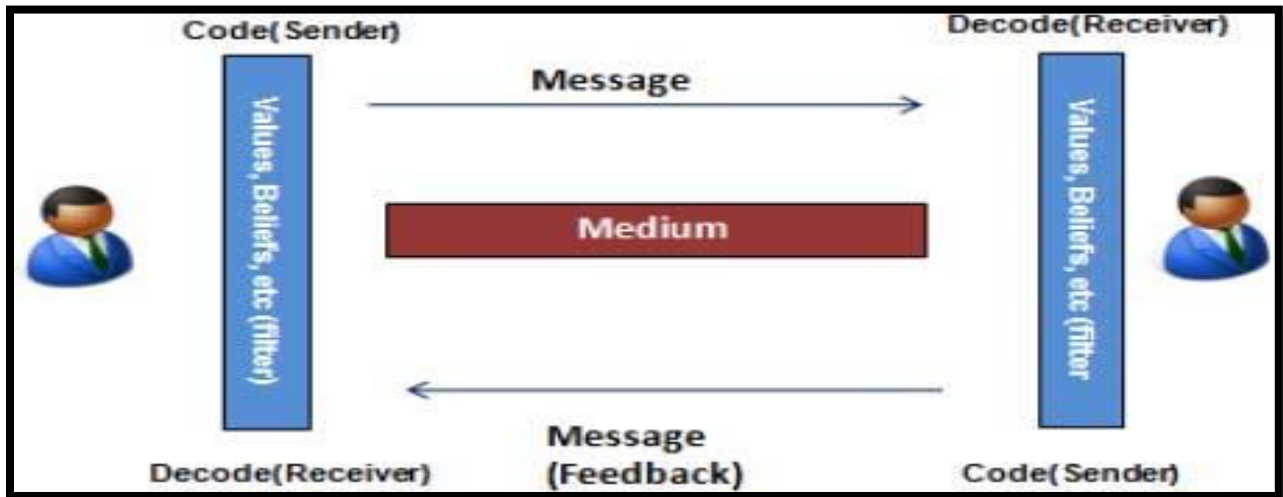


Figure 8: By digital coding

8.4 Communication matrix

The following table identifies the communication requirement for constructing this project.

Type	Objective	Medium	Frequency	Audience	Owner	Deliverables	Format
Kick-off meeting	Introduce the project team and the project. Review project objective and management approach	Face to Face	Once	Project Sponsor Project Team Stakeholders	PM	Agenda Meeting minutes	Soft copy in the archive Hard copy distribution

Project Team meeting	Review the status of the project with the team	Face to Face Conference call	Weekly	Project Team	PM	Agenda Meeting Minutes Project schedule	Soft copy in the archive Hard copy distribution
Technical Design meeting	Discuss and develop the technical design for the project	Face to Face	As needed	Project design team	Design lead	Agenda Meeting minutes	Soft copy in the archive Hard copy distribution
Monthly Project status meeting	Report the status of the project to management	Conference call	Monthly	PMO	PM	Slide templates Project schedule	Soft copy in the archive Hard copy distribution
Project Status report	Report the status of the project including activities progress and cost	Email	Monthly	Sponsor Project Team PMO	PM	Project Status report Project schedule	Soft copy in the archive Hard copy distribution

Table 10: Communication Matrix

8.5 Three (3) wrong scenarios of communications

1. Passive-aggressive communication

Passive-aggressive communication is a bad practice that has a direct negative impact on how people view themselves and others in the workplace. Passive-aggressive behavior or passive-aggressive communication is a difficult issue because the negative things that are said or done are often subtle and may not be perceived as overtly aggressive, offensive, or confrontational. However, the person receiving the communication invariably feels neglected or mistreated, to the point of damaging the relationship.

Employees or managers who refuse to address a co-worker directly, for example, engage in passive-aggressive behavior. Intentionally using emails and memos to communicate exclusively without

ever talking face-to-face with anyone in the office is one form of the problem. Intentionally avoiding a project or collaborating with someone on a particular task without giving a reason is also a form of passive-aggressive behavior in the workplace.

2. The blame game

Another example of poor communication is closely tied to ethics and responsibility. Failure to admit a mistake or take responsibility for a missed deadline demonstrates a lack of responsibility. However, blaming others is counterproductive and does not lead to a solution for the common good. Learning to take responsibility and move forward is a positive solution. However, those who continue to blame others for their mistakes damage working relationships and may be ostracized.

3. Not being able to listen

There are times when you need to forge a path forward, but managers and employees who act as uninvolved individuals and fail to listen to their peers are engaging in poor communication. There are many examples of poor listening, including failing to listen to your customers. If a product or service consistently receives negative feedback and you do not listen and solve the problem, your customers will quickly become dissatisfied and buy elsewhere. A competitor who listens to you and satisfies your customers' needs may win their business as well.

In an office environment, not listening to your employees is also problematic. It creates an ecosystem of disregard for individual feelings and devalues personal relationships in the workplace. For example, if employees express concern about a problem they see in the workplace, but the supervisor does not ask them to elaborate or address the issue, the problem may go unaddressed and employees may feel like their input does not matter. Employees want to feel that their ideas are valuable and that they are recognized as making valuable contributions to the company's mission.

9. Stakeholder's assessment matrix

When creating the stakeholder engagement assessment matrix, e.g. in the process 'plan stakeholder engagement', a project manager should refer to the stakeholder engagement plan for the desired level of engagement. The desired level ("D") of engagement is then incorporated into the stakeholder engagement matrix. When monitoring the actual stakeholder engagement, the project manager adds the observed current level ("C") of engagement for each stakeholder

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Sponsor				D C	
Project Manager					D
Project Management Team					D C
Project Department				D	
Engineering Department				D	
Procurements Department				D	
O&M Departments				D C	
Education Department			D		
Jubail Community			D C		
Parents			D		
Transportation Department				D	
Jubail Governor				D	
Children	D				
Construction Contractors					D
Saudi Electrical Company				D	
Marafiq				D	
Saudi Telecom Company				D	
Childcare Facilities				D	
Material Suppliers				D	
Local residents				D	
Teachers			D		

Table 11: Stockholder assessment matrix

10 Leadership

10.1 Project Leadership Overview

Leadership plays a significant role in attaining organizational goals and promoting individual professional achievement. Accordingly, leadership has been widely covered by management scholars, yet, little attention has been given to managerial and leadership behavior or styles of leaders in the construction industry (Liphadzi et al, 2014).

It is an essential factor in project and construction management as it can be seen as the art of influencing others to achieve anticipated results. Walker (2015) defined leadership as “the manner in which the project managers and construction managers conduct themselves in their role, in order to obtain the best performance from the people they are managing”.

Leadership has a large influence on the whole project process, including other people's actions. Managing construction projects successfully requires project managers to possess the four basic management functions of planning, organizing, leading, and controlling. Furthermore, Duy Nguyen, Ogunlana, & Thi Xuan Lan (2004) claimed that a construction project's success is also determined by many factors, including the competencies of the project leaders, their personalities, characteristics, skills, and leadership styles, among others also the impact on the construction project outcome.

Researchers have emphasized the importance of leadership styles and provided many suggestions about the characteristics, attributes, and skills that are helpful in the construction industry. Goodwin (1993) insisted on the importance of effective leadership and the skills that project and construction managers need. Accordingly, the project discusses leadership styles in the construction industry, focusing in particular on the project and construction management professions. Moreover, it examines project leaders' leadership styles in the construction industry.

10.2 Leadership and Construction

Several factors support the notion that the construction industry requires more leadership than any other. This is evident by the nature of the construction projects. The construction industry involves many large, technical, and multifaceted projects that require specialized skills and experience. In this industry, leadership is important because the teams and members of the team come from many different disciplines and are therefore large and multi-disciplinary (Hillebrandt, 2000).

Throughout the construction and engineering field, project and construction management were developed so that cost and planning could be improved (Arendse, 2013). The history of the construction

industry shows that management was mainly involved in management instead of leading, and there has been debate about the differences between management and leadership.

10.3 Leadership Styles in the Construction Industry

Munns & Bjeirmi (1996) explained that the success of a project relies heavily on the leadership style of the project manager. And how people interact with people they want to lead is extremely crucial to success. Price (2009) stated that leadership styles include autocratic leadership, democratic leadership, Transformational leadership, Transactional leadership, Charismatic Leadership, Laissez-faire leadership, and Democratic leadership.

Bartol, Matthews, & Martin (2003) debated autocratic and democratic leadership and discussed that leadership by autocrats involves telling others exactly what to do and expecting their subordinates to comply obediently. Even though it may be successful in some circumstances and the short term, yet, this approach is not effective in the long term.

Conversely, Democrat leaders are those who come to a final decision only after consulting the people they lead, depending on the consensus they reach. Some critics claim that popular decisions are not always the best ones to make, and therefore may not achieve the desired outcome. Transactional leaders focus solely on the goals that they are supposed to accomplish with their team. Subordinates are also rewarded by these leaders. Opponents of this leadership style argue that it is too narrowly focused and often focused on the wrong issues.

In contrast, transformational leaders empower members of their teams to make decisions based on the information provided to them and exercise little control over decision-making. It is a time-consuming process, but it is effective when the team members are dedicated to the organization's success. Price (2009) argues that building professionals should embrace and promote transformational leadership as a means of increasing employee performance and satisfaction.

In sum, Price (2009) stated that all transformational factors, such as charisma, inspiration, cognitive stimulation, and individual consideration are essential; however, Price (2009) also stated that transactional factors, including contingent rewards, management by exception, and active and passive behavior, are important for leadership effectiveness.

10.4 Influence of Transformational Leadership

The literature examines also how well-perceived elements of construction professionals' leadership styles are inspiration, idealized attributes, intellectual stimulation, idealized behavior, contingent rewards, and individual consideration. Price (2009) recommended that building professionals adopt and promote

transformational leadership based on the idea that it will enable them to increase employee performance and satisfaction.

Basically, the goal of transformational leadership is to engage followers so that they are motivated to create a relationship that raises their effort and morale. Followers are inspired to become leaders when transformational leaders look out for their needs and motivations (Price, 2009). Transformational leaders produce trust and satisfaction and working for them can be an extraordinary experience.

Transformational leaders are human-oriented and care for their employees (Bass and Bass, 2008). The more caring and considerate managers are, the more likely they are to provide healthy and safe working conditions for their employees. As a result, transformational leaders may also create intrinsic motivation for their employees when they communicate care and consideration, which may prompt them to take better care of themselves as well as their colleagues.

To achieve a high organizational safety climate, consideration and care for others are essential (Kines et al., 2011). Moreover, transformational leaders may encourage their employees to practice safe, efficient, and productive work behaviors by modeling them.

Grill, Nielsen, Grytnes, Pousette, & Törner (2019) argued that in construction site management, transformational leadership behaviors were observed primarily in production-oriented problem-solving, in which the site managers ensured that different viewpoints were taken into consideration through stimulating inter-individual and collective problem-solving processes. Other observed transformational leadership behaviors included applying personal goals and abilities to the project, demonstrating role modeling and verbally expounding on higher-order ideals, and explaining the importance of current work tasks and achieving the project's goals by emphasizing the importance of the specific task at hand.

10.5 Motivating Workers in Construction

Malachowsky (2018) defines motivation as “the process by which a person’s efforts are energized, directed, and sustained toward attaining a goal.” As individuals and situations vary from one to another, different motivational drives are needed. Mumford, et al. (2000) propose three motivation aspects that are necessary for developing leadership skills. First, leaders have to be prepared to make determined efforts to deal with complicated problems within an organization. Second, leaders need to show their willingness to express authority and dominance to apply their power.

Third, leaders must show a level of commitment towards an organization's social good. Malachowsky (2018) discuss that motivation is one of the critical key performance indicators that must exist on each leader dashboard. Leaders play a significant role in increasing the quality of a product or

service with minimal cost. Furthermore, employees' motivation leads to healthy work, places, happy people, happy society. Therefore, the success of a leader depends on proficiency in motivating team members.

Bredillet & Dwivedula (2010) suggested a model for motivating workers in a project environment. The model considers five major categories with subcriteria under the five main categories. These criteria are compatible with the nature of the project and important in improving motivation in the project environment.

1. Employee development: (a) job advancement; (b) variety of knowledge; (c) participative decision making; (d) high level of knowledge; (e) developing competencies; (f) sense of achievement.
2. Work climate: (a) variety of tasks; (b) social interaction; (c) feedback from work; (d) significant job; (e) communication flow.
3. Perceived equity: (a) adequate pay; (b) adequate recognition; (c) freedom at work; (d) feedback from colleagues.
4. Work objectivity: (a) complete piece of work; (b) clarity of goal.
5. Job security

11 Teamwork

Scarnati (2001) defined teamwork “as a cooperative process that allows ordinary people to achieve extraordinary results”. Also, Harris & Harris (1996) clarified that a team has a shared goal or determination where team members can develop effective and mutual relationships through knowledge sharing and skills to achieve team goals.

The literature consistently highlights that focusing on a common goal and a clear purpose is one of the significant elements of a team (Fisher, Hunter, & Macrosson, 1997). Therefore, Luca & Tarricone (2001) contended that there must be a high level of flexibility within team members to adapt to cope with that working environment where goals are attained by collaboration and mutual social dependencies instead of individualized, competitive goals.

RACI Model

One of the essential parts of project manager roles is delegation, therefore, early identification of roles and responsibilities early in a project is extremely essential. As a project manager, it is necessary to set the expectations of people involved in a project from outset. Projects are recognized by the involvement of many people, yet, how a situation where people are struggling against one another to do a task is avoided.

The same goes for dealing with a situation in which no one is taking responsibility and making a decision. How can people differentiate between their level of responsibility, when they should consult their project manager, or when they should exercise their own judgment? Applying the RACI matrix can help. The RACI matrix is a straightforward tool utilized for identifying and assigning roles and responsibilities and avoiding confusion over those roles and responsibilities during a project.

Construction of Kindergarten in Matrafiah District in Jubail City															
Deliverable or Task	Status	ROLES				Project Manager	Technical Lead	Functional Lead	Subject Matter Expert	Project Team Member	Developer	Administrative Support	Business Analyst	Consultant	PMO
		Executive Sponsor	Project Sponsor	Steering Committee	Advisory Committee										
		Sponsor / Leadership				Project Team				Project Sub-Teams			Other Resources		
Phase 1: Initiation Phase Activities															
Request Review by PMO		A	R			R	R		C						
Submit Project Request						R									A
Research Solution		I				R	A	R	C				C	C	
Create Project Charter		C	C			A	C	C	C				C	C	
Develop Business Case		I	A	I	I	A	C	C	C				C	C	C
Phase 2: Plan Phase Activities															
Create Schedule		I	I	I	I	R	C	C	C	C	C	C	C	C	I
Create Additional Plans as required		I	I	I		A				I			I	C	I
Phase 3: Execute Phase Activities															
Build Deliverables		C	C	C	C		R	R	R	R	R			A	
Create Status Report		I	I	I	I	A	R	R	R					C	I
Phase 4: Control Phase Activities															
Perform Change Management			C	C	C	A	R	R	C					C	I
Phase 5: Close Phase Activities															
Create Lessons Learned		C	C	C	C	A	C	C	C	C	C	C	C	C	C
Create Project Closure Report		I	I	I	I	A	I	I	I	I	I	I	I		I

Figure 9: RACI Model for the construction of kindergarten

12. Conflict and Crisis

Construction projects nowadays have become more complex in nature. McManamy (1994) stated that the complex, relational and lengthy process of designing and executing makes construction a process wherein arguments and conflicts are virtually ensured. Moreover, Whitfield (1994) argued that the participation of multidisciplinary in construction projects may lead to conflicts among different parties. In other words, conflict and disputes are inevitable to the construction industry particularly when most of the construction projects are surrounded by many uncertainties.

Kumaraswamy & Yogeswaran (1998) agreed that contractual matters, including variation, time extension, payment, quality of the technical specification, availability of information, administration and management, unrealistic client expectations and determination are common causes of construction conflicts.

Conflict in the kindergarten project may hinder the achievement of one of the parties nevertheless, it has many advantages that may improve the performance of the project as cited by Rauzana (2016). First, it provides information and generates ideas that improve the quality of decision-making. Second, it influences different parties to consider others' views. Third, it helps the project manager/leader to in finding the best solutions for matters that had been buried and become open. Finally, it provides mutual understanding and respect for others' opinions.

In today's globalized world, negative events are the cause of the crisis, which affects construction companies gradually. In most cases, these events may occur suddenly or over a period of time. When a crisis arises in an organization, a disruption to the organization's normal routine procedure makes this impossible. Environmental causes of the crisis are beyond the control of companies. In general, these are related to economic, political, legal, natural, and rivalry conditions, clients' expectations, and technological developments.

Crisis occurs across different industries such as the construction industry, much of the information on crises and their responses tend to be general. Nevertheless, certain things appear common to industrial crises conceptualization. Hällgren & Wilson (2007) claimed that progress in construction projects can be interrupted by many incidents. Nurul Islam & Hamidul Islam (2020) conducted a study and concluded that fourteen major variables influencing crisis management implementation in construction projects. Those are poor initial estimation, financial issues, too many changes, lacking the contractor's experience, worker strikes issues, inadequate knowledge of workers, workers unavailability, conflicts between parties,

target cost, technical issues, political issues, natural issues, schedule variance issues, compressing schedule. Also, Nurul Islam & Hamidul Islam (2020) found that the crisis in construction projects occurred due to inadequate funds, inflation rate, and political stability.

12.1 Project Life Cycle and Conflict

Conflict is defined, as cited by Meredith & Mantel (2012), as “the process which begins when one party perceives that the other has frustrated, or is about to frustrate, some concern of his”. To understand how conflict affects the performance in the construction industry, it is necessary to relate the project life cycle with the primary conflict groups and determine how certain patterns of conflict are associated with the various periods/phases in the project life. Therefore, the project manager can diagnose the nature of the conflict quickly and accurately.

Project life cycle stages such as kindergarten projects have been differently classified by scholars. For example, Adams et al. (1983) break the project life cycle into four stages: conceptualization, planning, execution, and termination. Meredith & Mantel (2012) cited that all project life cycle stages appear to be typified by conflict. Conflicts are rooted in matters such as schedules, priorities, staff and labor requirements, technical factors, administrative procedures, cost estimates, and, certainly, personality conflicts.

12.2 Areas of Conflicts between Project Owner and Construction Contractor

Conflict in the construction of kindergarten leads to dysfunction, which is detrimental to the project's outcome and stakeholders. Conflicts that are ignored can transform a simple issue into one that may become insuperable afterward. Addressing conflict once it arises is the most efficient way to avoid future discord. According to the International Risk Management Institute (IRMI)(n.d.), conflict arises for several reasons, and the most common ones are conflicts of interest, poor communication, and limited resources.

Conflicts associated with the Construction of Kindergarten in Mutrafiah District are listed below:

Areas of Conflicts between Project Owner and Contractor in the Construction of Kindergarten in Mutrafiah District		
S/N	Area of Conflict	Reasons for Conflict
1	Communication	Different communication styles. Unclear roles and responsibilities of project parties.
2	Scope of Work	Poor preparation. Developing the scope by a non-specialized team.
3	Schedule	Unrealistic schedules (being overly optimistic). Unclear listing of project activities.
4	Resources Allocation	Running multiple projects at a time. Non-availability of required tools and materials. Insufficient budget.
5	Re-assignment of Project Team Members	Overlapping with other projects. Projects priority not set properly. Unqualified manpower.
6	Conflict of Interest	Fighting for Personal Goal Transferring Risk

Table 12: Representation of Area of Conflict

12.3 Scenarios of the conflict's events in the Kindergarten Construction Project and Resolution Strategies

12.3.1 Scenario 1: Communication Conflict

It is found that the contractor is submitting the status report to different people once requested without concerning the main concerned party. Therefore, such behavior leads to misunderstanding and discord among people working together on construction projects. Also, lack of information, partial information, untimely information, and inaccurate information all can lead to work being done that does not meet expectations and sets the stage for conflict and animosity.

Resolution Strategies:

- Standardize the channels of communication in the project to fasten and ease the communication process.
- to establish a clear chain of command on a construction site that standardizes communication, creates efficiency and accountability, and eliminates confusion. The hierarchy for a work site should be laid out in the initial contract documents and include:

- Project owner
 - General contractors
 - Subcontractors
 - Members of individual crews like engineers, architects, plumbers, and electricians.
- Outline relationships in the contract documents and share them among concerned project parties.

12.3.2 Scenario 2: Schedule Overrun

Construction schedule overrun is common on construction projects over the world and the Saudi Arabia construction industry has not escaped the challenges of failing to deliver projects on time. According to Alkhathami (2004), schedule overrun is defined as “extra time required to finish a given construction project beyond its original planned duration, whether compensated for or not”.

Ali, Smith, Pitt, and Choon (2012) emphasized that four factors that cause schedule overruns: contractor-related factors, consultant-related factors, client-related factors, and external factors. Scenarios of schedule overrun caused by external factors involve unforeseen site conditions, bad weather, and updated governments regulation. For example, some products/ materials are behind scheduled delivery.

Resolution Strategies:

- Evaluate alternative products or vendors
- Determine product slack
- Seek alternative vendors
- Use a 10% budget cushion to expedite delivery
- Update budget

12.3.3 Scenario 3: Conflicts of Interest

Individuals fighting for personal goals may lose sight of the project or organizational goals meaning that a person or party has concerns that do not coincide with an overall goal. It is in the owner’s best interest that a project is completed at the highest quality for the lowest cost. In contrast, a contractor would prefer to expend the least amount of resources necessary to complete a project to maximize their profits. Each side is attempting to transfer risk to the other party (IRMI, n.d.).

For instance, the owner may attempt to take project management into their own hands and fail to adequately manage duties. Alternatively, a general contractor may attempt to delegate most of the work

to a subcontractor. Often an owner will insist on a lump sum contract that places an increased amount of risk on a contractor. In this scenario, a poorly estimated project scope can result in a contractor footing the bill (Contney Attorneys & Consultant, n.d.). another example is that the contractor is transferring manpower among other projects.

Resolution Strategies:

One tactic may be continually reminding owners, partners, employees, and the contractor how their personal goals and efforts "fit" into the project's strategic goals and outcome expectation. Being able to recognize and openly address conflicts of interest is crucial to a project's success. Nevertheless, the only way to be sure that everyone's interests are protected is to get it in writing.

Having a well-written contract and a well-defined scope of work is the only way to mitigate these kinds of disputes. Deciding where risks lie in advance will go a long way towards securing project completion regardless of the varying interests of biased parties involved.

Other Scenarios:

Another scenario for conflict may arise from the limited resources. Many situations on projects when resources are limited and have to be managed effectively. Conflict may arise over the use of equipment, space, material, time, manpower, etc. Such conflicts must be dealt with effectively to maintain harmony on-site. An optimal strategy is to include employees and partners in the resource allocation process. This will provide them with a better understanding of how allocation decisions are made in the best interest of the project.

12.4 Root Cause Analysis

Root cause analysis (RCA) is defined as “the process of discovering the root causes of problems to identify appropriate solutions” (Aventis Learning, n.d.). RCA assumes that it is much more effective to systematically avoid and resolve underlying issues. RCA can be performed with a collection of principles, techniques, and methodologies that can all be leveraged to identify the root causes of an event or trend. Approaches of RCA include:

1. Events and causal factor analysis
2. Change analysis
3. Barrier analysis
4. Management oversight and risk tree analysis
5. 5-why's technique

The 5-why's technique is used to analyze the root cause for the above-stated conflicts. It is a simple and effective tool for solving problems. Its main goal is to find the exact reason that causes a given problem by asking a sequence of “Why” questions. This technique helps the team to focus on finding the root cause of any problem. Also, it encourages each team member to share ideas for continuous improvement, rather than blaming others. In addition, it gives the team the confidence that it can eliminate any problem and prevent the process from recurring failures.

Below is the root cause analysis for the above three conflicts:

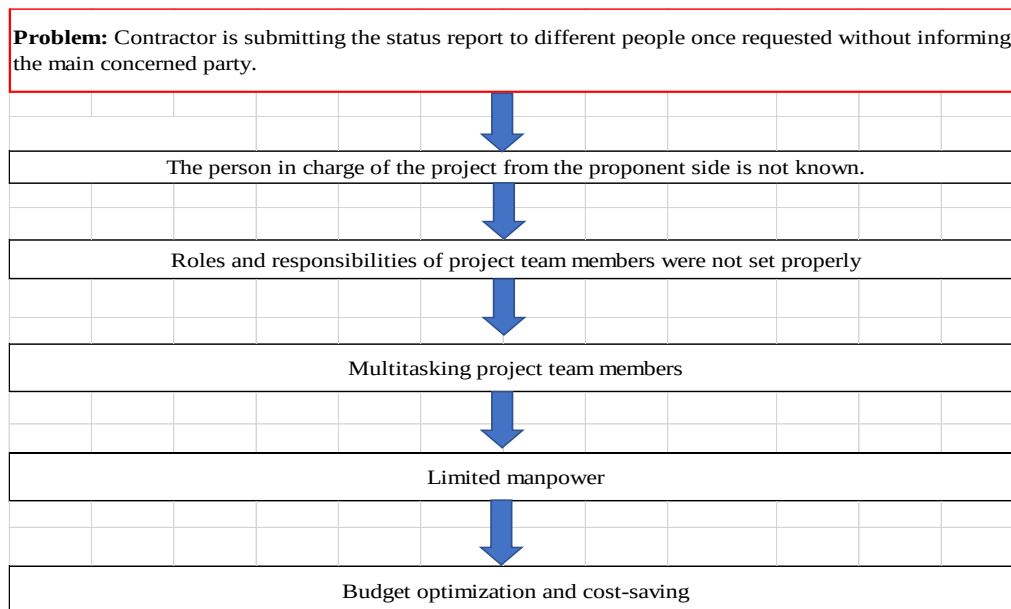


Figure 10: Communication conflict root cause analysis

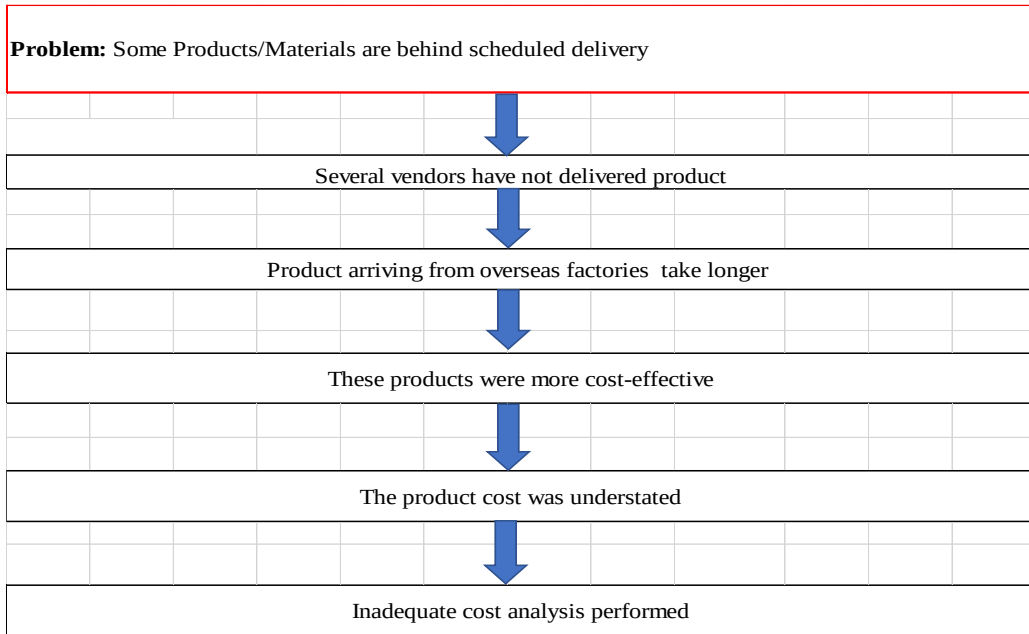


Figure 11: Product/Materials conflict root cause analysis

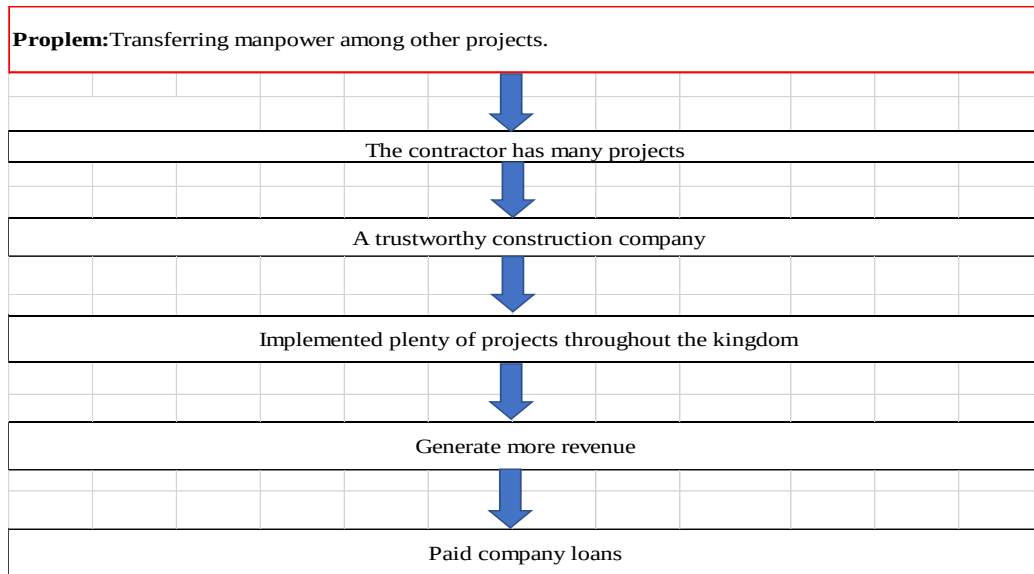


Figure 12: Transferring manpower among other projects

13. Project Scheduling:

Scheduling can be defined as the process of developing a set of planned dates to perform project activities and meet milestones and deliverables. It includes start/finish dates, duration, and resources assigned to each activity. Successful scheduling can bring lots of benefits like illustrating the interdependence of all project tasks, identifying required resources, facilitating communication, and determining the critical activities/critical path.

13.1 Distribution of Project Activities among Concerned Departments:

The Project Scheduling Process for the construction of the kindergarten in the Mutrafiah district comes across 4 main steps which help the project manager to determine the project schedule and project duration. The project steps are listed below:

- A. Developing the list of project activities.
- B. Establishing the duration for each activity.
- C. Sequencing project activities.
- D. Determining project duration.

Kindergarten Construction in Mutrafiah District

Timeframe	Stage	List of Project Activities	Concerned Department	Duration of each Activity (Days)
START 01/08/22 END 20/08/22 20 Days	PROJECT CONCEPT	A) Choose Design Team B) Select Project Site C) Discuss and Select Construction Service D) Identify Project Parameters / Feasibility	Office Services (Proponent)	4 3 3 10
START 01/09/22 END 31/10/22 61 Days	PLANNING AND DESIGN DEVELOPMENT	E) Identify Required Functionality & Aesthetics F) Complete Schematic Design G) Prepare Preliminary Estimate H) Establish Preliminary Schedule I) Complete Site Plan Approval Process J) Perform Value Engineering K) Secure financing L) Finalize Construction Documents M) Establish Final Project Budget	Office Planning Design	5 15 5 15 5 5 5 4 2
START 01/11/22 END 30/11/22 30 Days	BIDDING AND AWARD	N) Identify Subcontractor List for Bidding O) Solicit Subcontractor Bids P) Award Subcontracts	Contracts Advisory Division	11 14 5
START 01/12/22 END 23/12/22 23 Days	MOBILIZATION	Q) Obtain necessary Permits and Insurance R) Finalize Project Schedule S) Coordinate Project Start-up Items	Alascon Compnay Limited (Contractor)	4 12 7
START 01/02/23 END 01/08/23 182 Days	ACTIVE CONSTRUCTION AT JOB SITE	T) Construction Activity 1 U) Construction Activity 2 V) Construction Activity 3 W) Construction Activity 4 X) Construction Activity 5 Y) Construction Activity 6 Z) Construction Activity 7 AA) Field Supervision / Quality Control BB) Manage Subcontractors CC) Manage Change Orders DD) Coordinate Local/County/State Inspections EE) Track Costs (budget vs. actual)	Alascon Compnay Limited	29 25 20 21 20 15 14 6 7 5 12 8
START 10/08/23 END 08/09/23 30 Days	PROJECT CLOSEOUT	FF) Substantial Completion GG) Final Inspections HH) Certificate of Occupancy II) Punch List JJ) Closeout Documentation	Inspection Alascon Compnay Limited	5 12 3 8 2
START 10/09/23 END 15/09/23 6 Days	OCCUPANCY	KK) Final Billing LL) Final Walkthrough with Owner MM) Final Clean up	Inspection Office Service Loss Prevention Alascon Compnay Limited	2 2 2
Total Project Duration				352 Days

Figure 13: A List of Activities of Kindergarten Construction in Mutrafiah District.

13.2 Influence of Crashing and Fast-Tracking on Project Timetable

Crashing and Fast-tracking are two schedule compression techniques used to decrease the project's duration with no change in scope.

Crashing:

The PMBOK Guide, the 6th edition, defines crashing as a technique used to shorten the schedule duration for the lowest incremental cost by adding resources. In crashing, the activities on the critical path are reviewed, and the activities that can be completed early with extra resources are determined. Speeding up the process of crashing activities can be done by adding additional labor, resources, or incentives like overtime and monetary rewards.

Fast-Tracking:

The PMBOK Guide, the 6th edition, defines fast-tracking as a schedule compression technique in which activities or phases normally performed in a sequence are done in parallel for at least a portion of their duration. In fast-tracking, the activities on the critical path are reviewed, and the activities which can be implemented partially or in parallel with other activities are listed. Fast-tracking helps project managers to compress the project schedule up to a certain limit. Continuing beyond that limit will increase the risk, which may lead to rework and further delays.

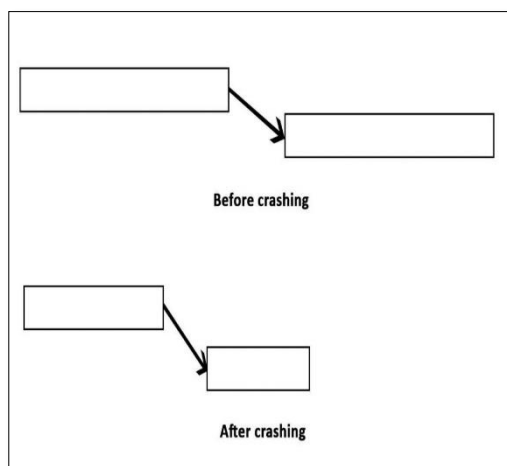


Figure 15: Representation of Crashing

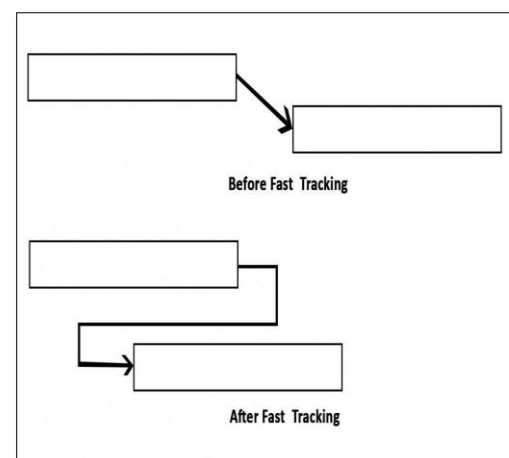


Figure 14: Representation of fast Crashing

Kindergarten Construction in Mutrafiah District (Original Schedule):

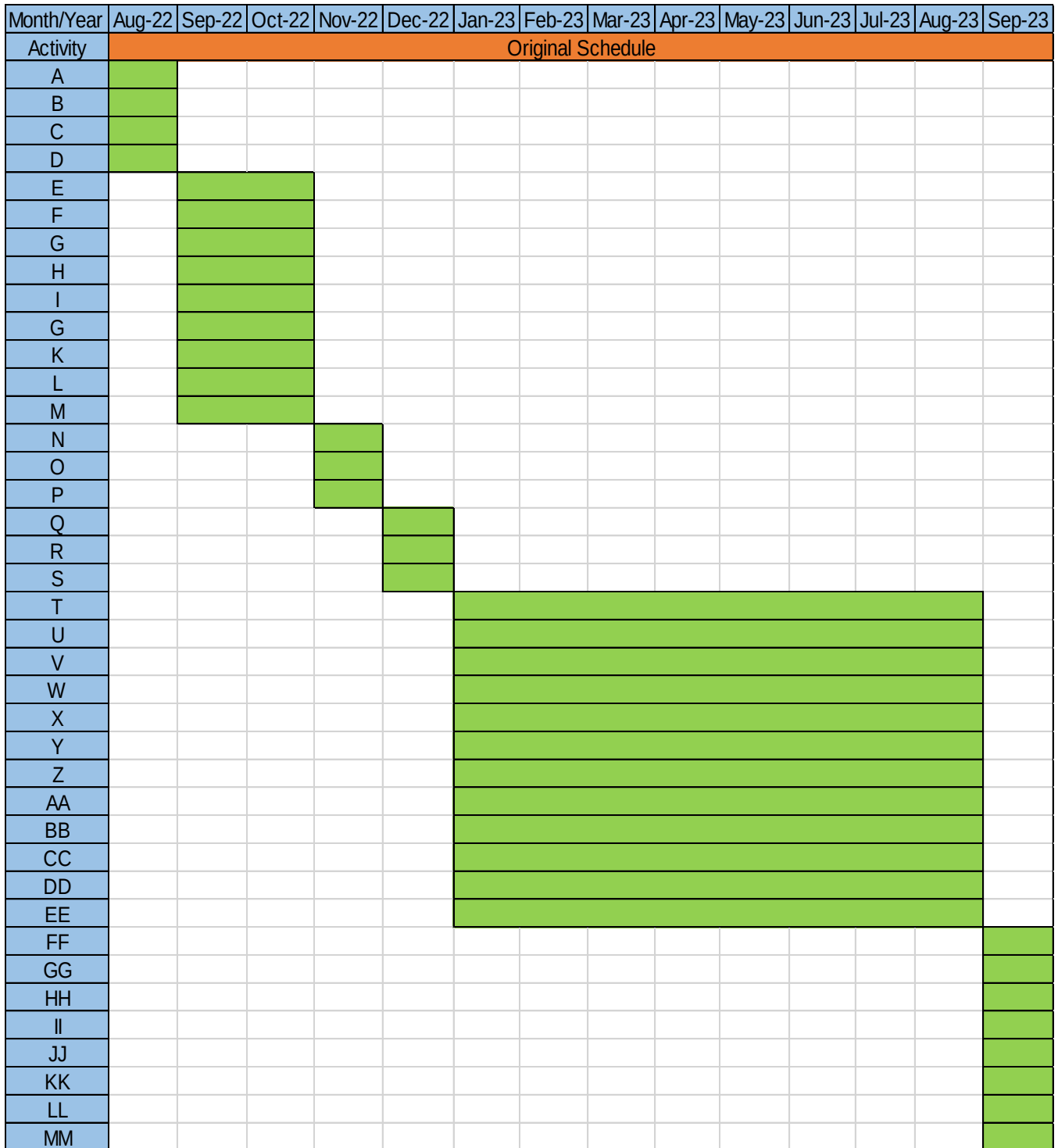


Figure 16: Original Schedule of Kindergarten Construction in Mutrafiah District.

Kindergarten Construction in Mutrafiah District (Schedule after Crashing):

Month/Year	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
Activity	Schedule After Crashing													
A														
B														
C														
D														
E		Added Resources												
F		Added Resources												
G		Added Resources												
H		Added Resources												
I		Added Resources												
G		Added Resources												
K		Added Resources												
L		Added Resources												
M		Added Resources												
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Z														
AA														
BB														
CC														
DD														
EE														
FF														
GG														
HH														
II														
JJ														
KK														
LL														
MM														

Figure 17: Schedule after Crashing of Kindergarten Construction in Mutrafiah District.

Kindergarten Construction in Mutrafiah District (Schedule after Fast-Tracking):

Month/Year	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23
Activity	Schedule After Time-Tracking													
A	Parallel Period													
B														
C														
D														
E														
F														
G														
H			Parallel Period											
I														
G														
K														
L														
M														
N														
O														
P														
Q														
R														
S														
T														
U														
V														
W														
X														
Y														
Z														
AA														
BB														
CC														
DD														
EE														
FF														
GG														
HH														
II														
JJ														
KK														
LL														
MM														

Figure 18: Schedule after Fast-Tracking of Kindergarten Construction in Mutrafiah District

Outcomes of Applying Crashing and Fast-tracking on Kindergarten Construction in Mutrafiah District:

Crashing	Fast-Tracking
Adds more new resources	Uses the already planned resources
Always Increases the cost	Does not always increase the cost
Phases or activities are performed in sequence	Phases or activities are performed in parallel

Figure 19: Outcomes of Applying Crashing

14. Rules for Negotiation

Negotiation is one of the conflict resolution techniques. It is a method by which people settle their differences when they must make compromises or partial agreement in order to avoid arguments and disputes. Project managers need to apply their negotiation skills at every stage of the project life cycle. Early in the project, at the planning stage, the project manager negotiates with stakeholders on time, cost, quality, and scope of requirements.

At the phase of resource mobilization and procurement, the manager negotiates with the resource suppliers and other potential providers. During the project, conflicts arise, and it is the responsibility of the manager to proffer solutions to these conflicts, which usually is done via negotiation.

It involves using the art of ‘persuasion to get others to understand and agree with your viewpoint. It works best when an individual has a win-win attitude. The key skills that are involved in a successful negotiation are good communication skills, sales and marketing skills, good psychological analytical skills, sociology skills, assertiveness, and conflict resolution skills.

Therefore, negotiations may take place between various kinds of different people, such as between a customer and seller, a boss and employee, two business partners, a diplomat or civil servant and a foreign diplomat, between spouses, between friends, etc.

There are five steps to the negotiation process, which are:

- Preparation and planning
- Definition of ground rules
- Clarification and justification
- Bargaining and problem solving
- Closure and implementation

14.1 General Rules for Negotiation

In this project, we will be concentrating on the ground rules. Ground rules are statements of values and guidelines which a group establishes consciously to help individual members to decide how to act. To be effective, ground rules must be clear, consistent, agreed to, and followed. Where articulated ground rules are missing, natural behavior patterns often emerge spontaneously. These are referred to as norms (PMI, n.d.).

Team ground rules define a behavioral model, which addresses how individuals treat each other, communicate, participate, cooperate, support each other, and coordinate joint activity. They may be used to define and standardize team procedure, use of time, work assignments, meeting logistics, preparation,

minutes, discussion, creativity, reporting, and respect. The following is a list of ten rules for guiding behavior during all negotiations:

Rule	Kindergarten Project Management Example
1. Be patient	Dealing with an underperforming team member—and perhaps defensive—may be uncomfortable for a project manager, so the tendency is to get the encounter over with as quickly as possible. A better approach is to develop rapport with the person, ask for permission to provide feedback or suggestions, carefully answer any questions that come up, and take the time to reach a satisfactory agreement.
2. Be positive	A principle of persuasive influence is to deal with people you like. A positive attitude with project sponsors helps build confidence and credibility in their minds. This means they engage more willingly with the PM in supporting the project and maintaining that support throughout the project lifecycle.
3. Gather information	Clients or customers have challenges that may be addressed by the outcome of the project. Ask probing questions about what they are doing and listen to the answers. Review the relationship history, especially if support issues have come up and whether or not they were adequately addressed. Find out their timetable or deadline, both to purchase and then to implement the solution.
4. Float trial balloons	Ask “What if we could provide key features in Phase 1 and address other wants in later phases?” These questions make no commitments but do explore reactions from the other party about possible approaches they may be willing to consider.

5. Know your status	Project managers are closest to the action on most projects and have significant status attributable to the information they possess. Other stakeholders have status via the authority they have to allocate resources or dispense funds. The real opportunity to achieve better outcomes is when one side is anxious to reach an agreement; the other side may then nibble to gain additional concessions, such as extending a resource's time on the project or reducing features in order to meet cost or time pressures.
6. Know your opening offer	You estimate the project will take between 4 to 6 months. Ask the customer when they want it, and they may respond in 8 months, in which case you have a cushion. If the PM were aggressive and quoted first, saying 4 months (the bottom line), there is no room to negotiate. If the customer has no clue and may ask for 2 months, the PM can open first by quoting 6 months (the edge of the envelope) and have room to negotiate something in between.
7. Limit your authority	Try to negotiate with the decision-maker so you deal with them directly and get an agreement quickly. When you are the decision-maker, have someone else negotiate on your behalf so you cannot be pinned down by hard-core negotiating tactics. This provides an opportunity to practice patience, review the proposal more thoroughly (instead of in an emotional moment), and come back with counter-proposals.
8. Know your bottom line	Two vendors have similar products where one has a slight edge and costs more. The PM wants a better product but has a strict budget limit of 10K SR. Negotiations with the higher-priced vendor proceed in order to get a lower price or arrange terms that fall within the budget limit. Use the limit to stand firm, negotiate with due diligence, and fall back on the other vendor if not successful. Knowing these limits determines whether to continue or walk away.

9. Be prepared	Have a risk management plan that provides advance notice of technology that may not work or tasks that take longer than planned. Clear trigger points invoke contingency plans calling for negotiations on the pros and cons of various options, leading to a quick resolution. Preparation avoids being caught by surprise and having to invent options where none previously existed.
10. Never reward intimidation tactics	A PM who does not push back against unreasonable scope, schedules, or resources is training sponsors to continue a demanding behavior. Instead, set expectations by negotiating the triple constraints at project start-up and when changes occur. Make concessions when the other side makes them as well. Do not give in to intimidation tactics or “the beatings will continue until morale improves.”

Table 13: Activities Examples

14.2 Negotiation plans

Preparation is the most important prerequisite to effective negotiation. Neither experience, bargaining skill, nor persuasion on the part of the negotiator can compensate for the absence of preparation. The following are two examples of negotiation plans.

Negotiation Plan 1 for sellers:

This Plan aims to outline how the seller will manage the negotiation process with a Preferred Respondent prior to finalizing the award of contract. Areas that the negotiation team needs to concentrate on include:

1. Identify the other side's need
2. Identify the buyers
 - User
 - Technical
 - Strategic
 - Coach
3. Identify the other side's positions and interests

4. Identify our BATNA (Best Alternative to a Negotiated Agreement) and the other side's BATNA
5. Identify other positions of power and leverage for each side
 - Time power
 - Information power
 - Standards power
 - Expert power
 - Title power
6. Identify outcomes best, expected, and minimum acceptable
7. Our opening proposal
8. Identify our killer arguments » Done it before
9. Identify our key discriminators
 - Why chose us?
10. Identify our ghosting discriminators
 - Why not choose the competition?
11. Identify the ROI that we will be supplying the prospect
 - Why do this at all?
12. Identify team members
 - Leader
 - Spokesperson
 - Numbers person
 - Experts
 - Observer
13. Identify third-party roles
14. Develop opening statement for relationship building
15. Develop questioning strategies
16. Develop an opening proposal
17. Develop pricing strategies
18. Develop concession strategies

19. Develop bargaining strategies

20. Ready for unethical negotiating techniques

Negotiation Plan 2 for procurement:

Planning for negotiation is critical to achieving a successful result in the construction of the kindergarten procurement stage. Areas that the negotiation team needs to concentrate on include:

- Deciding on the nature of the contractor's relationship with the supplier and how to establish that.
- Identifying all the points to be negotiated.
- Prioritizing the contractor's needs and wants and the supplier's needs and wants.
- Identifying alternative positions and the point at which the contractor will exit negotiations.
- Deciding on the approach to achieving the contractor's most desired outcome.
- Anticipating the supplier's moves and how to counter them.
- Working with the supplier to establish a realistic contract delivery or implementation plan.
- Addressing transitional arrangements from the current supply arrangement.
- Establishing what sustainability will look like.
- Identifying what best public value will look like.
- A negotiation plan should be completed and approved before initiating negotiations with the recommended supplier. The following approvals are needed:
 1. procurement manager confirms that the plan meets the requirements.
 2. project sponsor gives authority to proceed to negotiations with a contract view.

15 Project Design

Project Design embodies the evaluation of possible outcomes early-on, before committing to a course of action. By rapidly exploring possibilities -- through dialogue, analysis, and prototyping -- awareness is built and better results are achieved. And as things change a good design is easily adjusted. In the words of Dr. N.P. Suh of MIT it “involves a continuous interplay between what we want to achieve and how we want to achieve it”. (Suh, 1990 , p 25)

According to Hendrickson (2008), design is a process of creating the description of a new facility, usually represented by detailed plans and specifications; construction planning is a process of identifying activities and resources required to make the design a physical reality. Construction is the implementation of a design envisioned by architects and engineers (Hendrickson, 2008).

Some characteristics should be kept in mind at the very early stage of the project life cycle (Hendrickson, 2008)

- Usually every facility is custom designed, and most likely it will require a long time to complete.
- Design and construction of a facility are based on a specific site condition (natural, social and other locational conditions).
- The service life of a facility is long, so the anticipation of future requirements might be very difficult.
- Changes of design plans during construction are common.

Some form of design and planning exists in all the methodologies and processes that we use in today’s project/program environment. We may not look at it as “Project Design”, but the effort is expended and some of the same steps are executed. Project Design is a methodology that identifies, quantifies, and characterizes the significant effort of coordination that is present in complex projects. Project Design accommodates complicated interdependencies and provides a method to quickly recognize, assess and adjust those interdependencies through visual modeling and simulation before time and cost are negatively impacted.

Kindergarten’s Design

A new kindergarten building to be constructed in Mutrafiah district in Jubail - Sector F4, on a land of about 4,260 m² with an approximate capacity of 100 children. The users of the new building will be children of age 01 to 02 years old additionally with educational and administrative staff.

Education provided to children in their early childhood is critical for building the foundation for lifelong character formation. In the environment carefully designed for kindergarten education, children should be encouraged to have various experiences while spending time mostly by playing. Teaching at kindergarten should be comprehensive and yet be tailored to children's individual needs. Kindergarten's design is generally based on the following considerations:

- Designing environments for diverse life experiences.
- Improving facilities such that they strengthen the ties between schools, families and regions.
- Aiming a smooth transition from kindergarten education to elementary education.
- Making spaces for child fitness improvement.
- Considering promotion of special needs education.
- Considering sustainability in terms of the environment.
- Considering safety.
- Selection of proper materials.

The kindergarten is organized as follows:

Pedagogical spaces, social spaces, administrative units, service areas and outside activities. The pedagogical areas/children's classrooms, library and multipurpose space are located on one side, on the other side, there are administration units, services and corridor.

Some general requirements for the design are the following elements.

- Finalization of the program for the new kindergarten, based on the municipal needs.
- Surveys and investigations of the site of the building to be constructed.
- Conceptual design of the new building and of its surrounding.
- Detailed design of the new building and of its surroundings and making of technical specifications, the Bill of Quantities (BOQ) and drawings in accordance with the relevant international construction and safety standards.
- Assistance to the construction manager during the works execution phase.
- To identify the Triple constraint of the project.

15.1 Project constraints

A framework for evaluating competing demands. Project managers often talk of a “triple constraint” – project scope, time and cost – in managing competing project requirements. (PMI, 2004, p377)

In fact, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) contains three separate knowledge areas directly related to the three factors of the Triple Constraint - Project Scope Management, Project Time Management, and Project Cost management.

The Triple Constraint says that cost is a function of scope and time or that cost, time and scope are related so that if one changes, then another must also change in a defined and predictable way. A key problem with the model is that it only contains two factors, one of which is expressed in two different ways. Let us explore the three factors.

A project manager needs to be highly aware of all the constraints affecting their project and how to find the optimum balance and keep those constraints in mind and communicate the design department so the design activities which might affect the project constraints can be avoided by the alternative solution as a triple constraint is about balancing each constraint to reach a successful conclusion. As the project progresses, the project manager may find that any changes in design at the execution phase may have an impact on any of the constraints.

According to LaPrad (2018), triple constraints project management theory says every project operates within the boundaries of budget, schedule and scope. Any change in one factor will invariably affect the other two. Maffeo, (2018) said, because all three constraints (budget, schedule and scope) relate directly to one another, achieving them in tandem yields a quality project.

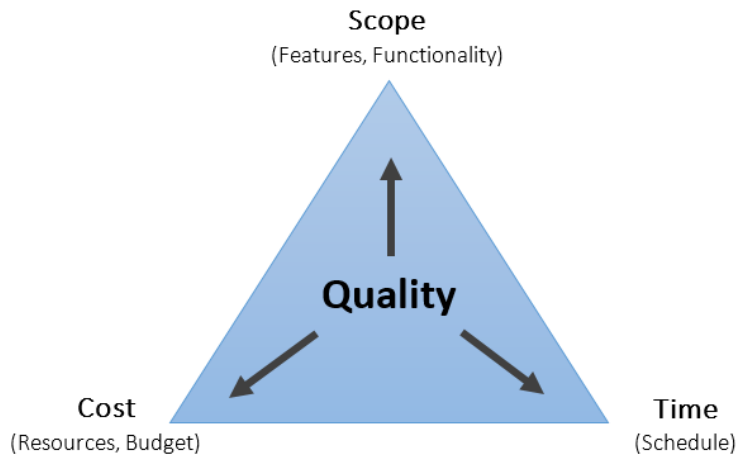


Figure20: Tripple Cosntraint Triangle

Note: Triple constraint triangle figure. Reprinted from Medium, by H. Dhillon (2018)
 From URL. <https://medium.com/@harpreet.dhillon/iron-triangle-triple-constraints-of-project-management-e818e631826c>

Current Project variables which need to be monitored are.

Time	• Delivery Time: 100 Weeks • Due date: 15th Dec, 2023
Scope	Construction of Kindergarten in Mutrafiah district in Jubail - Sector F4
Budget	16,000,000 SAR

Table 14 : Project Variables

15.1.1 Time:

The Time constraint talks about how to manage a project in a way that it meets the set deadlines and allocates all the resources effectively. The time constraint limits a project in two ways – deadlines and resources. First, a project has a set timeline and a date when it must be completed. Secondly, each project has a certain amount of people, and those people have a limited amount of available work hours. Once

again, the project is constrained to this amount and must be completed within it. Each constraint forms the vertices, with quality as the central theme.

15.1.2 Scope:

The Scope constraint is all about the goals and deliverables of the project. It defines priorities and the most important parts of the project, specifying what has to be done. If there are any changes to the scope it will invariably cause changes to the timeline and cost, or at least, it should maintain a fair balance for the client and the project team.

The scope is generally outlined in a document, which lays out all of the goals and requirements of the project. This ensures that everyone involved in the project knows what's expected of them and can execute it. It helps the client to see what will and won't complete for them within the project and makes sure that the team is aware of everything necessary to execute the project properly for the client.

15.1.3 Cost:

The cost constraint refers to handling the project to stay within a given budget. This includes not only the materials but labor, vendors, and all other costs of a project. A project's budget includes both fixed and variable costs, including materials, permits, labor, and the financial impact of team members working on the project. A few of the ways to estimate the cost of a project include.

Historical data: Looking at what similar projects cost in the recent past.

Resources: Estimating the rate of cost for goods and labor.

Parametric: Comparing historical data with updated, relevant variables.

Vendor bid: Averaging the total charge of several solid vendor bids.

15.1.4 Factors that affect the triple constraint of the project.

Time	i. Change in Specification. ii. Lack of project financing. iii. Scope change. iv. Planning and building regulations restrictions. v. Lack of Human recourses.
Scope	i. Communication Barrier

	ii. Scope creep iii. Political Interference. iv. Poor Planning. v. Change in Design.
Budget	i. Change in scope. ii. Delay in deadline. iii. Price fluctuation. iv. Risks v. Poor monitoring & controlling, vi. Force Majuro.

Table 15: Factors that affect the triple constraint

Project manager can measure both project success and estimating accuracy with the help of triple constraint.

15.2 Project Success Factors

Project success variously refers to “on time, within budget, to specification” completion; success of the product produced; or success in achieving the business objectives of the project. Also, these measures are often contested, making it difficult to determine whether there is a problem at all (Sauer, Gemino, & Reich, 2007).

The success criteria for a construction project are not only evaluate the cost, time and quality as a success factor but also including the successful of project management, organizational success and the customer satisfaction. Another perspective was stated were the importance of organizational’ s planning effort, project manger’s commitment and safety precaution in order to complete the construction project complete by meeting cost, meeting on time, follow the schedule accurately and meeting the quality needed to ensure the project success.

Below is the list of critical factors that can make this construction project successful.

15.2.1 Critical success factors

Process	Discipline-specific technical and managerial processes, methods, tools, and techniques employed to achieve the project objectives. Technical and managerial processes were: - Appropriately chosen for the purpose - Aligned with the project objectives - Integrated with each other (as appropriate) - Effectively implemented
Iron Triangle	The triple constraint states that the success of the project is impacted by its budget, deadlines and features. A Project Manager can trade between these three constraints. - Within Budgeted cost. - Within the allocated time period. - As per define scope.
Goals & Objectives	- Goals & objectives of Project are clearly defined. It can play an important role in the success of project. - Commitment of PM & all project team towards the project goals & objectives. Make sure there is agreement with management, project sponsors, and other stakeholders on the purpose and goals of the project.
Project Manager	- Experience and executive records of the project manager plays a critical role in the success of project. - Ability of on-time decision making. Decisions drive projects. There is a decision to proceed that makes a project a project. There are decisions regarding requirements, the choice of resources, design approach, and various other issues. Decision making is a critical success factor.
Project Requirements & Scope	Project requirement should be cleared & Scope would be clearly defined.

	ii. The project scope is defined in the goal setting, and planning stages of a project. It would be nice if the scope never changed, but this is the real world! The project manager must always be on the alert for changes to the scope and effectively manage those changes.
Project strategic planning	i. Proper project management plan that will document all the necessary stuff related to the project. ii. Create and share a Project Management Plan that will document how the project will be managed. This should be agreed upon with the resources and management. a. Document how changes will be handled, especially those that impact the scope, dates, budget, or resources. b. Document how issues will be managed and escalated. c. State how the schedule will be managed. d. Include all methods of communications that will be used for the project.
Monitoring & controlling	i. Monitoring and control keeps projects on track. The right controls can play a major part in completing projects on time. The data gathered also lets project managers make informed decisions. They can take advantage of opportunities, make changes and avoid crisis management issues. ii. Put simply, monitoring and control ensures the seamless execution of tasks & success of project by improving productivity and efficiency. iii. Quality data and reporting play a major role in monitoring & controlling.
Management commitment, Stakeholders	i. As top management support is considered one of the critical success factors in project management, effective executive involvement can significantly improve project success. Top management support is significantly correlated with project success.

	ii. The more engagement and involvement of the stakeholders will reduce and uncover risks on the project. Uncovering risks and then discussing a plan to mitigate them before issues arise will dramatically increase the success of the project.
Communication	i. Communication is one of the key items recognized as leading to a successful project ii. Communication is as critical other factors. Not only does the project team need to know why they are focusing on the project, who owns which task, with whom they should interact and collaborate in order to be successful, and to whom they should hand-off as the next critical path task, but they need to communicate with all related parties frequently. These should include the project sponsor, managers who need to support their efforts with resources and in communications etc. iii. Effective consultation with all stockholders plays a critical role in the success of project.
Risk	i. Effective risk management ii. Every project – big and small – needs risk management. Upfront risk planning and identification and ongoing risk monitoring, mitigation and avoidance should be practiced no matter what. The project manager and team who choose to ignore this critical practice are setting their project up for failure. For this reason, risk management also one of the key factors for the success of the project.

Table 16: Critical Success factors

15.3 Work Breakdown Structure (WBS),

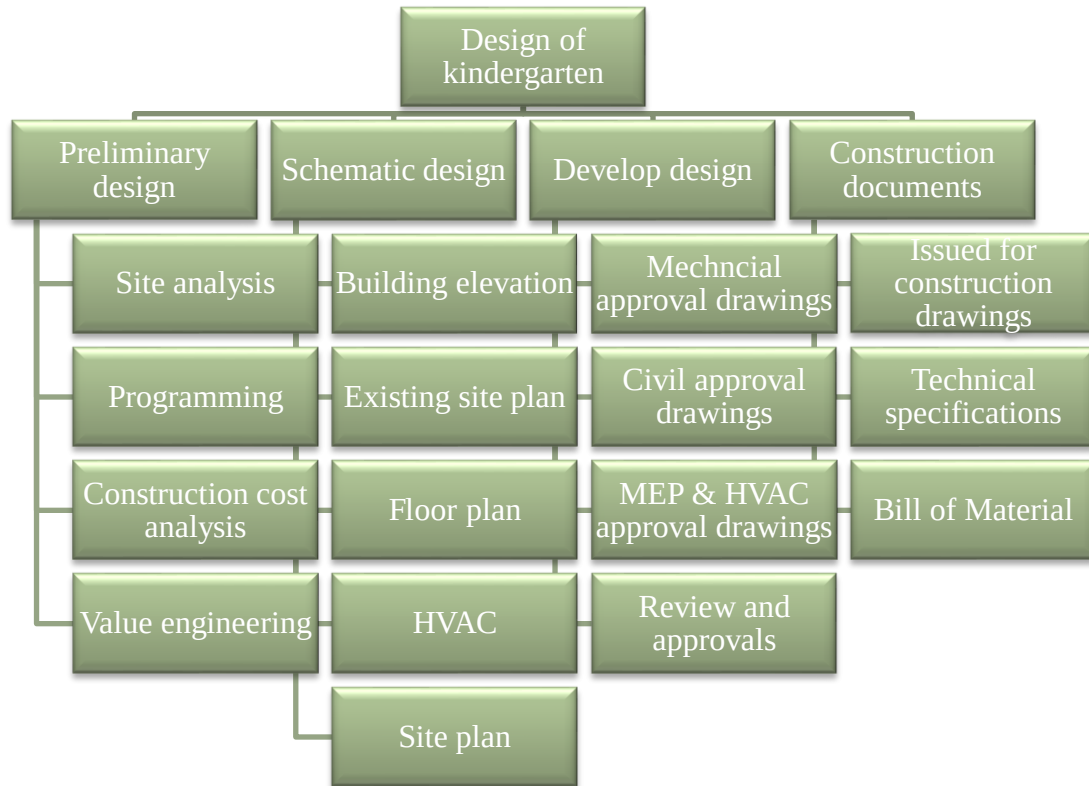


Figure 21: Work Break down Structure

15.3.1 Preliminary design:

The pre-design phase may include site analysis, programing, construction cost analysis, and value engineering.

- a. **Site analysis:** It includes site selection, geotechnical reports, and review of existing structures.
- b. **Programming:** Programing is the process used to arrive at the set of criteria on which the design is based, and by which it is later evaluated. One of the most important purposes of the program is to reduce the need for later backtracking and redesign. A thorough programming process is essential for maintaining an orderly and cost-effective design process later in the project. We have found that many problems that people encounter with the design of their centers could have been avoided with a thorough programming process. When working with a construction professional they may go through a detailed list of criteria in looking for program needs that translate into square footage or other design requirements.

Programming usually involves a meeting or series of meetings with the center's director, and in many cases the teachers, other staff, and possibly parents. In the programming meetings, the client's specific goals, priorities, and uses for the spaces are discussed in detail. All the requirements of the project are then put into a clearly organized written program, which will be a reference throughout the design process.

- Items specifically analyzed in the programming phase typically include the following:
 - Goals, needs, wishes, limitations, expectations, aesthetics.
 - Scope of work: the number of children in the program; size of the building; number of rooms; room adjacencies.
 - Activities to occur in each room and outdoor play area.
 - Pedagogical philosophy; parent interaction; staffing; meals; etc.
 - Classroom observation.
 - Safety and security requirements.
 - Existing and new utility locations and requirements.
 - Site context: Weather, noise, solar access, vehicular access, handicap accessibility, sense of entry, site analysis.
 - Codes and regulations: Outline of planning and building department parameters.
 - Budget and priorities: Preliminary cost analysis usually based on area and/or volume, to be refined later.
 - Project Scheduling.
 - In the case of reusing an existing building: Carefully document and evaluate present building and its conditions. Determine what can be reused, what must be discarded, what must be rebuilt.
- c. **The construction cost analysis:** It provides a construction budget amount for the capital improvement budget (CIB) and a cost plan to assist in explaining the budget and in guiding project management.
- d. **Value engineering:** in the pre-design phase scrutinizes the program, site selection, and project budget.

15.3.2 Schematic design

Based on an approved Program, the Schematic Design synthesizes the program into a defined, feasible design. The design will be shown in the form of Schematic Drawings, and in some cases a study model. The Schematic Design will address all significant areas of design and will be reviewed with the client before proceeding with more detailed drawings. A preliminary cost estimate is also usually provided at this stage.

Work in this phase typically includes the following:

- Complete preliminary building floor plans, sections, and elevations to determine space dimensions, areas, and volumes; sketches and site plans showing circulation, uses, relationships of spaces.
- Complete room layout of all child-related furniture, plumbing fixtures, etc.
- Preliminary material choices.
- Preliminary landscape concepts.
- Preliminary play yard layout.
- Study model, if appropriate.
- Address preliminary mechanical, electrical, and plumbing issues.
- Answer preliminary civil engineering questions (paving, grading, drainage, etc.) and structural engineering questions (structural system, soils, etc.).
- Coordination with engineering, landscape, and other consultants as necessary (structural, mechanical, electrical, landscape, civil engineers, etc.).
- Code research and coordination with regulating agencies (licensing, building department, planning department, etc.).
- Preliminary cost estimate.
- Present design to interested parties.
- Revise design after client discussions/comments.

15.3.3 Design development

Based on an approved Schematic Design, Design Development is the process of refining and fixing the design, and working out all the details, including the selection of materials and the engineering systems. The aim is to finalize all design decisions before proceeding with Construction Documents, the more detailed and expensive documents that the contractor will need to complete the project. A more detailed

cost estimate may also be provided at this phase. In smaller projects, Design Development may become part of the Schematic and Construction Document phases, rather than being a distinct phase of its own. The Design Development package will be reviewed with the client before proceeding further with the project. Work in this phase typically includes the following:

- Finalize all engineering issues such as structural system, heating and cooling systems, lighting system, etc.
- Coordinate with other design consultants, such as mechanical engineer, acoustical engineer, structural engineer, landscape architect, etc., on final systems and design.
- Finalize construction techniques and materials.
- Finalize equipment requirements, sizes, furniture layout.
- Finalize all design issues that affect the look of the building and the feel of the rooms.
- Choose finish materials.
- Finalize code issues.
- Complete outline specifications, a written list of criteria for materials and building methods.
- Revise cost estimate, considering probable labor and material requirements.

15.3.4 Construction Documents

Based on approved Design Development documents, construction drawings and written specifications are put together which describe in detail all of the construction work to be done. These are the documents upon which the construction contract will be based, and which the contractor will use to build the project. If a building permit is required, the application is usually made at the end of Construction Documentation. Work in this phase typically includes the following:

- Prepare specific and detailed Construction Drawings required to bid, apply for approval from building and planning departments, and complete construction. These may include dimensioned floor plans, elevations, sections, details, engineering plans such as electrical, mechanical, structural, and/or civil engineering plans, landscape plans, final interior design plans, energy report, and written Specifications that covering all materials, methods of construction, and construction contract requirements. Specifications are closely coordination with construction drawings.
- Complete all coordination with consultants. Coordination of consultants' Drawings and written Specifications is essential to avoid conflicts between the various trades during construction.

- Resolve any outstanding building or planning code issues.

16 Requirements and Objectives

Requirements are gathered and managed throughout all projects, at different levels of detail. The best practices of the Business Analysis discipline suggest that for effective management of requirements, the project manager should follow a “schema” that begins with the identification of the Business Requirements and progresses with the Stakeholder, Solution, and Transition Requirements (BABOK® Guide) (International Institute of Business Analysis, 2009, pp. 5-6). This categorization of requirements (i.e., Business, Stakeholder, Solution, and Transition) has also been recently adopted by the new PMBOK® Guide (PMI, 2013, p. 112).

At project Initiating, the project manager must understand the reasons why the project has been initiated, define the objectives that the project will achieve, and the metrics that will be used to measure its success. These are called “Business Requirements,” which describe the needs of the organization (not of groups or stakeholders within it) and the business value that the project should deliver.

16.1 Requirement traceability matrix

A requirements traceability matrix is a document that demonstrates the relationship between requirements and other artifacts. It's used to prove that requirements have been fulfilled. And it typically documents requirements, tests, test results, and issues.

There is no specified format for Requirements Traceability Matrix. It can exist in multiple formats, layouts, and structures

Project Title		Construction of Kindergarten in Mutrafiah	Project Manger		XYZ		
Project Number		XXX-CXX	Project Sponsor		XYZ		
ID	Category	Requirements	Priority	Business objectives	Deliverables	Verification	Validation
1121	Should Have	Teachers should be able to clearly articulate lesson materials to students and effectively share student progress with parents and administrators.	Medium	Provide a Quality educational for young children.	.....	.....	.....
1122	Should Have	Kindergarten teachers should be able to come up with creative way to keep their students engaged and make adjustment to lesson if their students are not absorbing information as planned.	Medium	Engauge the students	.....	.....	.....
1123	Mandatory	Children in kindergarten can have high energy and sometimes need a lot help maintaining their focus, which is why it's good for kindergarten teachers to posses a lot of patience.	High	.....	.....	.....	.....

Table 17:Requirement Traceability Matrix Sample

16.2 Methods used in requirement collection

Requirements are the most fundamental information for any project which will fulfil the requirements of the stakeholders. Following are the methods by which requirements can be compiled;

16.2.1 Data Gathering

1. Brainstorming – Involve a group of immediate stakeholders (*with reference to section 25.1*) asking them to provide all their suggestions and ideas about what they will prefer to see in the outcome.
Note: No restrictions are enforced in a brainstorming session.
2. Interview – Interviews can be planned with some of the senior stakeholders to understand some of their requirements and expectations
3. Focus groups – Moderated discussion with a group of stakeholders belonging to a particular group or function and finalize requirements with them.
4. Facilitated Workshops – Moderated discussion with a group of stakeholders belonging to a cross functional groups together and finalize some of the requirements which will be common for all of them
5. Questionnaires & Surveys – Used for collecting inputs from large group of stakeholders who may be widespread
6. Benchmarking – Project Manager to confirm if there is any bench-marked Kindergarten project which is already executed.

16.2.2 Observation and Conversation

Very often stakeholders are unable to articulate the requirements because of lack of skills and enough knowledge at their end. In such cases, observation technique is used to understand the requirements by observing the as is processes and thereby understand the requirements. Mostly used to understand the existing manual processes which need to be automated.

16.2.3 Nominal Group Technique

Prioritizing requirements by involving the group of stakeholders. Identifying the must-have, should-have and could-have requirements.

16.2.4 Facilitation techniques

The project team need to drive and facilitate the stakeholders so that the clear requirements are collected.

16.2.5 Affinity diagrams

Categorizing various requirements in logical groupings for better understanding and clarity

16.2.6 Decision Making

Finally, the requirements which need to be fulfilled have to be decided by involving the group of stakeholders and voting techniques are used for the purpose.

16.2.7 Prototyping

Requirements collected by interactions are always prone to misinterpretation. In order to reduce such misinterpretation prototypes are often made. A prototype provides an opportunity to validate the common understanding of the requirements by all parties.

16.3 Hierarchical structure of the objectives of the project connected to the strategy

One of common ways of depicting the relation between strategic objectives to that at the project level is to use the concept of hierarchy of objectives. This is similar to creating a work breakdown structure and can be described as an Objectives Breakdown Structure.

This is based on framework suggested by Robert Youker (2001) which is briefly summarized below in figure 23.

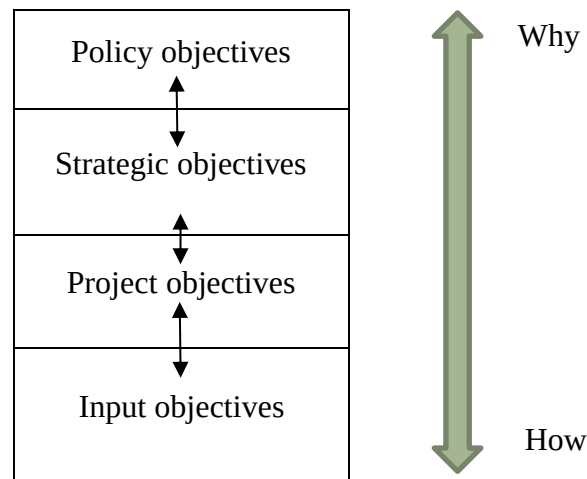


Figure 22: Objective Breakdown Structure

The relationship between strategy and projects, aligning the outcome of projects with organization strategy and maintaining it on ongoing basis, has become contemporary topics. In relating strategy and projects the subject of strategic or corporate planning is considered outside the purviews of project management whereas implementing is very much a part of it. Nevertheless, it is beneficial for project managers to understand the strategy of an organization and the way it is formulated. Further as mentioned earlier, one of the reasons for the disconnect between strategy and projects could be the lack of appreciation of operational factors by senior managers and a similar lack of understanding of the strategy at the top by operational personnel. Also, relating project outcomes to strategic objectives presents its own challenges. All these point to only one direction – a need for consolidating knowledge and practices as part of another knowledge area, which can be termed as project strategy management.

The below set of tables demonstrates the connection between objectives and strategy of constructing a kindergarten in Jubail city:

Objectives	Strategy
Quality Educational facility	▪ Build a Quality educational facility for young children. ▪ To recruit skilled and experienced teaching staff and non-teaching staff.

Child Development	▪ Enhancement of the whole child through physical, social, emotional, intellectual, and creative development with respect to a child's ability and culture. ▪ Frequent, positive, warm interactions appropriate to a child's age and development. ▪ Varied learning activities appropriate to a child's age and development.
Health and Safety	▪ Healthy, safe and nurturing environments. ▪ Nutritious meals and snacks. ▪ Knowledgeable and skilled providers to respond to the needs of each child.
Effective Program Administration	▪ On-going communication with families and opportunities for meaningful family involvement. ▪ Opportunities for training and support for providers. ▪ Implementation of an on-going, systematic evaluation process.

Table 18: Connection between project objectives & Strategies

17 Project Scope

Project scope is the work required to output a project's deliverable. Change happens, and project scope management includes the process to manage scope changes and make sure the project will still come in on time and within budget. The scope document also states the objectives and output of a certain project. It must include the key deliverables and how you propose to accomplish them with a set of milestones. Additional information or modifications to the project scope and objectives should be included in the Project Summary Section of the Project Plan. Project managers, appointed at the time a project is chartered, will conduct a review and analysis of the project scope and objectives as part of the project plan development.

A. General Information - Basic information that identifies the project.

- Project Title – Construction of Kindergarten
- Project Working Title –Design & construction of Kindergarten.
- Project Sponsor –
- Project Manager –
- Prepared by – The person(s) preparing this document.
- Date/Control Number – The date the plan is finalized and the change or configuration item control number assigned.

B. Project Scope

Deliverables

For this project the deliverables are.

- The Engineering report
- Design Drawings
- Project report
- Building of Kindergarten
- Design review Report

Project Approach

Children have a strong disposition to explore and discover. The Project Approach builds on natural curiosity ,enabling children to interact, question, connect, problem-solve, communicate, and reflect. This kind of authentic learning extends beyond the classroom to each child's home, community, nation, and the world. It essentially makes learning the stuff of real-life and children active participants in and shapers of their worlds (Katz and Chard, 2000).

C. Project Business Objectives

To provide high quality care and education for children and a secure foundation for learning in an encouraging and nurturing environment, where there is an equality of opportunity and support for all and where staff and parents or carers work in close partnership.

17.1 Project Scope Statement

The Project Scope Statement provides the documented basis for making all project decisions and is used to direct the project effort and communicate the project scope to the project team and other project stakeholders.

Projects that do not have a Project Scope Statement are plagued with scope creep issues. When a project team creates a Project Scope Statement early in the project lifecycle, they define the boundaries of the project.

According to the Project Management Institute, a strong project scope statement has several key characteristics i.e.

- Define the boundaries of the project.
- Define the business need and the expected outcome of the project.
- Identify constraints that limit a project team's options for developing a solution.
- List assumptions regarding decisions outside the project team's control.
- Identify business processes impacted by the project.
- Identify internal and external entities with which the project team will interface.

The below is the scope statement for constructing a kindergarten in Jubail city:

Project Title	Construction of Kindergarten in Mutrafiah	Project Manger	Mr. Samee
Project No.	XXX-CXX	Project Sponsor	
Purpose.	The main purpose of the document is to list all the requirements for the kindergarten that will provide a quality educational facility for all children.		
Scope	Build a new kindergarten that provide a quality education with state of the art facilities for up to 100 children. The kindergarten includes two front offices, one teacher lounge, one kitchen, one large children's play area, one large common area, and one infant room		

	for children aging 06 weeks to 12 months, one toddler room for children 13 months to 24 months, one music classroom and one large room for after school care. In addition, there will be three dedicated sleeping rooms with soundproof walls and adequate furniture to accommodate most enrolled children.		
Deliverables	Complete building of kindergarten.		
Constraint	Time	• Delivery Time: 100 Weeks • Due date: 15th Dec, 2023	
	Scope	Construction of Kindergarten in Mutrafiah district in Jubail - Sector F4	
	Budget	16,000,000 SAR	
Assumptions	• Budget and schedule have already been determined in the Kindergarten Project Charter. • Kindergarten will be located in the Mutrafiah, district in Jubail - Sector F4 therefore, the sector 04 parking area has been assessed to have adequate parking spaces for the kindergarten patrons. • Land for the kindergarten is already owned by the project sponsor and not included in project costs.		
Exclusion	• Operations Manual, Guidelines, or any component relating to how Kindergarten will operate on a daily basis is out of scope for this project. • Center will not be equipped to handle and therefore will not accept children with special needs. • Transportation to and from kindergarten is not provided. • Designated smoking area anywhere on the property.		

Table 19: Project Scope Statement

17.2 Scope creep

The definition of scope creep is when a project's scope changes, the project work starts to extend, or "creep", beyond what was originally agreed. With just about any project, change is inevitable, but it's the uncontrolled changes that delay projects and cause scope creep. Requested changes that are documented and implemented as part of the updated scope of a project are controlled.

The problem comes with any unauthorized changes which can affect productivity, deliverables not being achieved, budgets being exceeded. The completed project can potentially look very different from what was originally envisioned. There are a number of reasons why scope creep occurs that are fairly common with most projects, including:

17.2.1 Unclear Project Scope:

Vague project goals and requirements can steer project team in different directions. Each team member will assume the scope from their own perspective and start working in isolation. Hence, it is crucial to define the project scope from the beginning clearly. The best way is to document the project scope. Be clear with the minute aspects of project requirements.

17.2.2 Not Involving Client Throughout the Project:

There is a need to communicate with client at different stages of project completion. In doing so, Project manager can understand their pulse, their change in opinion, and so on. Also, they can anticipate changes at their end. On the contrary, if a project is directly delivered in one go, it may even end up redoing the entire project by spending more resources.

17.2.3 Ineffective Team Communication:

Team communication decides the quality of any project outcome. With effective communication, Project Manager can efficiently collaborate on the tasks. When communication channels break down, each team member completes an assignment with incomplete information and support, leading to project scope creep.

17.2.4 Project Complexity:

A complex project involves numerous stakeholders and takes a lot of time for completion. With more inputs, opinions, negotiations, etc., it becomes difficult to arrive at a proper consensus. Hence, a scope creep can occur during different instances like scope creep in software development, scope creep in agile projects, scope creep during final vetting phase and so on.

17.2.5 Lack of Proactiveness:

The project manager and the team need to be proactive from the beginning of the project planning. Be bold and ask more and more questions. If the client requirement is vague and uncertain, ask them to simplify it. If not, the requirements tend to pile up and catch you unaware.

17.2.6 Direct Contact Between Client and Team Members:

Sometimes, when a new requirement crops up at the last minute, the team members directly coordinate with the client without keeping the project manager in the loop. This bypass of authority leads to chaos and non-clarity of exact requirements. In fact, managers are trained to allocate the tasks in the best way possible at the nth moment.

17.2.7 Absence of Client Agreement:

Before start working on a project, it is necessary to identify the exact client requirements. In many cases, the failure to put forth multiple questions to understand the real requirements lead to project scope creep. Make sure that client agreement seals it in the form of a written to avoid future confusions.

17.2.8 Differing Stakeholder Opinions:

There are numerous stakeholders involved in project completion: clients, different teams, customers, etc. Each stakeholder has its own requirements and expectations as to how a project needs to be delivered. Disagreements crop up on what to prioritize, what tools to use when to make the project live, and so on. These crucial stakeholder factors finally add up to the creation of project scope creep.

17.2.9 Ineffective Leadership:

Effective leadership involves deciding with farsighted and conviction. The art of saying “No” also forms a significant part of leadership. In many cases, project managers are reluctant to say “No” to a last-minute project requirement, even though it may seem impossible to deliver. This leads to last-minute hiccups in the form of project scope creep.

An excellent example of a project scope creep is a significant delay in completing a project due to clients’ consistent change requests, as was seen in the construction of kindergarten’s playing area where client triggered the change request just before the completion of playing area. The last movement change request resulted in project delay and also increases the cost due to rework.

The root cause of such a scope creep is making too many last-minute changes on a project, causing unseen delays. The best way of managing it is by either saying ‘no’ to unnecessary changes or agreeing on how to handle last-minute change requests at the beginning of the project.

17.3 Product Analysis Management

Product analysis can be used to define products and services. It includes asking questions about a product or service and forming answers to describe the use, characteristics, and other relevant aspects of what is going to be delivered. Each application area has one or more generally accepted methods for translating high-level product or service descriptions into meaningful deliverables. Requirements are captured at a high level and decomposed to the level of detail needed to design the final product. Examples of product analysis techniques include but are not limited to:

- Product breakdown
- Requirement’s analysis
- Systems analysis
- Value analysis and value engineering.

17.3.1 Product Breakdown

Product breakdown structure (PBS) is a tool for analyzing, documenting and communicating the outcomes of a project, and forms part of the product-based planning technique. The PBS provides “an exhaustive, hierarchical tree structure of deliverables (physical, functional or conceptual) that make up the project, arranged in a whole-part relationship” (Haughey, 2015). This diagrammatic representation of project outputs provides a clear and unambiguous statement of what the project is to deliver.

17.3.2 Requirements Analysis

Closely tied to requirements gathering and elicitation is Requirements Analysis. The purpose of Requirements Analysis is to discover unknown requirements, i.e., to turn unknown requirements into known requirements. Users' needs that were not expressed during requirements gathering and elicitation can be uncovered through Requirements Analysis. It is beneficial for the project if unknown or missed requirements are discovered as early as possible in the project life cycle. This will minimize the cost impact of requirement changes. (Kumar, 2006)

17.3.3 Systems Analysis

System analysis is the process of studying a procedure or business to identify its goals and purposes and create systems and procedures that will achieve them in an efficient way”. Another view sees system analysis as a problem-solving technique that breaks down a system into its component pieces for studying how well those component parts work and interact to accomplish their purpose. System analysis relates closely to requirements analysis or to operations research. It is also “an explicit formal inquiry carried out to help a decision maker identify a better course of action and make a better decision than he might otherwise have made. (Bentley, p. 160).

17.3.4 Value Analysis & Value Engineering

Yan (2012) defines Value Engineering also known as Value Analysis as function analysis of a product or job in order to increase the value. He argued further that value projects involve three basic units; the value, the function and the life cycle cost. Thus:

$$\text{Value (V)} = \text{Function (F)} / \text{Cost (C)}.$$

Some authors argue that Value Engineering is a process that can be applied all through the product development phases or project lifecycle (Yan, 2012).

According to Kelly et al. (2004), VM is the process in which function benefits of a project are made explicit and appraised consistent with a value system determined by the Client. The Client is required to explicitly and implicitly establish a value system for the project..

17.4 Transformation of the work packages in Work Breakdown Structure to activities

Work Breakdown Structure (WBS) is a fundamental project deliverable that arranges the team's work into manageable divisions. According to Project Management Body of Knowledge (PMBOK), a work breakdown structure refers to deliverable oriented classified decomposition of the work to be accomplished by the project team. WBS visually defines the scope in manageable units that a project team can comprehend with every level of the work breakdown structure providing extended definition and detail. Though it covers all the work in the work and only the work required but it's not a contractual agreement. WBS covers all the deliverable and all the work needed to be delivered on the Project.

17.4.1 Activity

An activity is referred to as the scheduled phase in a project plan with an individual beginning and end. An activity typically comprises of multiple tasks and upon completion, the entire activity is completed. Many activities can be combined leading to the summary activity. The duration of an activity can be figured out considering the effort it takes to complete the designated tasks. The beginning and end of activity are also determined by limitations commonly known as dependencies. In addition to that, the milestone is another determining factor. These dependencies between activities and other planning factors are visualized and estimated in a Gantt diagram. This is often used by project managers to plan tasks and monitor their progress. The work packages are disintegrated into schedule activities to create an activity list. This activity list is used in developing the project schedule. An activity has an anticipated duration. In case an event has no time period, it is referred to as a milestone. The work package is the lowest level of deliverables in a project. It's an outcome of an endeavor.

Below table illustrate the transformation of the work packages in Work Breakdown Structure to activities

Sr #	Work Package ID	Work Package	Sub Work Package	ID	Activity Task Name	Predecessor	Duration in week	Resource Type
1	XXXX-XCXX.1	Initiation		A1000	P.O awarded			
2	XXXX-XCXX.1	Initiation		A1010	Kick Off	A1000		
3	XXXX-XCXX.1	Initiation		A1020	Project Charter	A1010		
4	XXXX-XCXX.1	Initiation		A1030	Acquire Land or Plot	A1020		
5	XXXX-XCXX.1	Initiation		A1040	Permission from Authorities	A1030		
6	XXXX-XCXX.2	Design & Engineering	Architect design	A1050	Interior design	A1020		
7	XXXX-XCXX.2	Design & Engineering	Civil Design	A1060	Foundation Drawing	A1020		
8	XXXX-XCXX.2	Design & Engineering	Civil Design	A1070	Civil Drawing	A1060		
9	XXXX-XCXX.2	Design & Engineering	MEP Design	A1090	Mechanical design	A1020		
10	XXXX-XCXX.2	Design & Engineering	MEP Design	A1100	Electrical Design	A1020		
11	XXXX-XCXX.2	Design & Engineering	MEP Design	A1110	HVAC design	A1020		
12	XXXX-XCXX.2	Design & Engineering	MEP Design	A1130	Approval of Design Package	A1110		
13	XXXX-XCXX.2	Design & Engineering	MEP Design	A1140	Preparation of IFC drawings	A1130		
14	XXXX-XCXX.2	Design & Engineering	MEP Design	A1150	Issuance of Construction drawings	A1140		
15	XXXX-XCXX.3	Procurement	Civil Material Procurement	A1160	Selection & Procurement of material for Civil Construction	A1150		
16	XXXX-XCXX.3	Procurement	Interior & Exterior material Procurement	A1170	Selection & Procurement of material for Interior & Exterior Work	A1150		
17	XXXX-XCXX.3	Procurement	Interior & Exterior material Procurement	A1180	Administrative & Class rooms Furnitures	A1150		

Table 20: Work Package and activities

18 Time

A project schedule is a timetable that shows the start and end date of all project tasks, how the tasks relate to each other and usually which team members or other resources are responsible for delivery.

It is a dynamic document that is created during initial planning stage. The approved project schedule acts as a baseline to work to, but it is maintained and updated throughout the project as things change.

18.1. Functions list or the activities included in each work package in WBS

To develop that common understanding of the project work, another key project deliverable should be created: the Work Breakdown Structure (WBS). The WBS is defined in the PMBOK® Guide as a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables. It organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work.

There is a saying in project management that “if it’s not included in the WBS, it’s not included in the project!” A WBS is a direct representation of the work scope in the project, documenting the hierarchy and description of the tasks to be performed and relationship to the product deliverables. The WBS breaks down all authorized work scope into appropriate elements for planning, budgeting, scheduling, cost accounting, work authorization, measuring progress, and management control. The WBS must be extended to the level necessary for management action and control based on the complexity of the work.

18.1.1 Defining Work Packages

The work package is the lowest level of detail within the WBS. There are normally several work packages required in order to fulfill a single WBS element. Work packages must be structured so that all work can be allocated to complete the WBS element. Work packages should be couched in the “verb-noun” structure illustrating what action is accomplished on which item (e.g., Develop Requirements Traceability Matrix, or Program Sort Routine.) The work package description is key to understanding the work to be accomplished within the quadruple constraints of Scope, Quality, Time, and Cost. Normally earned value data is captured at this level of detail to ensure that the proper health of the project is being tracked.

18.1.2 Defining Activities

Activities are a further breakdown of the work packages. Don't get hung up on which term we use here to describe these activities: some software packages consider them to be “tasks,” and others consider them “steps.” What we are discussing here are the actual actions taken by an individual or group that can be measured to determine their current state subjectively and not objectively. It is imperative that the work defined here is something that can be measured.

#	Activity ID	Activity Name	Original Duration	Start	Finish
1	XXXX-XCXX	Design and construction of	195	01-Jan-22	14-Jul-22
2	XXXX-XCXX.1	Initiation	42	01-Jan-22	11-Feb-22
3	A1030	Acquire Land or Plot	30	03-Jan-22	01-Feb-22
4	A1010	Kick Off	1	01-Jan-22	01-Jan-22
5	A1000	P.O award	0	01-Jan-22	
6	A1040	Permission from Authorities	30	13-Jan-22	11-Feb-22
7	A1020	Project Charter	1	02-Jan-22	02-Jan-22
8	XXXX-XCXX.2	Design & Engineering	105	01-Jan-22	15-Apr-22
9	XXXX-XCXX.2.1	Architect design	30	01-Jan-22	30-Jan-22
10	A1050	Interior design	30	01-Jan-22	30-Jan-22
11	XXXX-XCXX.2.2	Civil Design	40	01-Jan-22	09-Feb-22
12	A1070	Civil Drawing	20	21-Jan-22	09-Feb-22
13	A1060	Foundation Drawing	20	01-Jan-22	20-Jan-22
14	XXXX-XCXX.2.3	MEP Design	30	01-Jan-22	30-Jan-22
15	A1090	Electrical Design	30	01-Jan-22	30-Jan-22
16	A1100	HVAC design	30	01-Jan-22	30-Jan-22
17	A1080	Mechanical design	30	01-Jan-22	30-Jan-22
18	XXXX-XCXX.2.4	Approval On Design Package	20	10-Feb-22	01-Mar-22
19	A1110	Client approval on submitted package	20	10-Feb-22	01-Mar-22
20	XXXX-XCXX.2.5	Issuance of IFC Drawing	45	02-Mar-22	15-Apr-22
21	A1130	Issuance of Construction drawings	15	01-Apr-22	15-Apr-22
22	A1120	Preparation of Construction drawing	30	02-Mar-22	31-Mar-22
23	XXXX-XCXX.3	Procurement	135	02-Mar-22	14-Jul-22
24	XXXX-XCXX.3.1	Civil Material Procurement	90	16-Apr-22	14-Jul-22
25	A1140	Selection & Procurement of material for Civil	90	16-Apr-22	14-Jul-22
26	XXXX-XCXX.3.2	Interior & Exterior material Procurement	90	02-Mar-22	30-May-22
27	A1160	Administrative & Class rooms Furnitures	90	02-Mar-22	30-May-22
28	A1150	Selection & Procurement of material for Interior	90	02-Mar-22	30-May-22
29	XXXX-XCXX.3.3	MEP material procurement	80	02-Mar-22	20-May-22
30	A1170	Selection & Procurement of material for MEP	80	02-Mar-22	20-May-22

Figure 23: Activity list of kindergarten construction project

18.2 Relationships between the activities

18.2.1 Finish-to-Start

The Finish-to-Start (FS) logic type simply states that the succeeding activity cannot begin until the preceding activity has completed. An example of the FS constraint is that the foundation of a house must be finished before the walls can be built.

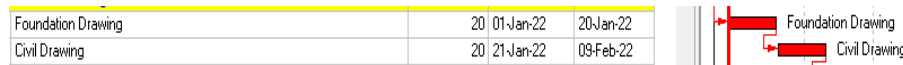


Figure 24: Finish to start activity

18.2.2 Finish-to-Finish

The Finish-to-Finish (FF) logic type, is used to identify that a successor activity cannot finish until the predecessor activity is finish. This is normally used when both activities can be performed for the most part in parallel; however, some piece of work must be accomplished before the other piece can be accomplished. The FF logic is normally accompanied by either a lead or a lag (discussed later) to separate the finish dates of the activities.

An example of the FF logic is that a document cannot be finalized until all comments have been received and incorporated. The predecessor in this case is the comment period with the successor being the incorporation of comments. This indicates that once some comments have been received, work can begin incorporating or responding to those comments, but the document is not complete until all comments are received and handled.

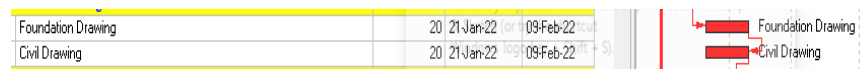


Figure 25: Finish to Finish activity

18.2.3 Start-to-Start

The Start-to-Start (SS) logic type is used to signify that for a succeeding activity to begin, a preceding activity must first begin. This is normally accomplished when both activities can be performed

for the most part in parallel; however, some work must begin before work can begin on the other activity. The SS logic is normally accompanied by either a lead or a lag to separate the start dates of the activities. Typically, the SS logic is used when material and labor are separate activities in a schedule, but there could be other instances of use. With that basis, think of construction and the pouring of concrete. The predecessor activity would be “Pour Concrete” with a SS to “Finish Concrete.” Start-to-Finish

The Start-to-Finish (SF) logic type is used very sparingly. The SF logic is not intuitive, but it is defined as the successor activity being required to start before the predecessor activity can finish. This logic will provide for some distinctly different results based on the tool being used.

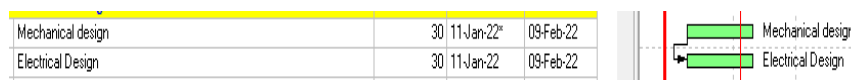


Figure 26:Start to Start activity

18.3 Logical diagram of the project activities, and identify the critical path

Logic is the biggest driver in a properly constructed schedule. Planning and care must be taken to ensure that the logic is accurate and that false or soft logic is not used. Hard logic is the only valid form of logic to use within a schedule; any false or soft logic defeats the effectiveness of the tools used and will need to be modified during schedule execution. There are four standard types of logic used, with Finish-to-Start being the most prevalent and easiest to understand and use.

18.3.1 Types

There are many aspects to using the right logic type within a schedule. Every activity in the schedule will have at least one predecessor and one successor. The only exception to this is the very first activity, which will not have a predecessor, and the very last activity which will not have a successor. To stop tying up the ends of the activities (both predecessor and successor) leaves those activities hanging as an isolated activity that will never show up on the critical path until the project's remaining duration is equal or less than that activity's duration.

When developing the logic, NO logic should exist on Summary or Hammock lines. This will override or confuse the logic on the activities within.

- **False Logic** - logic used to arbitrarily modify the sequence of events in a schedule to bring about preconceived results in an activity's start and/or finish dates.
- **Soft Logic** – logic used to shift references of schedule start and/or stop dates based on perceived requirements within the activities
- **Hard Logic** – logic used which provides valid links between activities.

18.3.2 Critical Path

The critical path is defined as “longest path through the project” (Project Management Institute, 2008), which means that there may or may not be slack in the schedule, but that the schedule's longest path to completion is through the critical path. With this in mind we must analyze the schedule to ensure that our proposed critical path actually makes sense to us from a programmatic view. Does it line up with the thinking of our SMEs that this is really the “longest pole in the tent?” There may be tuning to the resources required, the durations, or even the logic, as we go through the analysis of the critical path. There may even be places where constraints (discussed later) may be required in order to ensure that the critical path is planned correctly.

One thing to remember is that most of the tools use zero (0) as the definition of the critical path for slack. This is adjustable and, in many cases, should be adjusted to ensure the critical path is meaningful. Of course, changing this value may provide for a multimodal (more than one) critical path. There is nothing wrong with this, just more to manage, and this normally provides a strong point of review and management of the plan.

18.4 Gantt chart and Milestones model

Several authors identify the Gantt chart as the first formal technique for managing projects. O'Brien states that, “Prior to (the early 1900's), there had been no predominant scheduling techniques. Scheduling was done on an informal basis as an inherent part of other activities.” The Industrial Engineering Handbook states, “The first formal scheduling model used by management was the Gantt Chart.” Chase and Aquilano amplify on this by stating that the Gantt chart “technique is interesting for historical reasons since it is one of the first recorded attempts to relate activity to time.

The “Bar Chart” first gained prominence as the result of its application by Henry L. Gantt to the production scheduling at the Frankford Arsenal in 1917, primarily for manufacturing types of work. The chart develops an explicit relationship between work and time. Many variations have been developed including its application to project work; it is probably the single most widely used technique for graphically

portraying a project plan on a time scale. Even so, the bar chart has significant deficiencies. It can be considered static in that it requires redrawing to make appreciable changes. On large projects it is necessary to draw the bar chart in a summary form. This factor often draws such comments as “It conceals more than it reveals!” or, to quote O’Brien, “The bar chart often suffers from the morning glory complex. It blooms early in the project but is nowhere to be found later on.” A summary chart can be supplemented by detail charts, each covering only one or a few bars on the summary chart. Coordination of these various charts is often very difficult and certainly tedious. Here is the clear explanation about the Gantt Chart.

- A Gantt chart is the Visual representation of the Project Schedules. Also, Project activities are shown in the Stacked Bar Chart to represent Completion Tasks, Tasks In Progress and Tasks Pending. And each stack in the chart is highlighted with a different color to differentiate % of tasks to represent the status.
- Advanced Gantt Charts will have scroll bars to scroll the items in Charts. And scrollbars helps the user to navigate and display required items on Chart.
- And we can also show the additional metrics. For example, Project and Milestone separators on the Gantt Charts. And we can also show the overall aggregates by Milestones, Phases and Projects.
- Similarly, we can add dependencies and predecessors in the Gantt Charts to relate with other tasks.
- And we can also group all sub task under a main task. And this grouping helps to expand and collapse all sub tasks under a main task.

Below is the glimpse of Kindergarten Project Gantt Chart

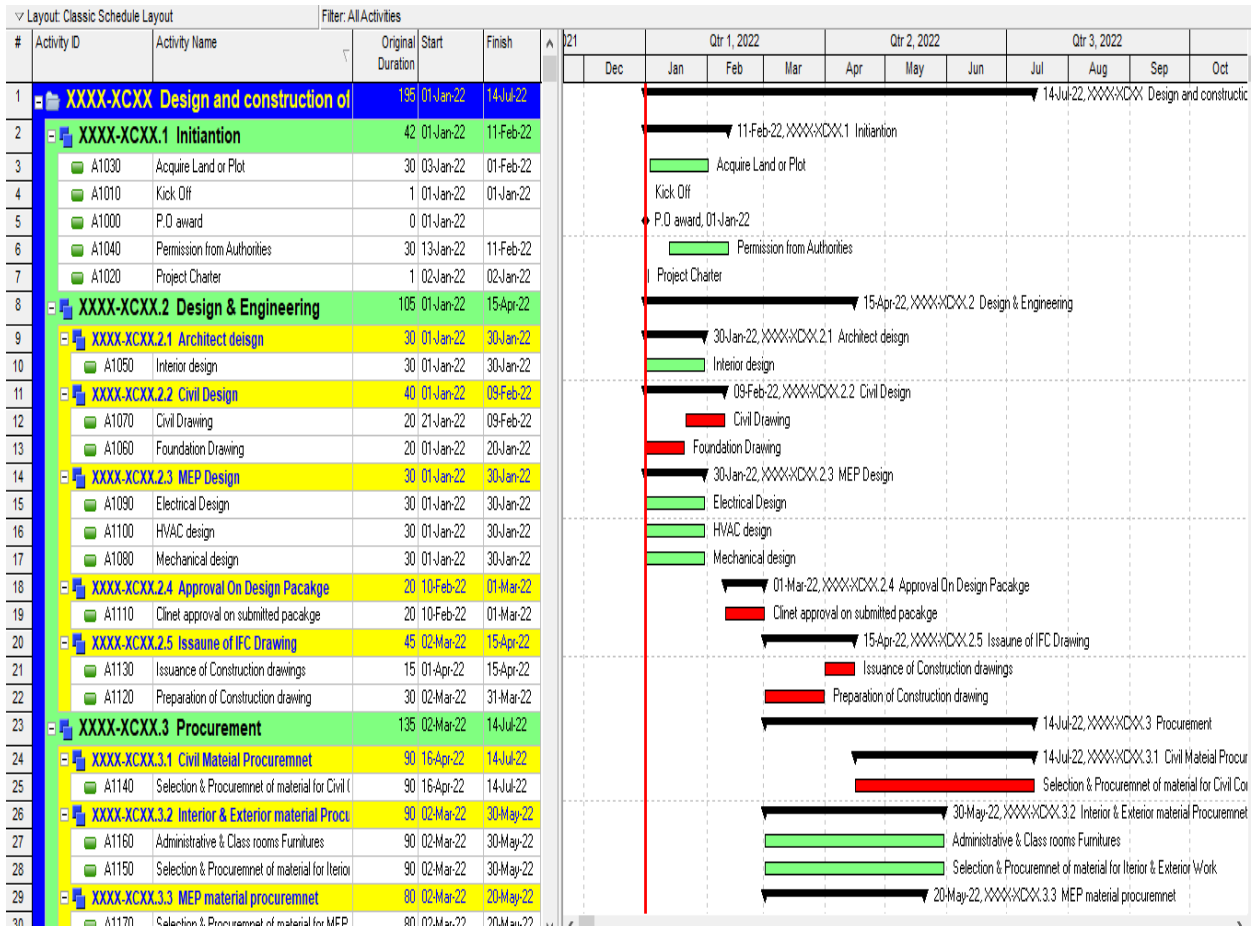
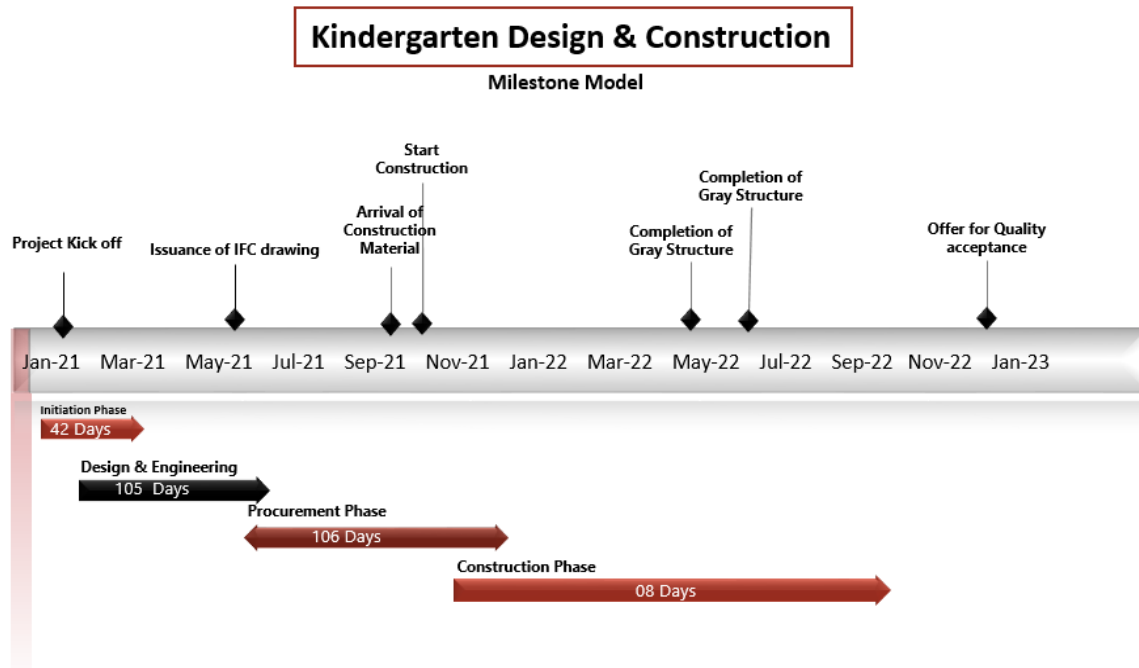


Figure 27:Gantt Chart

18.4.1 Millstone Model

A modification to the Gantt Chart used small triangles to mark “milestones” on a bar and was called the Milestone Chart. Milestones represent easily identified points on one bar of a Gantt Chart, i.e., a major event. Thus, it was not necessary to wait until the completion of a major task to determine if it was in fact on schedule. Experts recommend that a project plan should be stated in such a way that there will be at least one and probably no more than three milestones scheduled per month. Apparently, the logic is that not having any milestones reported complete tends to make superiors uneasy, while more

than three tends to confuse them.



*Figure 28:*Milestone Model

19 Quality

Quality Management (QM) is a key element of Project Management. It is a simple concept. It involves carrying out a project through its four phases (concept, development, execution, and finish) with zero deviations from the project specifications. The environment necessary to support this effort must focus on quality policies, plans, procedures, programs and specifications. This report identifies the key components that should be used to manage quality throughout the life of a project.

The Quality Management Function is the process of ensuring that all aspects of a project and its results fully meet the needs and expectations of the project's client, participants and shareholders — both internal (relating to the project's system of development), and external (relating to the project's performance or service). The primary components of the quality management function are:

- **Overall Quality Philosophy** - The involvement of all project participants in ensuring that project goals, requirements and performance standards are in compliance with the expectations of both the client and the project team.
- **Quality Assurance** - The managerial processes that determine the organization, design, objectives and resources, and that provide the project team, client and shareholders with performance standards and feedback on the project's performance.
- **Quality Control** - The technical processes that examine, analyze and report the project's progress and conformance with performance requirements

19.1 Deming Model for Quality

The Deming cycle is a continuous quality improvement model which consists of a logical sequence of four key stages: Plan, Do, Study, and Act. The model is divided into four phases that form a circular, repetitive process. This methodology, originally called the Shewhart cycle, was developed by Walter A. Shewhart. It was renamed the Deming cycle by the Japanese in 1950. W. Edwards Deming suggested that this procedure should be followed for the improvement of any stage of production and as a procedure for finding a special cause of variation indicated by statistical signals. The plan stage involves studying the current situation, gathering data, and planning for improvement. The Do stage consists of implementing the plan on a trial basis. The Check stage is designed to determine if the trial plan is working and to see if any further problems or opportunities have been discovered. The Act stage consists of implementing the final plan. This leads back to the Plan stage for further diagnosis and improvement.

19.1.1 Plan

One of the most important projects within any business is to identify key business processes that will produce a desired outcome. Having an understanding of key business processes required to run the business and increase performance sets the foundation for process improvement. Once the foundation is set and key processes are in place, it should be easy to understand and identify problems within a process and create a suitable process plan to deal with it.

19.1.2 Do

Key business processes require constant evaluation in order to eliminate deficiencies and maximize performance. It is necessary for business organizations to understand the problem and analyze the root cause in order to develop a process plan of action to resolve systemic issues and improve the process. Testing is part of the “Do” phase in order to find effective solutions to the process issue.

19.1.3 Check

The effectiveness of key processes depends on the effectiveness of the process plans put in place to improve. Without following-up on the effectiveness of corrective actions and results, it will be nearly impossible to determine process capabilities and improvements. Measuring, monitoring and evaluating process results will help decision makers establish the best possible solution for improvement.

19.1.4 Act

Adjust the process by incorporating corrective actions. This step allows business organizations to share best practice, share lessons learned, and re-deploy new processes with the workforce.

19.2 SIPOC Model and Ishikawa for One of the Issues of the Project Outputs

19.2.1 SIPOC Model

The acronym SIPOC stands for Suppliers, Inputs, Process, Outputs and Customer. Using information from these five areas creates a process map that gives a high-level overview of a Six Sigma project. It is a simple, yet effective tool to align the project team and all stakeholders as to the core process within the scope of the project.

The general approach to the SIPOC process identification includes the following steps:

- Start with a simple definition of the in-scope process
- Identify key steps of the process (expand these at the bottom of the SIPOC diagram)

- Have the team identify the major inputs and outputs of the process
- Have the team identify key suppliers of the inputs, and customer for each output

SIPOC is actually an acronym with letters that indicate each process component being evaluated:

19.2.1.1 Supplier

The supplier is the person or entity that provides resources needed to create value for the customer. They could be the supplier of raw materials, manufactured items, or information. These suppliers could be vendors, employees, or manufacturing facilities.

19.2.1.2 Input

This is what's being provided by the supplier and will help create the value or solve the problem for the customer. It may be materials or information or both?

19.2.1.3 Process

The series of steps taken to convert the input to an output that gives the product or service. At this point it is staying at very high-level. Full process flow diagram is not drawing out. Instead, simply want high-level steps are involved in the discussion.

19.2.1.4 Output

The resource or service produced by the process. It could also include any by-products that are not used by anyone. For example, if a process produces waste products that must be disposed of, consider that also.

19.2.1.5 Customer

This is the receiver of the product or service. This could be a customer internal to a company or an external customer.

SIPOC Model for Kindergarten Construction Project;

Supplier	Inputs	Process	Outputs	Customers
•Civil Construction Material Supplier •Wood & Carpentry material supplier •MEP material Supplier •Framing & Surface finishing Material	• Birks • Stone • Concrete • CS rods • Mixing material • Tables • Chairs • Wooden Pallets • Electrical systems and equipment, Plumbing Material • HVAC • Sanitary material • Paint • Doors • Windows	Make a design ↕ Procure material ↕ Build Kindergarten Building Structure ↕ Complete MEP Work & Decoration work ↕ Final Inspection & Acceptance	Kindergarten Building	Project Sponsor

Table 21:SIPOC Model

19.2.2 Ishikawa Diagram

A fishbone diagram is a cause-and-effect discovery tool that helps figure out the reason(s) for defects, variations or failures within a process. In other words, it helps break down, in successive layers, root causes that potentially contribute to an effect. Sometimes called an Ishikawa diagram or cause-and-effect analysis, a fishbone diagram is one of the main tools used in a root cause analysis. There are some feasible category or combination of categories that might cause the above problem, as follows:

- Plant – Equipment or space which involved in material procurement and delivery.
- Policies – the company’s higher level decision rules.
- Procedures – the company’s steps in material procurement and delivery.
- People – all parties involved in this process, i.e. engineer, purchaser, vendor, logistic/transporter, etc.
- Measurement – calibration and data collection related to the procurement and delivery process.
- Environment – Building, logistic, space and physical things related to procurement and delivery process.

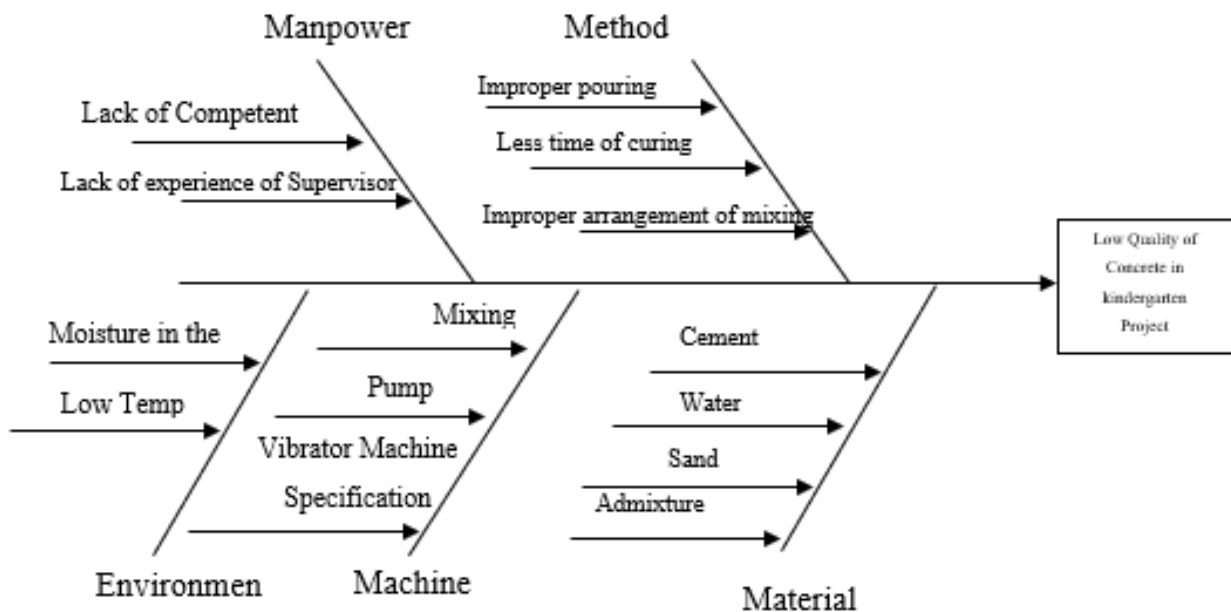


Figure 29: Ishikawa Diagram example for kindergarten Project

19.2.2.1 Project Issue

Beside equipment and workers, materials are one of the three major components of the resources of the project. Late in materials delivery, will create significant impact to the project objective.

From the above categories, the following are the three categories that has identified, causes the most significant effect to late material's delivery to project site, where the other three are relatively easier to manage:

a) Policies

The company policy that all materials procurement has to be procured under centralized Procurement Department. This needs to be evaluated as the centralized procurement (project and maintenance procurement) will bring excessive load to this department.

b) Procedures

Shipping prioritization – still not clear and depend on whether end user “push” logistic to prioritize their material. There should be a prioritization system that consistently follow and working automatically

c) People

Engineer (material requester) – incomplete or wrong or not understandable specification has caused long delivery of vendor quotation

Purchaser work overload, lack of vendor data base and lack of experience/creativity of purchaser has also caused long delivery of “correct/appropriate” vendor quotation.

20 Finance

Financing the project is to guarantee that the amount of money needed is available. This means that the project management sponsor, in order to know how much money is needed, needs to be able to calculate the amount of the cost, benefits and investment.

Once it is known how much money is needed for the project, it is the sponsor's responsibility to assure that the money is ready when it's needed. The sponsor may have direct funding or may establish debt or get other sponsors to fund the project, but it's indispensable that he or she have full knowledge of the project money implications.

20.1 Cost Breakdown Structure and the project balance in accordance with WBS

A Cost Breakdown Structure (CBS) is a breakdown or hierarchical representation of the various costs in a project. The Cost Breakdown Structure represents the costs of the components in the Work Breakdown Structure (WBS). The CBS is a critical tool in managing the project lifecycle, especially the financial aspects of any project by creating a structure for applying measurable cost controls.

In project estimation methods, project cost breakdown can be used for providing more accurate estimates of the final figures.

- Expert judgment: experts' opinion used to make up for the lack of clarity in existing cost breakdown can influence cost drivers where more predictability is required. While this method is used to come up with more accurate estimates, significant difference between the planned and the final figure is still possible.
- Analogous estimation: comparing estimates based on cost breakdown for previous projects with new similar ones helps improve estimation technique and get more accurate assessment of project costs, profitability, and general outcome.
- Bottom-up analysis: planned project costs are structured on the basis of the costs of small tasks, services, and product parts. High accuracy is achieved by taking into account all cost drivers, including costs of routine works, overhead, and possible additional costs.
- Top-down analysis: a top-down cost structure can be used for coming up with a ballpark estimate of the final figure. When using it, it's essential to factor in various additional costs not included in the initial estimate.
- Parametric estimation: this estimation method can be used with cost structures where cost drivers are predictable and measurable. On the basis of existing data, different parameters can be estimated with a high accuracy degree.

20.1.1 Cost Break down Structure of Kindergarten

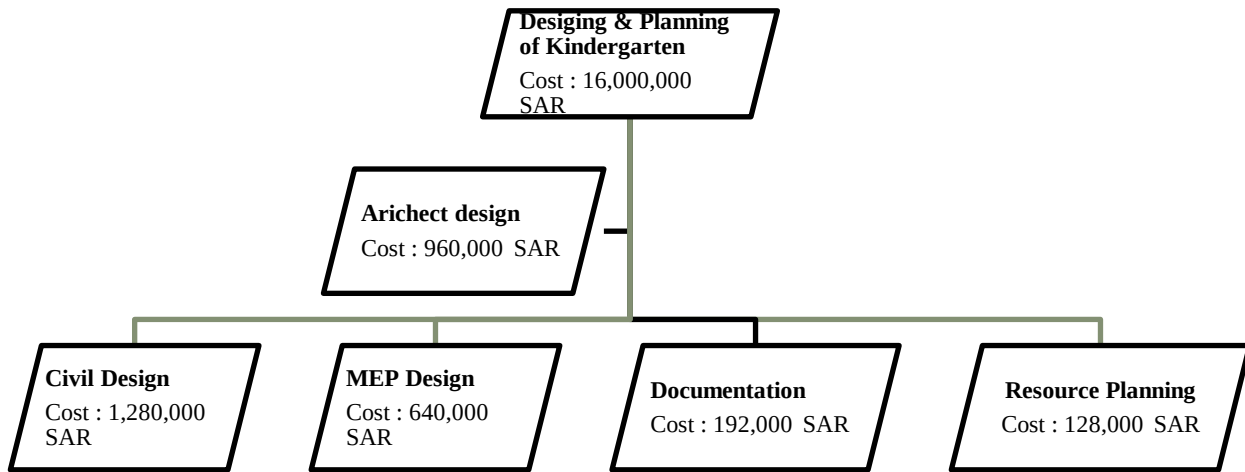


Figure 30: Cost Break down Structure

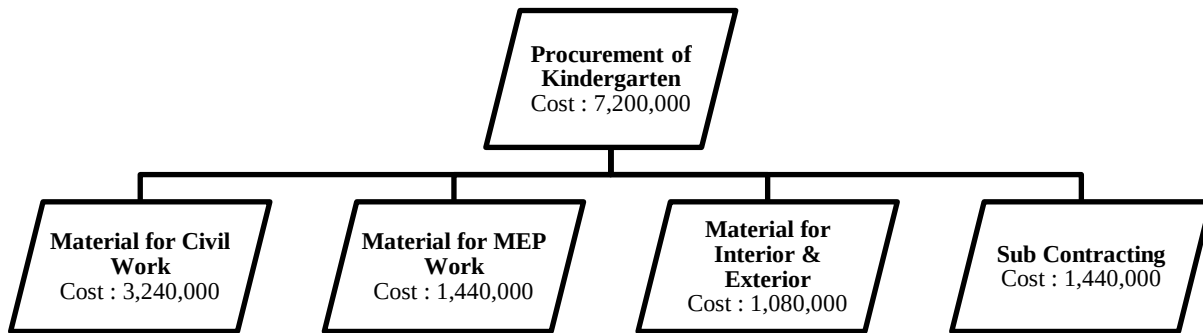


Figure 31: Cost Break down Structure

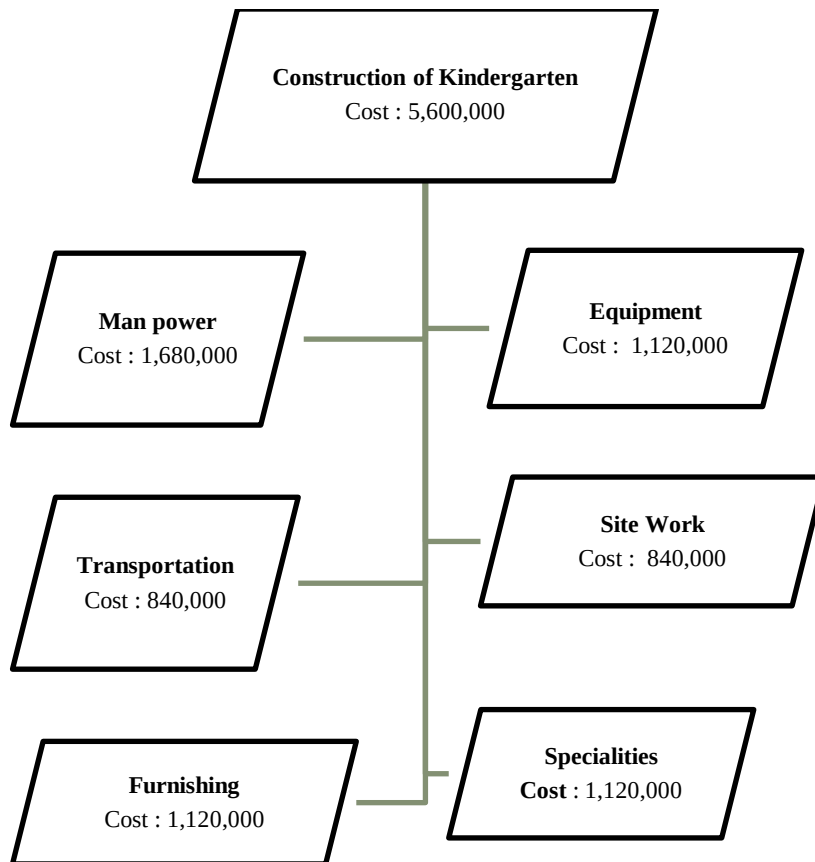


Figure 32: Cost Break down Structure

20.2 Earned Value Calculation of the project after ending of 20% of its period and completion of 50% of the outputs case-by-case basis

Project Management presents many tools and techniques for the management of the successful project. One of the most regarded of these tools would be Earned Value Analysis.

Earned Value Analysis (EVA) is a method that allows the project manager to measure the amount of work performed on a project beyond the basic review of cost and schedule reports. EVA provides a method that permits the project to be measured by progress achieved. The project manager is then able, using the progress measured, to forecast a project's total cost and date of completion, based on trend analysis or application of the project's "burn rate". This method relies on a key measure known as the project's earned value.

Oftentimes the term "earned value" is defined as the "budgeted cost of worked performed" or BCWP. This budgeted cost of work performed measure enables the project manager to compute performance indices or burn rates for cost and schedule performance, which provides information on how

well the project is doing or performing relative to its original plans. These indices, when applied to future work, allow for to project manager to forecast how the project will do in the future, assuming the burn rates will not fluctuate, which oftentimes is a large assumption.

Earned value analysis uses three key pieces of project information: the planned value, actual cost, and earned value. The first two terms are not new, they are the plan spend curve and the actual cost expenditures curve many project teams have been using for years.

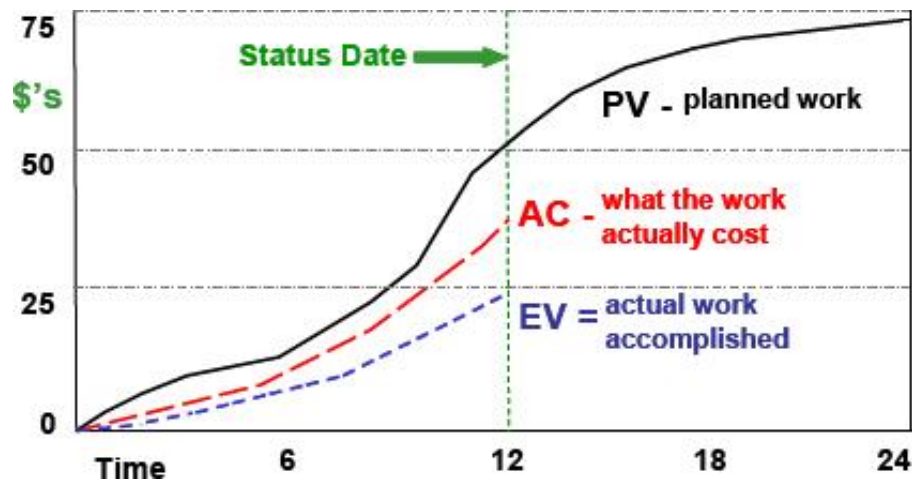


Figure 33: Earned Value analysis

Reprinted from PMI, by Lukas, J. A. (2012). From URL.

<https://www.pmi.org/learning/library/make-earned-value-work-project-6001>

- **Planned Value (PV)** is the budgeted cost for the work scheduled to be done. This is the portion of the project budget planned to be spent at any given point in time. This is also known as the budgeted cost of work scheduled (BCWS).
- **Actual Costs (AC)** is simply the money spent for the work accomplished. This is also known as the actual cost of work performed (ACWP).
- **Earned Value (EV)** is the percent of the total actual budget completed at a point in time. This is also known as the budgeted cost of work performed (BCWP). EV is calculated by multiplying the budget for an activity or work package by the percentage progress.

20.2.1 Earned Value Management Calculation of Kindergarten Project

Budget at completion (BAC)	16,000,000
Project Duration	2 Year
Total Period Passed	20% of Project Duration
Planned Work Completed	20%

20.2.1.1 Planned Value

Planned Value 20% x 16,000,000 = 3,200,000 SAR

20.2.1.2 EV = % complete x budget

Actual Cost	4,530,000
Work Package progress	30%
Budget	16,000,000
Earned value	16,000,000 x 30% = 4,800,000

20.2.1.3 Earned Value Calculations

With the terms PV, EV, and AC defined, along with how to determine progress, some key calculations can easily be done, which provide important information on how the project is doing.

Cost Variance: $CV = EV - AC$	4,800,000-4,530,000	270,000
Cost Performance Index: $CPI = EV/AC$	4,800,000/4,530,000	1.06
Schedule Variance: $SV = EV - PV$	4,800,000-3,200,000	(2,400,000)
Schedule Performance Index: $SPI = EV/PV$	4,800,000/3,200,000	0.25

20.2.2 Forecasting Using Earned Value

The Cost Performance Index is an excellent indicator of the cost efficiency for completed work. One main use of CPI is forecasting the final project cost. Before listing the common formulas used, a few terms need to be defined (PMI, 2008, p.184):

- **Estimate to Complete (ETC)** - the expected additional cost needed to complete the project.
- **Estimate at Completion (EAC)** - The expected total cost of the project when the defined scope of work is completed.

- **Budget at Completion (BAC)** - The total approved budget when the scope of the project is completed (including any project contingencies).

$EAC = AC + (BAC - EV)$	$4,530,000 + (16,000,000 - 4,800,000)$	15,730,000 SAR
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20.2.3 To Complete Performance Index

Another useful evaluation tool is the ‘To Complete Performance Index’ (TCPI), which provides a forecast of the required performance level, expressed as the CPI, which must be achieved on the remaining work to meet the project financial goal. The TCPI calculation can look at either the current authorized budget or the current estimate-at-completion. TCPI provides a “sanity check” for the project manager on whether the required CPI for the rest of the project is realistically obtainable. Of the two formulas, looking at the CPI required to complete the project based on the estimate-at-completion is probably more meaningful. The two TCPI formulas are (PMI, 2008, p.185):

$TCPI_{(BAC)}$	=Work Remaining /Fund Remaining	$(BAC-EV)/(BAC-AC)$
$TCPI_{(EAC)}$	=Work Remaining /Fund Remaining	$(BAC-EV)/(EAC-AC)$

21 Resources

A resource can be a person, a team, a tool, finances, and time. Resources should be assessed and allocated before a project begins. Resources are the largest contributor to successful project delivery, and project managers spend significant time planning and managing their activities. Once deployed, the project manager ensures that the assigned resources perform at their maximum potential and complete the delivery.

Effective project resource planning provides a clear picture of who is doing what and how long they need to accomplish the same. It helps to visualize underutilized resources or those getting rolled off from tasks and re-allocate them to suitable project vacancies.

On an enterprise level, project resources can be human and non-human, which includes but not limited to:

On an enterprise level, project resources can be human and non-human, which includes but not limited to:

a. Labor:

Labor or human resource forms the backbone of any project and comprises employees (part-time or full-time) and contingent staff with various skill sets required for delivery.

b. Consumables & materials:

These are the consumables needed to generate the final product. The materials for a road construction project are soil, rock aggregates, binders like lime, bituminous materials, cement, etc.

c. Equipment & Tools:

It covers all the tangible assets (machinery, plant, equipment, etc.) and intangible assets (software, process, methods, and even ideas). These assets might change depending upon the type and nature of the organization.

d. Facilities:

Resources need an environment for project execution, such as land, conference room, office space, accommodation, and more.

e. Finance:

The most significant resource is the money required to procure the resources and carry out the necessary work.

21.1 Concept of Resource Leveling and Smoothing

Resource optimization is needed when resources have been over allocated, such as when a resource has been assigned to two or more activities during the same time. It may also be needed when certain

resources (e.g., equipment or machinery) are available in limited quantities, while the CPM schedule demands more than the available quantities. Two techniques of resource optimization techniques are:

1. Resource leveling
2. Resource smoothing

21.1.1 Resource leveling

Resource leveling is a technique in which start, and finish dates are adjusted based on resource limitation with the goal of balancing the demand for resources with the available supply. When performing project planning activities, the manager will attempt to schedule certain tasks simultaneously. When more resources such as machines or people are needed than are available, or perhaps a specific person is needed in both tasks, the tasks will have to be rescheduled sequentially to manage the constraint. Resource leveling during project planning is the process of resolving these conflicts. It can also be used to balance the workload of primary resources over the course of the project, usually at the expense of one of the traditional triple constraints (time, cost, scope).

Resource Leveling evaluates all the resources to see if the network diagram or the critical path needs to change. This is done to accommodate resource assignment dependencies and ensuring resources aren't over booked. Resource leveling may result in change of the total project duration. Resource leveling is used to examine unbalanced use of resources (usually people or equipment) over time and for resolving over-allocations or conflicts.

21.1.2 Resource smoothing

Resource smoothing is a technique that adjusts the activities of a schedule model such that the requirements for resources on the project do not exceed certain predefined resource limits. Once resource leveling is done, there is a possibility that the float or slack values have changed. It is also possible that there are days when resources aren't utilized as much as other days. Resource smoothing is done to ensure that resource utilization is more or less similar across the project. Resource smoothing will not change the total project duration.

21.2 Distributing the project resources of equipment and tools

Resource allocation is the process of assigning and scheduling available resources in the most effective and economical way possible. Projects will always need resources, but they can often be scarce. The task, therefore, lies with the project manager to determine the proper timing and allocation of those resources within the project schedule. In project management, resource allocation or resource management is the scheduling of activities and the resources required by those activities while taking into consideration both the resource availability and the project time. In order to save costs and maximize project efficiency, project managers must ensure that resources are assigned in a controlled and pragmatic manner. Here are some important things for allocating resources to projects.

21.2.1 Understand the Project Scope & Timeline

To make the best use of the resources, better understanding of project scope is required so that resources are not over extended. Second, estimate how long each phase will last and set clear milestones at the end of each phase.

21.2.2 Identify Resources

With a detailed task timeline ready, it's time to identify the resources required to complete each task. Past team knowledge and experience come in handy for this.

21.2.3 Find available resources

After identified the tasks and resources, it's now time to check the resource pool. This is the key to mitigating the resource allocation challenges we covered earlier on. Remember to look out for resources that:

- Aren't on other assignments,
- Aren't on an absence such as a holiday,
- And meet any time zone restrictions the project may have.

21.2.4 Allocate resources

Resource allocation is the process of assigning assets in a manner that supports Project's goals.

21.2.5 Monitor project schedule

Any changes in project schedule can and will impact the resource allocation plan. That's why needed to keep a close eye on any changes to the project schedule.

- Delayed tasks that cause a significant delay in dependent tasks.
- Unplanned off days.
- Over-worked team members.
- Changes in business goals and objectives that may adversely affect resource availability.

22 Procurement

Companies are seriously exploring the potential of supply chain management (SCM) (Gunasekaran et al., 2008). The procurement process is an area of interest to organizations responsible for project delivery for better performance in product quality, cost, cycle time, and responsiveness (Sanderson & Cox, 2008).

The procurement process is composed of different stages (pre-acquisition phase, tender process and contract award, contract and supplier management), each one requiring a specific and careful design capable of guaranteeing the best possible results (Baldi et al., 2016)

In case of a project requiring buying goods or services, the procurement department comes into action. A project manager is expected to understand what procurement experts will need from them, provide the experts with that information, and then work with the procurement department throughout the life of the procurements.

- Post the decision of procuring goods or services, the procurement manager should:
- Facilitate to create a Procurement Management Plan
- Create Procurement Statement of Work (SOW)
- Determine type of contract
- Determine procurement document
- Request for Proposal (RFP)
- Invitation for Bid (IFB)
- Request for Quotation (RFQ)
- Send the documents to the seller then, Seller Reviews the documents, seeks additional information (if needed), sends required documents
- Negotiations take place with the seller and contract is signed with right seller
- Procurement administration is the next step
- Monitoring and Control of Procurement administration is done
- Procurement closure involves procurement audit and lessons learned
- Final Payment is made

22.1 Procurement execution process and contractor selection

Execution/Conduct Procurements is the process of obtaining seller responses, selecting a seller, and awarding a contract. The key benefit of this process is that it provides alignment of internal and external stakeholder expectations through established agreements.

During the Conduct Procurements process, the team will receive bids or proposals and will apply previously defined selection criteria to select one or more sellers who are qualified to perform the work and acceptable as a seller.

On major procurement items, the overall process of requesting responses from sellers and evaluating those responses can be repeated. A short list of qualified sellers can be established based on a preliminary proposal. A more detailed evaluation can then be conducted based on a more specific and comprehensive requirements document requested from the sellers on the short list. In addition, tools and techniques described here may be used alone or in combination with select sellers. A weighting system can be used to:

- Select a single seller that will be asked to sign a standard contract; and
- Establish a negotiating sequence by ranking all proposals by the weighted evaluation scores assigned to each proposal.

22.1.1 Tool & Technique

- Bidder Conferences
- Proposal Evaluation Techniques
- Independent Estimates
- Expert Judgment
- Advertising
- Analytical Techniques
- Procurement Negotiations

22.1.2 Selected Sellers

The selected sellers are those who have been judged to be in a competitive range based upon the outcome of the proposal or bid evaluation, and who have negotiated a draft contract that will become

the actual contract when an award is made. Final approval of all complex, high-value, high-risk procurements will generally require Organizational senior management approval prior to award.

22.1.3 Agreements

A procurement agreement includes terms and conditions and may incorporate other items that the buyer specifies regarding what the seller is to perform or provide. It is the project management team's responsibility to make certain that all agreements meet the specific needs of the project while adhering to organizational procurement policies. Depending upon the application area, an agreement can also be called an understanding, a contract, a subcontract, or a purchase order. Regardless of the document's complexity, a contract is a mutually binding legal agreement that obligates the seller to provide the specified products, services, or results, and obligates the buyer to compensate the seller. A contract is a legal relationship subject to remedy in the courts.

The selection of a supplier is one of the main activities of the procurement area. Without an adequate and precise method to select the most appropriate supplier, the performance of the whole project may be affected (Cheng & Li, 2004). This task is difficult and challenging, replete with many uncertainties. It is a complex process, which requires individuals to make judgments and decisions and trade-offs between competing goals and limited resources. The selection of one supplier over another depends largely on the company's preferences in terms of evaluation criteria and weights used, and the commitments the supplier is willing to make (Watt et al., 2009).

22.1.4 Supplier Scoring Model

A Supplier scoring model, also known as a decision matrix, is an analysis tool that provides a systematic, structured process for selecting options based on multiple criteria. It allows us to decide based on several important factors. It simplifies, and quantifies, what regularly starts out as a complicated question in order to arrive at an objective answer.

To create a supplier scoring model, the following steps are applied:

- Identify the criteria important to the decision process
- Assign a weight to each criterion based on its relative importance in the decision (ideally, so they all add up to 100%)

- Assign numerical scores to each criterion for all of the options being considered.
- Calculate the weighted scores by multiplying the weight for each criterion by its score and adding the resulting values. Below is the best example of scoring model in kindergarten's suppliers' evaluation.

Criteria of evaluation with example:

SR #	Criteria	Weight
1	Ability to deliver in below target price. (Price)	30%
2	Reputation on the basis of past projects (Reputation)	35%
3	Ability to deliver the material on given timelines. (Timeline)	35%

The scores for each vendor are shown below.

Criteria	Vendor A	Vendor B	Vendor C
Price	10	10	8
Reputation	10	6	7.5
Timeline	5	10	9

Weightage of each supplier is calculated in below table.

Criteria		Vendor A	Vendor B	Vendor C
Price	30%	3	3	2.4
Reputation	35%	3.5	2.1	2.625
Timeline	35%	1.75	3.5	3.15
	Total	8.25	8.6	8.175

22.1.5 Supplier Comparison Form

A Supplier Comparison Form help the project managers to understand comparative advantages among suppliers. They help you compare their performance and understand what features are important to your supply chain. An excellent example of Supplier Comparison Form is illustrated below

CS Reference: 0				Comparative Statement								
Date: XXX-XXZ				Vendor No. 1		2		3				
Project #				Vendor Name XXX		XXY		XXZ				
Chargable :				Origin China		England		America				
Delivery at:				PQ No								
Specification:												
Sr.No.	Description	Unit	Qty	Brand/Origin	Unit Price (USD)	Total (USD)	Brand/Origin	Unit Price (USD)	Total (USD)	Brand/Origin	Unit Price (USD)	Total (USD)
1	Ceiling Lights	Nos	150		32.06	4,809.00		40.00	6,000.00		60.00	9,000.00
2	Air Conditioning System	Nos	1		20,000.00	20,000.00		23,000.00	#####		27,000.00	27,000.00
3	JB's	Nos	5		800.00	4,000.00		1,200.00	6,000.00		13,000.00	65,000.00
4	Projectors	Nos	7		500.00	3,500.00		600.00	4,200.00		750.00	5,250.00

Figure 34: Supplier Comparison Form

23 Planning and controlling

Project planning as a process is output oriented. It is concerned with deciding in advance what, when, how, and who will take the necessary actions to accomplish established objectives. In this context planning is a pervasive management function which is accomplished by all levels in the project hierarchy, the difference being scope, detail, and the magnitude of the effort. Planning forms the foundation for future actions, using the past as a guide.

For the technical definition, there's the Project Management Institute's project management bible, Project Management Body of Knowledge (PMBOK), which states: "Project controls are the data gathering, management and analytical processes used to predict, understand and constructively influence the time and cost outcomes of a project or program; through the communication of information in formats that assist effective management and decision making."

Think of project controls as the mechanism that keeps a project on schedule when planning and executing, keeping costs within budget. In fact, it works throughout the entire life cycle of a project.

- In project management, project controls address the following
- Project strategy
- Methodology

- Schedule
- Cost estimates
- Risk management
- Project documentation
- General oversight
- Quality
- Resources

It's all about collecting and managing data, finding trends in that information, reporting on progress, and then putting into practice

23.1 Agenda- Invitation and virtual record of a virtual meeting

A virtual meeting is when individuals in various locations connect at the same time using technology to accomplish a shared goal, but they should not be confused for virtual events or webinars. Virtual meetings tend to be somewhat simpler to plan and do not need as much prep time as a virtual event. As with any in-person meeting, it is important for a virtual meeting to have a detailed agenda, as well as plan to effectively follow that agenda.

A meeting agenda is a chronological list of topics, tasks, and activities to be addressed or tackled upon during a meeting. A virtual meeting agenda allows attendees to have an outline of what will be discussed in the meeting so they can prepare ahead of time to ensure the most productive and effective meeting possible.

Here's a virtual meeting agenda for some issue in kindergarten project for better understanding.


Send

Title

Delay in Delivery of wood stock.

Required

Pro@rcjubail.gov.sa; project@rcjubail.gov.sa team@rcjubail.gov.sa

Optional

ceo@rcjubail.com

Start time

Tue 3/1/2022

3:00 PM

☐ All day

☐ Time zones

End time

Tue 3/1/2022

5:00 PM

[Make Recurring](#)

Location

Microsoft Teams. Meeting ID: 001122005

[Room Finder](#)

Agenda:

- To review the situation that arises after delay in the delivery of your order.
- To Discuss the strategy to minimize the impact of this situation.

Please click the link below to add in the meeting.

microsoft.com/feedback/forum/ad198462-1c1c-ec11-b6e7-0022481f8472

From: Pro@rcjubail.gov.sa

Sent: Sunday, November 14, 2021 7:06 PM

To: Pro@rcjubail.gov.sa

Cc: ceo@rcjubail.com

Subject: Delay in Delivery

Dear Sir,

I am writing this email to inform you that there has been a delay in the delivery of your order. The shipment that we were supposed to receive yesterday has not arrived yet due to covid situation. The wood stock that you ordered has stalled and we are doing our very best to make sure that it will be here as soon as possible.

Best Regards,
Procurement Manger
Procurement Department

Figure 35: Virtual Meeting Invitation & Agenda

Minutes of Meetings

A well-executed meeting ends with prompt and clearly documented Meeting Minutes. A skilled and successful Project Manager always has meeting minutes prepared and distributed within 24 hours of having a meeting. Project meeting minutes not only summarize what was discussed and agreed upon during the meeting but also includes a list of action items. It is important that the action items are documented and distributed quickly so the assignees have enough time to follow up on their action items or ask for clarification. Below is the example of kindergarten minutes of meetings.

Subject	Minutes of Meetings			Prepared by:	
Venue	Conference room	Held On	1 nd Mar, 2022	Ref No.	XXXX
Participants				Distribution	
1. Project Manger 2. Procurement Manger 3. Project Engineer 4. CEO 5. Purchase Officer				1. PMO 2. Procurement Office 3. CEO 4. Project Team	
Agenda of Meeting: To discuss the procurement Status					
Meeting Duration		60 Mins	Issue Date		2 th Mar, 2021
Key Points discussed in the meeting:					
Sr.#	Discussion Points		Action Items		Timelines
01	Delay in the delivery of Wood stock		Air lift the material from China to minimize the effect of delay.		End of March
02	Other		It has been learnt that projects schedule suffer initially due to the wrong estimations during the bidding stage and later at procurement stage.		

Figure 36: Minutes of Meetings

23.2 Performance measurement and reports submission

Project performance measurement is the creation of regular reports against the project's constraints (schedule, resources, and budget) to project governance, team members, and stakeholders. The reports provide visibility into progress/performance of the project in a summarized, concise format.

Regular project status reporting is one of the most important sources of information for project governance and team members. Appropriate status reports enable informed decision making and risk management for the project and can be used as a tool to keep stakeholders (including team members) engaged and informed. Project status reports are usually created by the Project Manager, after gathering updated information from the project team. The status reports should be shared with the sponsor, governance, the project team, and other stakeholders, where required. The format and details within the status report may vary, depending on the audience.

Project status reporting is an iterative process throughout project execution and should be done on a regular basis (no less than monthly).

Project Performance:

Project: XXX-CXX -Construction of
Kindergarten in Mutrafiah
Project Manager:

Project Phase: Initiation/Planning/**Execution**/Closure

Status date: 2/9/2021

Project timeline: 1-Jan-22 – end Dec 23

Overall Project Status:	Green	Trend: ➡
-------------------------	-------	----------

Milestone	Status	Progress NS – Not Started HF – Almost Halfway AC – Almost Complete C – Complete	Due Date	Reason	Comments/Actions to Return to Green
Arrival of construction material	R	HF	15/9/2021	Bricks and Steel rods material are late due to some additional requirements	Ask vendor to expedite the deliveries by continuous follow ups.
Foundation work Start	R	NS	20/9/2021	Partial material available.	Strat the foundation work with available material and meanwhile enforce the vendors to expedite the deliveries of balance material.
	Y				

Legend:

Project/Milestone Status: **Green** – No major issues (Driving on the road) **Yellow** – Risk towards meeting targets **Red** – Can't meet targets; one or more constraints must change (In the ditch)

Trend: Improve ➡ Steady ➡ Decline ⬇

Notes for team attention

Key Project Notes:

Manage project communications with all stakeholders throughout the project.

Project status

Accomplishments this period:

Design of Kindergarten has completed & IFC drawings has been issued.

Planned but not completed:

Strat the Foundation work.

Planned for next period:

Piling & completion of grey structure.

Figure 37: Project Performance Report

23.3 Change Request model, including (impact analysis- alternatives analysis- recommendation)

A change request is a proposal to alter some aspect of a given project. Change requests can originate either internally or externally. For example, the client may request a change to the agreed-upon deliverables, or change request receive form a team member who's actively working on the project. Either way, without a formal change request process in place, these proposals can easily get lost, buried, or simply overlooked.

A typical change request can request a change to several project areas including requests to expand or reduce the scope of the project, requests to modify policies, procedures, plans, or processes, requests to modify expenditures, and requests to update of modify schedules. Change requests can be made directly or indirectly and can be initiated internally or externally. One constant throughout most change request processes is that change request must be made formally, via a written proposal or request form typically, and that changes are not to be implemented until they are formally approved. The following figure provides an overview of a change request through different PMBOK Guide's processes.

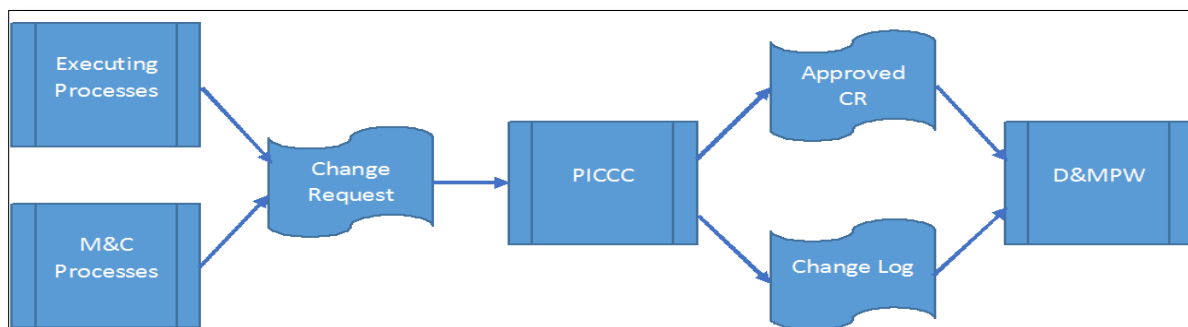


Figure 38: Change Request

- M&C is Monitoring & Controlling.
- PICCC is Perform Integrated Change Control.
- D&MPW is Direct & Manage Project Work.

The above figure depicts the following points:

1. A Change Request (CR) is an Output of most Executing and all M&C Processes.
2. A CR is an Input to the PICCC Process.
3. A decision for CR is taken by the Change Control Board (CCB) in PICCC process. A CR can be Approved, Partially Approved, Rejected, or kept in abeyance by CCB.

4. Approved changes and Change Log is Output of PICCC.
5. Approved changes are Input to the D&MPW process, where they are implemented.

In performing integrated change control after change request triggered the impact & alternative analysis to be performed to analyze the change request.

Change Impact Analysis (Bohner and Arnold, 1996) has been proposed as a solution to the problem. Traditionally, techniques for change impact analysis have used static or dynamic analysis to identify dependencies. Project Impact Analysis is part of a packet designed to support the evaluating and tracking of a suggested modification to a project's scope. The Project Impact Analysis contains the results of the analysis performed by the Project Manager related to the implications that the change will have on the project and other projects if approved. The packet goes through three phases. The first phase is the "Request" phase, the second phase is the "Impact Analysis" phase and the third phase is the "Approval-Denial" phase. The entire packet is designed to drive the change request process and to become a permanent record of each specific request.

A change request form is the part of the change management process, which is a discipline that helps project leaders prepare, equip and support change. Change happens, and if one doesn't respond to it, the change can derail the project. It's always better to address change sooner than later. This change request form is the first step towards collected the data that will determine how you deal with change, so it doesn't create issues or problems in your workflow.

Change Request Form

Project Name	XXX-XXZ	Change Number	02
Requested By	XXX	Date of Request	1st-April 2022
Presented To	XYZ		

☐ **Change Name** Change in design

Description of Change:
 The design of the kindergarten's playing area is to be changed.

Reason for Change:
 The slides & swings are not available in the market as given in the last drawing.

Effect on Deliverables (including a list of any affected deliverables):
 Delay in the completion.

Effect on Organization:

Effect on Schedule (including Estimated Completion Date for this change):
 The project will be delayed almost 01 months.

Effect on Project Cost:

Item Description	Hours		Dollars	
	Reduction	Increase	Reduction	Increase
Analysis		0		\$ 0.00
Development (Code and Unit Test)		0		\$ 0.00
Total Net Change in Cost:				\$ 0.00

Reason for Rejection (if applicable):

Project Sponsor.

☐ **Approved**
☐ **Rejected**

Signature: _____
Title: _____

Date: _____

Figure 39: Change Request Form

24 Risk and opportunities

Risk is the recognized possible loss, usually measured as the probability of the unfavorable event. The uncertainty shows the events that exits and activity results are nondeterministic and the degree of impact of those events can be both positive and negative. While the probability of favorable outcomes may be viewed as opportunity. So, used opportunities carry with them associated risks and the greater opportunity, the greater is the degree of uncertainty and the consequent associated risk. Hence, opportunity and risk are tied together and, indeed, one can be seen as the result of the other.

The constant goal of project management should be moving uncertainty away from risk and toward opportunity. The authors from “Project Management Institute - PMI” (2004) indicate that “project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one objective”. Cooper et. el. (2005) marks that risk thus has two elements: the likelihood or probability of something happening, and the consequences or impacts if it does. Positive consequences or impacts describe opportunity (positive risk) a risk that will have a positive impact on project objectives, or a possibility of positive changes “. Negative consequences or impacts describe threat (negative risk) a risk that will have a negative impact on project objective if it occurs, or a possibility for negative changes “.

24.1 Risks (threats) and opportunities and giving examples

Describing risk as “uncertainty that matters” allows for different types of consequences, and leading standards and guidelines define the concept of risk to include both upside as well as downside impacts. This means that the word “risk” can be used to describe uncertainties which if they occurred would have a negative or harmful effect, and the same word can also describe uncertainties which if they occurred would be helpful. In short, there are two types of risk: threats and opportunities. The first step is to be clear about what we are looking for: uncertainties which might or might not occur, but which if they did happen would help us to achieve our objectives, for example allowing us to work smarter, faster, or cheaper.

There are at least four distinct ways of finding them:

- Some opportunities arise from the absence of threats. If the bad thing does not happen, we might be able to take advantage of something good instead. For example, if poor industrial

relations do not lead to a strike, we might be able to introduce an incentive scheme and turn the situation round from negative to positive.

- Other opportunities are the inverse of threats. Where a variable exists on a continuous scale and there is uncertainty over the eventual outcome, instead of just defining the risk as the downside it might also be possible to consider upside potential. For example, where the productivity rate on a new task is unknown, it might be lower than expected (a threat), or it might be higher (an opportunity).
- We should also remember secondary risks, which are introduced by implementing a response to another risk. Sometimes by addressing one risk we can make things worse (the response creates a new threat), but it is also possible for our action to create a new opportunity. Avoiding potential delays to my car journey by taking the train might also allow me to do some useful work during the journey.
- Lastly, we must not neglect 'pure opportunities' which are unrelated to threats. These are simply unplanned good things which might happen. For example, a new design method might be released which we can apply to benefit our project. Or a recruit to the team may unexpectedly possess a skill needed to solve a problem. This type of opportunity needs to be actively sought out, requiring fresh thinking and awareness of how potential additional benefits might be created.

24.2 Risk register

Risk Register is a document that contains the information about identified risks, results of Risk Analysis (impact, probability, effects), as well as Risk Response Plans. Risk Register also use to monitor and control risks during the whole project life cycle. The purpose of a project management risk register is to identify, log, and track potential project risks. A risk in project management is anything unexpected that could happen that would positively or negatively affect project.

Risk registers may vary depending on the organization and the project. However, most risk register templates share these commonly used elements:

- **Risk identification ID:** A name or ID number to identify the risk.
- **Risk description:** A brief explanation of the risk.
- **Risk breakdown structure:** A risk breakdown structure is a chart that allows to identify all project risks and categorize them.

- **Risk categories:** There are many risk categories that can impact a project such as schedule, budget, technical and external risks.
- **Risk analysis:** The purpose of risk analysis is to determine the probability and impact of a risk. Qualitative risk analysis or a quantitative risk analysis both can be used.
- **Risk probability:** project manager will need to estimate the likelihood of each risk and assign a qualitative or quantitative value.
- **Risk priority:** The risk priority is determined by assigning a risk score to each risk, which is obtained by multiplying the risk impact and probability values. If qualitative measurements are used, risk needs to be prioritize with the highest impact and highest probability.
- **Risk response:** Each risk needs a risk response to mitigate its effect on project. Those risk responses are also documented in a risk response plan.
- **Risk Ownership:** Each risk needs to be assigned to a team member who becomes a risk owner.

The risk owner is responsible for deploying the appropriate response and supervising it.

Below is the figure of Risk register for Kindergarten Project.

Risk ID	Date Raised	Risk description	Likelihood of Risk Accruing	Impact of Risk	Severity	Risk Owner	Response
01	16-11-2021	Project Scope is not well defined	Medium	High	High	Project Sponsor	Make sure that Scope of project is well defined in Define scope phase.
02	16-11-2021	Material delivery is delayed	Medium	High	High	Procurement Manger	Keep in contact with vendor with continuous follow ups. Have an alternative supplier on retainer.

Table 22: Risk Register

24.3 Qualitative Risk Analysis

Qualitative risk analysis is simply the process of prioritizing the risk based on probability of occurrence and impact, as well as some other characteristics if they are relevant. It's what most of us would recognize as an important step in project risk management – the part where we decide which are the risks we are going to focus on because we don't have time to spend effort on all of them. The point of doing it is to priorities individual risks by looking at how likely they are to happen (probability of occurrence) and how bad they would be for the project if they did happen (impact).

As with risk identification, it has to happen throughout the project because risks come and go and also change in severity. Something that has a low probability of occurrence today could have a dramatically different likelihood of occurring tomorrow if something else happens to make it so.

A qualitative risk analysis ranks the recognized project risks using a pre-defined rating scale. The risks will be recorded based on their probability of taking place and the impact on project objectives should they happen. A qualitative risk analysis tends to be more subjective, hence it focuses on recognizing risks to measure both the probability of a precise risk of events happening during the project and the impact it will have on the general plan should it happen. The results are then recorded in a Risk Assessment Matrix to communicate outstanding hazards to stakeholders.

The qualitative risk matrix in **Figure 38** shows high-priority risks in red and the lowest in green.

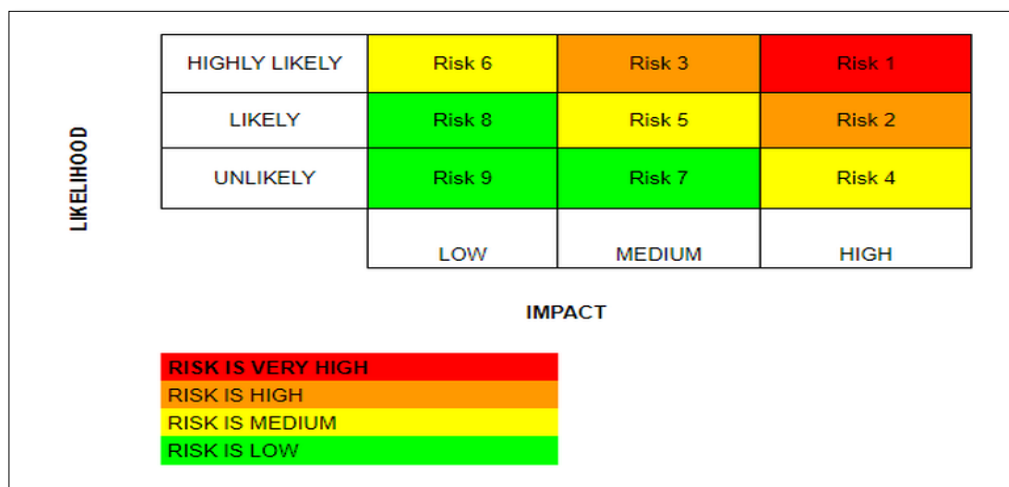


Figure 40 : Qualitative Risk Analysis

Qualitative Risk Analysis Techniques/Methods

There are a few techniques used when carrying out a qualitative risk analysis to determine the likelihood and impact of risk. Here are the most common techniques:

- A risk assessment matrix (RAM): This is a technique used to determine which risks need project manager to develop a risk response for. The first step in developing a RAM is to define the rating scales for probability and impact.
- Strength, Weakness, Opportunities, and Threats (SWOT) analysis: This is a tactical planning technique used to help an organization recognize strengths, weaknesses, opportunities, and threats linked to project planning.
- Improvements, Challenges, Opportunities, and Risks (ICOR) analysis: This technique blends risk management practices with the SWOT analysis. A SWOT template with ICOR information puts in plain view the improvements expected, the challenges to be faced, opportunities to be realized elsewhere, and any risks involved with the event.
- Delphi technique also known as Estimate Talk Estimate (ETE): This technique makes use of expert judgment to identify, analyze and evaluate risks on an individual and unidentified basis.
- Decision Tree Analysis: This method is often used to help determine the best course of action wherever there is ambiguity in the consequence of possible events or projected plans.
- Bow tie Analysis: This method helps to recognize and implement barriers to each of the roots and consequences disjointedly, effectively mitigating both the likelihood of risk occurrence and the following impacts, should the risk still happen.
- These techniques are used based on based on the situation at hand and what to achieve. Sometimes, it needs to perform a SWOT analysis and with that project manager can make necessary plans to make a turn around.

24.4 Risk response strategies

The priorities, which are created for opportunities in the analysis and evaluation process could be interpreted in the same way as risk priorities, with the focus on capturing and exploiting the opportunities rather than avoiding or mitigating the possible problems

- Extreme opportunity: a detailed planning is performed at senior levels to prepare and capture the opportunity.

- High opportunity: senior executives' attention is needed, and management responsibility should be specified.
- Medium opportunity: is managed by specific monitoring or response procedures.
- Low opportunity: is managed by procedures that do not need the specific application of resources.

The actions for risks, which have positive or negative results are defined in PMBOK project risk management process Risk response planning phase. After opportunities have been changed or shared, there may be residual opportunities that are formed with no immediate actions.

In a strategy or scenario risks are described and needed response actions are considering. It is a way to define processes in a broader way and used tools and techniques to minimize or share. Strategies are useful by creating response actions for negative impact or possible problems where managers have low knowledge or expertise. They include managers actions related with positive risks for objectives of the project. There can be only one or a set of strategies, which are the effective for each selected risk. Here is response strategies for risk.

Negative Risk response		Positive Risk response	
Avoid	Risk avoidance is a risk response strategy whereby the project team acts to overcome the threat or protect the project from its impact.	Exploit	The aim of this strategy is to eliminate the uncertainty associated with a particular upside risk. The strategy may be selected for risk where the organization needs to ensure that the opportunity is realized. Directly related response actions include assigning more resources to the project to reduce the time to completion or provide better quality than originally planned.
Mitigate	Risk mitigation is a risk response strategy whereby the project team acts to reduce the	Enhance	The strategy changes the size of the opportunity by increasing probability and / or positive 108 impacts to the project and

	probability of occurrence or impact of a risk.		maximizing key drivers of these positive impact risks.
Transfer	In the risk transference response strategy, the project team transfers the impact of a risk to a third party, together with possession of the response. Transfer strategy does not remove the risk. It just transfers the responsibility of managing risk.	Share	This strategy includes allocating ownership to a third party who is best able to capture the opportunity. The risk-sharing partnerships, teams, special-purpose companies, or joint ventures could be established on purpose of managing opportunities.
Accept	In the risk acceptance strategy, the project team decides to recognize the risk and not take any action if the risk does not arise.	Accept	Strategy for both Threats and Opportunities acceptance is adopted because it is seldom possible to eliminate all risks from a project. The strategy shows how the project team has decided not to change the project management plan in order to deal with risk, or it is unable to identify any suitable response strategy. This strategy can be used both for threats and opportunities and be either passive or active.

Table 23: Negative & Positive Risk Responses

25 Stakeholder

The term stakeholder is used as a general term to describe individuals, groups, or organizations that have an interest in the project and can mobilize resources to affect its outcome in some way. A formal definition of a stakeholder is: “individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion” (Project Management Institute). Project stakeholders usually include the project manager, the customer, team members within the performing organization, and the project sponsor. However, there are more than just these few.

25.1 Stakeholder engagement assessment matrix

The stakeholder’s engagement assessment matrix is a way of analyzing and portraying the level and direction of stakeholder engagement. The matrix is one of the analytical techniques that are the tools and techniques listed for the PMI process of plan stakeholder management.

The engagement classifications recommended in the PMBOK are:

unaware - does not know about the project or its benefits and other impacts

resistant - aware of the project and its impacts, but resistance to the change

neutral - aware of the project, not resistant or supportive

supportive - aware of the project, and supports the change and potential impacts

leading - aware of the project and potential impacts, and actively ensuring its success

Following the PMI’s taxonomy, the current level of engagement is documented with a “C”. The desired level is represented with a “D”. A populated stakeholder engagement assessment matrix looks like the following example.

Stakeholders	Unaware	Resistant	Neutral	Supportive	Leading
Sponsor				D C	
Project Manager					D
Project Management Team					D C
Project Department				D	
Engineering Department				D	
Procurements Department				D	

O&M Departments				D C	
Education Department			D		
Jubail Community			D C		
Parents			D		
Transportation Department				D	
Jubail Governor				D	
Children	D				
Construction Contractors					D
Saudi Electrical Company				D	
Marafiq				D	
Saudi Telecom Company				D	
Childcare Facilities				D	
Material Suppliers				D	
Local residents				D	
Teachers			D		

Table 24: Stakeholder engagement assessment matrix

26. Summery

In this project, we study the project management of construction projects in educational facilities for the Early Childhood (ECH) Program. Project management finds a wide application area in construction educational facilities. A case study of the construction of a kindergarten was carried out to determine the importance of project management success using The Project Excellence Baseline (IPMA PEB®), and to find out how to manage design and construction throughout the life cycle of the project. As construction projects involve a number of participants and stakeholders, their participation and commitment can have a major influence on the goals of construction development. The project report provides a basis for the construction of a kindergarten based on project management best practices that emphasize the necessity and significance of tailoring the project management approach to the unique characteristics of the project and its context.

26.1 Lessons Learned and Recommendations

26.1.1. Lessons Learned

The construction team made trips to observe not only newly constructed facilities but other kindergarten, as well. Many kindergartens were facing problems regarding water and electric power supply. It was recommended that when installing water and electric power supply systems for the same type of project on the Mutrafiah district in Jubail, training in day-to-day maintenance and immediate repair in an emergency, etc. should be included.

26.1.2. Recommendations

The Project Kickoff meeting is when you assemble all your team members with stakeholders in attendance watching you layout how you are going to run the project. Think of the stakeholders as parents that want the project team members to succeed. Whether you are teaching Kindergarten or running a project you need to set the ground rules and expectations from the beginning and develop and refine it along the way. Setting up expectations and ground rules will avoid any assumptions and make everyone's job easier by knowing what is expected of you.

Application of project management tools, like WBS and responsibility matrix, along with careful project planning lead to successful project completion, and can be recommended for use in small to medium design projects.

High attention to details and collaborative team work is recommended for future design projects. Owner, architect, consultant, designer, construction company representative should be involved during the design stage. Civil design is a complex process and required knowledge in different spheres.

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