



# Modern Project Management System and Project Success Aspects

## Key Principles of the Project Management 1<sup>st</sup> – 6<sup>th</sup>

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### **Abstract:**

**“A goal without a plan is just a wish”**

Modern project management is a well-understood discipline that can produce predictable, repeatable results. The methodologies of modern project management are highly analytical, usually requiring automated tools to support them on large projects. Depending on the type, size and class of the project, this management activity can be very complicated. Like most other disciplines, it is learned through both practice and past experience. Project management encompasses many different skills, such as understanding the interdependencies among people, technologies, budgets, and expectations; planning the project to maximise productivity; motivating others to execute the plan; analysing the actual results; and reworking and tuning the plan to deal with the realities of what really happens as the project is executed. In order to manage a project and bring it to a successful completion, its project manager and other team members must have a complete understanding of the methodologies being used for the management of different parts of the project.

Based on the importance of the subject this study discusses the follows:

### **Principles of the Modern Project Management System:**

Modern Project Management Principles are necessary assets when charting a path to completion. These principles of project management can be applied to any level or branch of a project that falls under a different area of responsibility in the overall project organization.

The first part of this study has been developed to give a proper description on the modern project management system, by highlighting the background and history overview, fiving an overview on the Modern Project Management entity, then highlighting the key principles by discussing the applicable elements and work processes.

### **Project Success Aspects:**

The high frequency of using projects in all fields determined the increasing importance of adequate project management. Considering the direct relationship between reaching project's objectives and the long term development of an organization, aspects regarding Project's KPI, project's success aspects and the Project's success criteria/factors are topics of great interest in project management researches.

This second part of this study aims to present an overview on the aspects of project success by identifying the main success components (Criteria/factors) when dealing with projects.

## **Modern Project Management System:**

### **• Background and History Overview:**

Long before the existence of any institute for project management, or updated knowledge books and guides on how to manage projects, or even before the existence of **Gantt charts** (Henry Gantt, 1915), history offers several examples of colossal projects successfully completed. The **Pyramids of Giza**, **Great Wall of China**, and **Coliseum** are all good examples of such projects.

Throughout the history of humanity, humans have been working on improving and refining the practices of project management. Since beginning in this field, global community establishes the common basis for current project management practices such as the job specification which led to have the WBS (Work Breakdown Structure) developed in 1955, also Henri Gantt invented the Gantt-Charts in 1915, which used as tool until today in projects management.

Decade	Ancients	
	Scope Issue (construction of the pyramids)	Importance of planning (Confusions)
1800	Industrial Revolution and Mechanical Thinking	<ul style="list-style-type: none"> <li>• Gantt Chart</li> <li>• Fayol</li> <li>• Juhah's Guideline for project plan</li> </ul>
50's	CPM	<ul style="list-style-type: none"> <li>• PERT</li> <li>• Role of Project Manager</li> </ul>
60's	Life-Cycle Costing	<ul style="list-style-type: none"> <li>• Cost and Schedule</li> <li>• Control Systems</li> <li>• Quality Assurance</li> <li>• Value Engineering</li> <li>• WBS</li> <li>• Explosion of Civil Works</li> </ul>
70's	Soft skills (but still tools and techniques are the main focus)	<ul style="list-style-type: none"> <li>• Matrix organisation</li> <li>• External factors</li> </ul>
80's	other disciplines (QM, simultaneous engineering)	<ul style="list-style-type: none"> <li>• Management by projects</li> </ul>
90's	Textbooks and Standards	<ul style="list-style-type: none"> <li>• Strategic relevance</li> <li>• Dissemination in all sectors</li> </ul>

**Figure # 01 Historical Diagram Project Management Development.**

**The 50s** are considered birth of the modern project management. The role of project manager emerged as the person totally responsible for the entire project.

In the **beginning of the 60s** other practices were introduced, such as life-cycle costing, front-end concept formulation, C/SCSC (Cost and Schedule Control System Criteria), quality assurance, value engineering and WBS (Work Breakdown Structure).

**The 60s and 70s** also witnessed a growing interest of intellectuals in the project management field and general management theories have being systematically applied to project management, such as the system approach (Shenhar, 1970's). Project management tools and methodology were applied to different types of projects and in sector other than aerospace, construction and defence. In this period two major professional bodies were established: in 1965 (IPMA – International Project Management Association), and PMI (Project Management Institute), in 1969. These institutions contributed to the legitimating of project management as a Discipline.

**In the 70s**, project management was utilised by companies as a management tool for solving special tasks. At this period, project management field acknowledged the relevance of soft skills and environment. It was recognised that soft skills were necessary for the development of projects and behaviour techniques were applied to project teams. This development followed the trend in the human resource perspective in the general organisational theory. The influence of external factors such as political and economic factors to the management of project increased and became vital for the project success and hence a trend in the 70s. This development followed the development of system and contingency theory. However, the **main focus** remained on the **tools and techniques**.

**In the 80s**, a paradigm for project management emerged. Project management was recognised as a key instrument in turbulent environment, and appropriated to almost all kinds of change processes.

This growing use of projects in organisations led to increased adoption of matrix or project organisations. At this point, project management crosses again the organisation theory field, but this time, the project management field is the one to influence the general management science by proposing a new perspective of management.

Different disciplines were developed / included in the project management tools/concerns, such as Configuration management, simultaneous engineering, total quality management, partnership and procurement, financing, risk management.

With the development of IT technology in the 80s and 90s, computer-based tools, mainly for scheduling, were developed and diffused.

Up to the **end of the 90s**, Project Management Body of Knowledges and textbooks were published, attempting to create standards in the project management practices and theory development. Since this period, these standards are being developed and further specialised in different areas and sectors.

- **Overview of Modern Project Management System:**

**Capital/Operation Project** is:

An undertaking requiring Concentrated Effort; which mean that such effort need to consider the business opportunity / Development to be converted as project to be executed and handed over to operations / End Users party

- ✓ To Create, Renew, or Expand Facilities (Infrastructure or Production Facilities)
- ✓ To Achieve Specific Business Objectives (Produce or refined a particular product to marketed at a defined price).

And in regards to the projects it's Important to differentiate between the two project environment which are (**Brownfield and Greenfield Projects**). Brownfield Project Influenced more by existing site conditions:

- New facilities located very close to or within existing facilities (process plant or Infrastructure).
- Significant interface with the existing facilities.
- Existing drawing maybe inaccurate
- Existing facilities condition needs to be checked and considered in the engineering calculation.
- Access for inspection, refurbishment and construction likely limited.
- Unclear if existing Utilities capacity is available
- Considerable Project work may be required during existing facilities turnaround(s).
- Existing Facilities standard may be outdated.

Each project has its own **project organization** which is a structure that facilitates the coordination and implementation of project activities. Its main reason is to create an environment that fosters interactions among the team members with a minimum amount of disruptions, overlaps and conflict. One of the important decisions of project management is the form of organizational structure that will be used for the project. How the organization do it is as important as what they do:

- Ensure safe performance of work by all participants (SHE&Q)
- Conform to specifications to assure a safe and operable plant (Quality)
- Complete when specified (schedule)
- Complete within budgeted funds (cost)
- Other factors may be applicable on specific.

Any organization would conduct an annual capital expenditure based on their annual capital projects execution and management.

The Project Management Institute defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. A project is a temporary endeavor undertaken to create a unique product, service, or result.

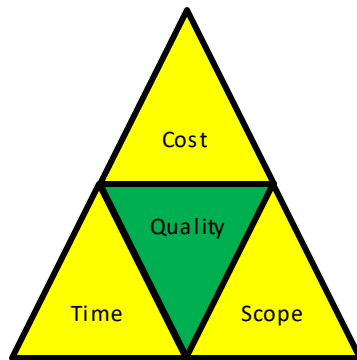
**Titles** such as **project manager, program manager, and product manager** are often used interchangeably even though there is a definite role distinction between them.

Project managers working in a matrix organization usually have overall project authority and responsibility, including schedule, cost, and scope. They are generalists, rather than technical overseers. Their job is to achieve a project goal while working within the constraints of time, money, product or service features, quality, and risks. In a matrix organization the project manager has no one reporting to him/her administratively. Instead, needed skills are “borrowed” from the functional managers. The project managers own the work while the functional managers own the resources. Functional managers may sometimes be called project managers but in fact they are not because they perform an entirely different role. Theirs is to bring in highly skilled personnel to the corporation and assign them to the projects in a matrix organization. They also ensure that skilled specialists are kept current in their field through training and development.

Functional managers generally provide the technical input to the projects, supplying skilled individuals, as needed, to support suggested technologies and processes.

Projects are usually based on three major factors, time, cost, and scope. Once these three aspects are defined it is the project manager's responsibility to manage within the constrained values. For instance, if a project's scope must be met at a maximum budget of \$5 Million, and completed within fifteen months, then the project manager must continually evaluate the impact on cost, and time, if additional project scope is proposed.

**This places the project manager in a unique role. Technical personnel tend to place their highest priority on the technical aspects of the product (scope), and give less focus to the schedule (time) and budget (cost). Finance personnel tend to place their highest interest on cost, and generally remained unconcerned about time or scope.** This when project managers face the need to **trade-off** one of these three constraints against another a problem arises. Which of the three is to be sacrificed in order to meet the more important one? In other words, if a proposed change in scope is being considered, and it can be accomplished by adding more personnel (cost increase), or by extending the project completion date by working within the number of available people, which is the best choice? The only way for the project manager to make an intelligence choice is by knowing the priorities of the **Triple Constraint** factors (Generally called "**Golden Triangle**").



**Figure # 02 Golden Triangle.**

As we do have an interference with the human factor in project execution which mean a broad set of skills are required and called **Project Management Critical Skills**, which can be define as major skills in particular as follows :

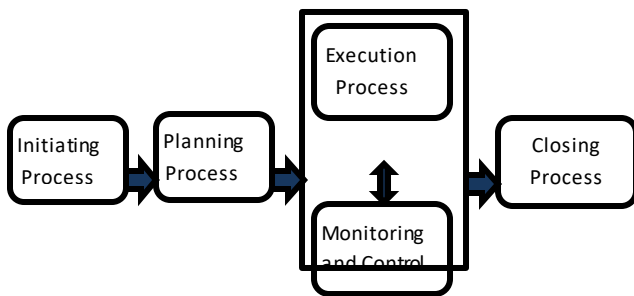
➤ **Technical Skills:** Having technical skills is important for project managers working in today's high-technology fields is critical but it is not the only needed skill. They must have proven leadership skills and pragmatic business skills.

Although it would be **impossible for a project manager to master all disciplines participating on a project**, it is vital that managers have a working knowledge of each discipline. This level of knowledge should enable them to communicate effectively with technical personnel, and to recognize and understand technical problems.

➤ **Leadership Skills:** If a project manager has a solid grasp of project management techniques, principles and processes, yet has inadequate leadership skills, the results will often be disastrous. Leadership skills include the ability to communicate effectively, to negotiate with peers, subordinates and superiors, and the ability to use the proper leadership style. **A common mistake made by corporate stakeholders** is assuming that because an individual is strong technically he must be strong in the area of leadership.

➤ **Business Skills:** Modern-day corporations are realizing that the most effective way to manage project costs is to delegate responsibility to project managers and hold them accountable. As a result, project managers must have a working knowledge of the financial aspects, and understand the “language” spoken by business personnel. Terms such as then-dollars and constant dollars must be understood. Project managers must know what NPV, ROI, and B/C ratios are.

PMT has to utilize their critical skills in the project execution by performing activities and developing materials which called project execution processes. A process is defined as a set of interrelated actions & activities performed to achieve a pre-specified product, result, or service. Each process is characterized by its inputs, the tools and techniques that can be applied, and the resulting outputs.



**\*Figure #03 General Project Management Process Groups.**

The five process groups consist of project initiation, planning, executing, monitoring and controlling, and closing processes.

**Initiating Process Group:** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project.

**Planning Process Group:** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.

**Executing Process Group:** Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.

**Monitoring and Controlling Process Group:** Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.

**Closing Process Group:** Those processes performed to finalize all activities across all Project Management Process Groups to formally close the project.

## The Principles (Element and Work Process):

From the Project Workflow, best practices and Lessons Learned, we could highlight the key Elements and work process to define the Key Principles of the Project Management, as follows:

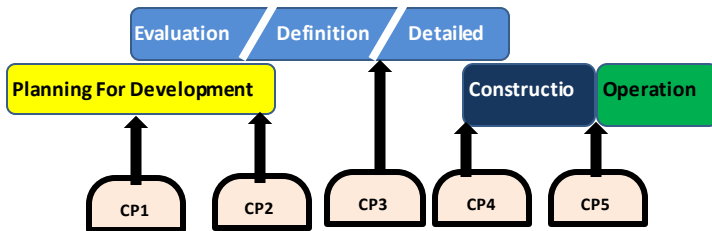
### First Principle:

#### Project Alignment, Optimization and Reviews :

Each Organization has developed their own Project Management System to define and execute their own Capital / Operations Projects, as structured and disciplined approach.

As it known that **each Project is Different, each Organization is Different, each Contractor is Different**, but all the project shared a typical periodic time line which have been set the base of building and developing the project management system, by setting the required definitions and deliverables which are required to pass from stage to the next one.

Following Chart shows the typical Project Engineering Timeline and stages:



**\*Figure # 04: Typical Engineering Project Timeline**

From this typical chart we can note that the project has to pass from development planning phase to Engineering definitions and detailed design then to construction phase and after that to operation phase which mean the close out point of project which all this mentioned phase comes under the highlighted General Project Management Process Groups in Figure # 03.

The Organizations have created a different **Check Points** and this to be used as periodic management check points to ensure capital investments made in support of businesses are aligned with the business needs and improve shareholder value. These created check points have been given a different name base on the organization naming methodology such as: **Check Point, Optimization Point, Gate Review, Alignment Points**,,, etc. These Check Points are controlled by designated authority who is acting as a Project or Asset Owner.

Any Organization will use their developed Project Management System based on its key features, In general the key features of any Project Management System has to be as follows:

- ✓ Projects progress through phases with major check points.
- ✓ These Check Points are controlled by designated authority and this based on the project classification or categorization.
- ✓ Specific deliverables and definitions required and established for each check point.
- ✓ Project need to be categorized based on its cost and complexity, this to define the required definitions, deliverables and the required authorities for the approvals and alignment.
- ✓ The definitions of the Roles and Responsibilities: Defining the Positions, Personnel, Authorities, Parties Representatives and the stakeholders.
- ✓ Active Issues Management System, which could impact overall project objectives.
- ✓



## Second Principle: Development Planning and Issues Management:

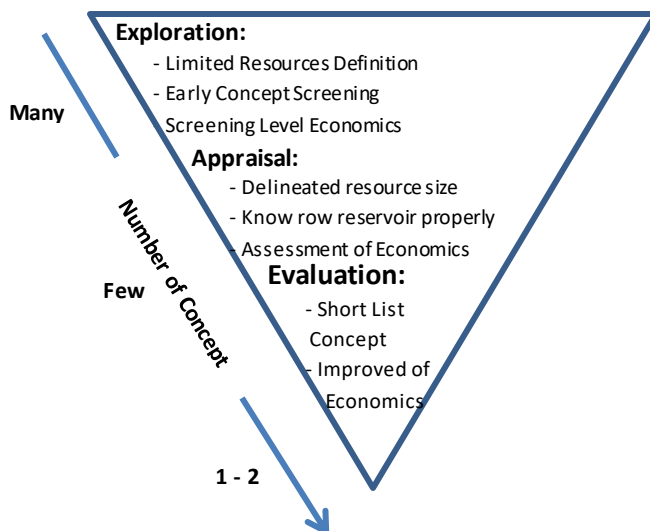
It can be defined as the discipline of analyzing, integrating technical, commercial and project execution strategies for the safe and economic depletion of a resource or supply of market.

The objectives of this element are to:

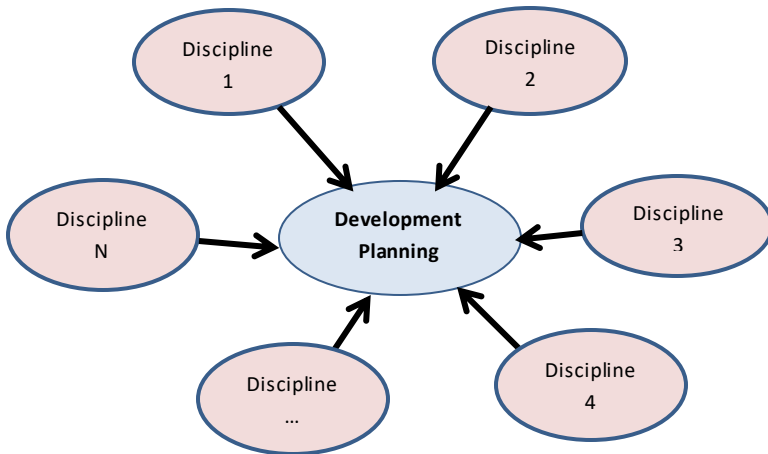
- Capture high –potential Resources of market opportunities
- Maximize the profitability and manage risks.
- Align the investment strategy with corporate financial goals
- Apply appropriate technology

Development planning approach, by multidisciplinary teams with ensuring all the required parties and authorities re involved, and to update the plan as critical project parameters become better defined.

As starting point PMT has to review the project scope and to define the screening cost and project complexity to have the ability in defining what are the applicable work process and deliverables against the project plan also who is responsible to coordinate, liaise, review, provide an input, approve the required definitions and developed information.



**\*Figure # 05: Development Planning work process**



**\*Figure # 06: Development Planning involvement chart.**

Most of the organization they do have developed tools to set the project roadmap and project responsibilities and authority matrix, which the PMT can use to scale up and scale down the required work process and involved authorities from case to case based on project size and complexity.

PMT has to develop the address what are the applicable work processes and required definitions/deliverables to set up Project Roadmap, then Deliverable Responsibility Matrix need to be developed in alignment with the roadmap this to define the timing of required effort, input, work process applying and the responsible party/PMT member.

One of the Best Practices has been highlighted by some of the organization such Exxon Mobile, RasGas, Total, Shell. Conducting an **optimization workshop** in the late of development planning phase to review the scope define the minimum kit scope, address the justified add, the optimized options, and the outcome of this workshop will be addressed accordingly in the ECP and the Project Execution Plan.

As known any project will have issues, and these face of the PMT, so they are responsible to set an issues management plan to streamline the required work processes in managing these generated issues. These issues are identified and prioritized using an input form project planning and the periodic assessment, and in general in project management field we do have three kinds of issues which need to be mitigated:

- Day-to-Day Issues and List To-Do List: this kind of issues can be managed individuals by PMT member and sure need to be communicated with other PMT members for awareness.
- Project Issues: this need to have an involvement of multiple disciplines to resolve.
- Key Issues: This required management concurrence with issues and resolution plan, also it require to interface with another parties

### Third Principle

#### Leadership, Teamwork, Interfaces and Organization Plan:

**“People Get works done, but Team Get project done”**

Building of Project Management Team, to have a high performing team in place as the PMT make decision better than individuals, the PMT must be designed and maintained, to insure the business continuity,

PMT development has to pass in to a certain stages as follows:

Forming → Storming → Norming → Performing

PMT Development required from the team such supportive behaviors, PMT skills are the key things to work on from interpersonal relation, teamwork, leadership to stand for, center of creative,, etc.

For the Projects may be impacted by external factors over which the PMT has a little direct control or influence, here the awareness of the issues and risks utilizing the appropriate resources to manage these issues and risks is the responsibility of the PMT, So the PMT with their management are responsible to set the interface management plan to avoid any expected issues or show-stopper.

Organization Plan for the PMT defines the project team with other interfaces parties and how it will manage the project; this plan has to be updated at the end of each project phase, to address the key needs of the staffing plan, PM is responsible to ensure an adequate time allowed for sourcing to support project schedule

One of the key work process define the responsibility of each member in the PMT organization called the Deliverables Responsibility Matrix, as it defines each deliverable and what are the required input from each party and discipline.

### Fourth Principle:

#### Contracting, Contracts Management and Procurement Management

Contractors duties are providing business approach focused on effective engineering contracting, Trained and Qualified Personnel, Integrated Systems to produce the required deliverables and specialized knowledge.

As part of Execution Strategy the PMT is responsible to

- Develop the contracting strategy; it's a process of utilizing available project and market information to select the best contractor(s) to achieve the project objectives by recommending the contractor type: EPCM, EPC, PCI, OEM,, etc. Sure this needs to be communicated with the appropriate authorities for the approval.
- Obtaining the best terms and optimum distribution of risk between the owner and the contractor.

One of the best alignment tools has been used and it has been addressed as best practices in some of the organizations and in other a mandatory work process, which is the development of the **Work Breakdown Structure (WBS)**.

For the larger Projects the PMT responsible to coordinate for a workshop to ensure all Stakeholders and Shareholders are **aligned**. Based on that PMT would be able to develop the contracting plan based on the approved contracting strategy and to be reflected in project schedule (Estimate Confidence Package (cost & Schedule) should be updated accordingly).

## Fifth Principle

### FEED, Optimization and Detailed Design:

FEED and Optimization activities come as the 3<sup>rd</sup> phase in the general project life-cycle (Definition Phase – see Figure# 03 & 04), and the purpose of these two activities:

- ✓ Conduct the optimization-related activities on the alternative / concept selective during evaluation phase.
- ✓ Define the project required technical definitions in sufficient detail for efficient progressing to Engineering Detailed Design.

At this phase some of the organizations - based on the required resources for the project scope with considering its complexity – are hiring an Engineering Contractor to develop the required technical definitions. Also in this phase PMT would finalize the facility or Asset or the scope design basis and project execution plan (include the ECP, Contracting Strategy, Construction plan and Interface Management Plan).

Normally for the Capital Projects, Full Funding obtained after the completion of this phase with a critical alignment with project stakeholder – Opportunity to influence diminishes after the completion of this phase is agreed (Please see Figure # 03).

Proper planning for this phase is very important to meet the purpose of these activities, so proper development of the Early Project Execution Plan (EPEP) which will provide the Contracting and procurement strategies / Work Breakdown Structure with preliminary owner organization plan.

Early in this phase the EPEP is refreshed as necessary and implemented accordingly to initiate the definitions activities (FEED and Optimization).

The key successful factors in this phase are:

- Proper communication between the contractor and the owner, Roles and Responsibilities are defined well
- Proper Interface Management Plan (Internal Owner Roles vs. Internal Contractors Roles)
- Proper Planning initiated and controlled by the PMT.
- Alignment, Alignment, Alignment in planning and controlling (Activities Plan, Management of Change,,etc.)

For Special Capital Projects which required Long Lead Equipment, the Procurement Order has to be placed as per the procurement contracting plan to meet the schedule and to get the required technical definitions from the supplier for FEED development and the Engineering Detailed Design.

## Sixth Principle

### Economic (Cost & Schedule), Funding and Control MOC:

Cost and Schedule package has been considered as one of the key deliverables for its criticality as uses:

- Input to project economic model
- Key factor in management decision and planning
- Basics for the cost and schedule control for all project components
- Checking the contractors estimate and bids

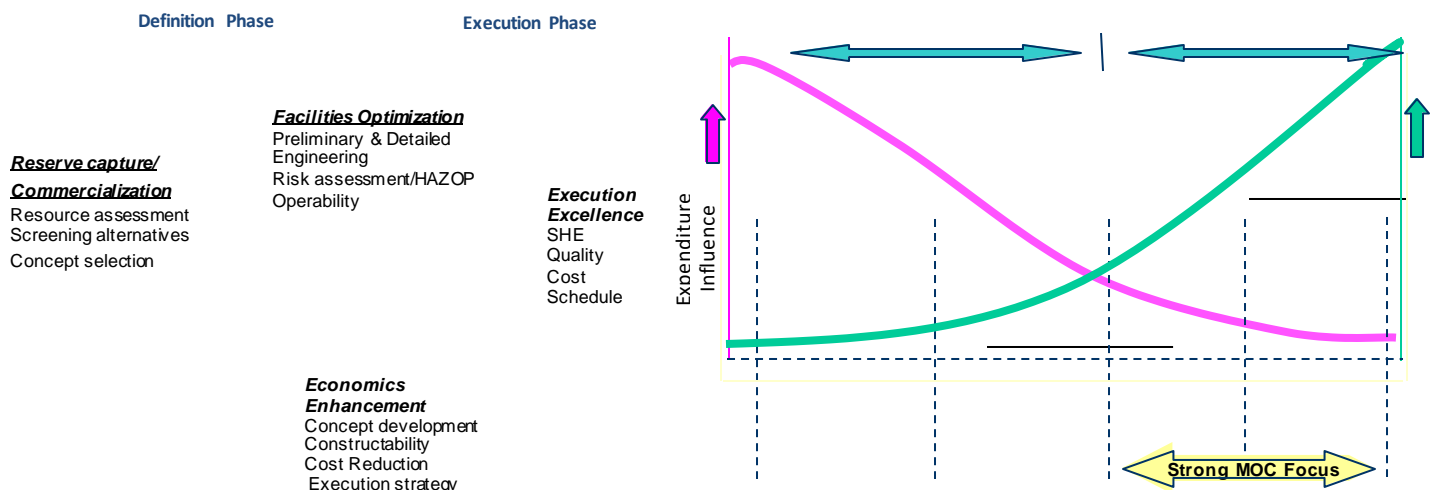
PMT is responsible to develop the Estimate package (cost and schedule) and to be communicated properly with management as ECP (Estimate Confidence Package (Economic Model incorporated in)) to secure the required fund for the project and this based on case to case of project, some of the project get the fund after the definition phase and some of the project get the fund based on installment will be requested by submitting the advanced commitment request to senior management for their approval.

PMT at early development planning phase will develop screening cost estimate, and the more detailed classified will be developed at the end of each phase to have more accuracy definitions of it especially in the Brownfield Projects.

PMT has to work on project control plan to maintain the cost and schedule out comes within the approved budget, project control plan need to be defined at the early of the definition phase and the PMT has to place a **strong MoC process**, this due to the criticality of any change for the follows:

- In general post definition phase, philosophy is to build what is designed
- Significant change after definition phase will be drastically cost impact, Create Overrun area, Schedule disruption, effort diverting, plan changing,,etc.

Project Team should use the highest possible level to control effectively, however level of detail may need to be fine-tuned during project life cycle, the following Influence Diagram (Influence vs. Cost) shows the significant impact of any change after the completion of the defining phase so its need a strong Management of Chang. See the following Figure # 07 Cost vs Influence.



**\*Figure # 07 Influences vs. Cost Diagram**

Influence vs. Cost in project Management, such an important point to stand for and to control the project workflow to maintain the cost and schedule outcomes within the approved budget and time line, this drive the Project Manages and their team to set a project control plan during the selection of the alternative or the concept.

## Project Success Aspects:

Reaching projects' objectives in compliance with constraints of cost, time and performance is usually not sufficient to determine whether the project was successful or not.

Initially, project success was referred to as reaching the objectives and the planned results in compliance with predetermined conditions of time, cost and performance. As knowledge in project management field developed, the "Triple Constraint or golden triangle" was considered not enough to define project success.

Project success was recognized to be a complex, multi-dimensional concept encompassing many attributes. **Projects are unique**, reason why project success criteria differ from one project to another. To increase complexity even more, within the last decades the concept of project success is approached in relationship with stakeholders' perception, being accepted that success means different things to different people.

PMT and Stakeholders need to monitor the project progress, this yield to the necessity of developing evaluation systems can measure the ongoing progress, and to evaluate/assess the project at the close out phase this to measure the compliance with cost, time and scope. These aspects yield to initiate the following measurement and evaluation elements:

- ✓ Key Performance Indicators:
- ✓ Project Success Factors
- ✓ Project Success Criteria

By combining these three elements we can define the component of Project's Success.

## Component of Project's Success:

### Key Performance Indicators:

Project KPIs are measurable indicators that help to track a project's performance. To ensure that projects get completed on time, project managers need to monitor and understand their team's work process and lead the project towards long-term goals. The quickest way to get a complete overview of your project performance is to use a Project KPI Dashboard

The golden rule of KPI dashboards: **each and every project metric should be measurable, actionable and visually understandable.**

Compare the Planned Value with other project KPIs to see whether you're running ahead of schedule or have already spent a bigger slice of your budget than scheduled to date.

PV can be calculated by these two formulas:

**Planned value** = (the hours left scheduled on the project) X (project worker's hourly rate)

**Planned Value** = (Planned % of tasks left to complete) X (project budget)

<b>Actual Cost (AC)</b>	AC KPI is referred to as Actual Cost of Work Performed (ACWP).
<b>Earned Value (EV)</b>	EV KPI is referred to as >Budgeted Cost of Work Performed (BCWP).
<b>Return on Investment (ROI)</b>	ROI reflects on its profitability and shows whether the benefits of the project exceed its cost.
<b>Cost Variance (CV)</b>	Cost variance KPI reflects on the project expenses.
<b>Cost Performance Index (CPI)</b>	CPI is the ratio of the planned budget to what you've actually spent to accomplish these tasks.
<b>Cost of managing processes</b>	To get an overview of time and resources spent on supervising and managing the project.
<b>Overdue project tasks / crossed deadlines</b>	If you have a high percentage of overdue tasks, it's time to think through the project schedule and bring in some new contributors.
<b>Schedule Variance (SV)</b>	Shows how much ahead or behind of planned budget (and scheduled work) your project is running.
<b>Schedule performance index (SPI)</b>	This KPI will tell you whether you're ahead or behind the planned project schedule.

**Figure # 10: Project's KPI's Definition**

## Project Success Criteria:

A differentiation should be made between the two related concepts: success criteria and success factors. First, relevant success criteria have to be identified and then, success factors should be determined in order to increase the chances of project success (Müller, Turner, 2007). Although, in this clause, we focus our attention mostly on success factors, success criteria cannot be neglected.

Success criteria are defined by Muller and Turner (2007) as **variables** that **measure** project success. Since project success might be perceived differently by shareholders / stakeholders, there is a need for comprehensive criteria that reflect their interests and views. All researchers emphasize the importance of stakeholders / Shareholders' satisfaction as main success criteria, complementary to the golden triangle of time, budget and quality from his own point of view, and adds that different time lags should be considered. **Establishing a set of criteria applicable to any type of project is unrealistic.** Although certain criteria might be relevant in measuring the success of most projects, they should be adapted to size, complexity, duration, type and stakeholders / shareholders requirements.

This increased level of complexity when approaching aspects of projects' success is normal and determined by the dynamic environment where projects are implemented. While in project management knowledge the list of success criteria is supplemented constantly with measurable or non-measurable items, **in practice the situation becomes confusing**, project managers having to deal with situations of **implementing projects that don't have clearly defined success criteria**. And from my experience in the field I would like to quote that **"success criteria should be agreed on with stakeholders before the start of the project, and repeatedly at configuration review points throughout the project"**.

## Project Success Factors:

Success factors can be perceived as main variables that contribute to projects' success, as levers that can be operated by project managers and PMT to increase chances of obtaining the desired outcomes. A combination of factors determines the success or failure of a project and influencing these factors at the right time makes success more probable.

In earlier project management studies and researches the main focus was on identifying generic factors that contribute to projects' success. Within the last years, authors emphasized on the existence of different success factors depending on project type. **The struggle to identify the critical success factors is an ongoing topic**, approached by many researchers especially due to the pressure of implementing successful projects in a dynamic global market and ever changing business world, where continuous innovation is a must in order to achieve competitive advantage.

As a result of the numerous studies that approached the topic of project success, several lists of success factors exist. One of the researchers represents a reference point by establishing a list of ten success factors, recognized by other authors as accurate: **project mission, top management support, schedule and plans, client consultation, personnel, technical tasks, client acceptance, monitoring and feedback, communication, trouble-shooting.**

Other Researchers adopted in their studies a set of nine themes in order to describe success factors of projects: **cooperation and communication, timing, identifying/ agreeing objectives, stakeholder satisfaction, acceptance and use of final products, cost/ budget aspects, competencies of the project manager, strategic benefits of the project and top management support.**

From experience base:

**"In regards of timing of project evaluations work processes applying which aim analyzing the success, concluding that the process is useful at any time between the first milestones until the completion of the project. The results of these evaluations might indicate inconsistencies that can have negative influence on the final outcomes. Whenever these situations occur, project managers and PMT should act in order to increase success chances by influencing the previously identified success factors"**.



### Aspects of Project's Success:

From what described in the previous clause we could identify the component of the project's success of success criteria and success factors (**Evaluate/ Assess Project after completion**), with citing the following reference: "Various researchers attempt to group these mentioned success factors for easy acceptance. These authors claim that instead of analyzing individual factors affecting the outcome of the project, these factors should be grouped as the combined effects which would eventually lead to either the success or failure of the project (Schultz et al., 1987, Clarke, 1999, Westerveld, 2003, Nguyen et al., 2004, and Bryde and Brown, 2004). As such, this study categorised the success factors into **four main groups** based on the review of the principles of management, namely **Human management, Process, Organization** and an additional category of **Contractual and Technical** based on the implementation of a construction project.

Factor analysis was carried out using the principal component method of extraction and varimax rotation method. The four factor groups are extracted, with their respective factor items, factor loadings, and percent of variance, cumulative variance and reliability coefficients.

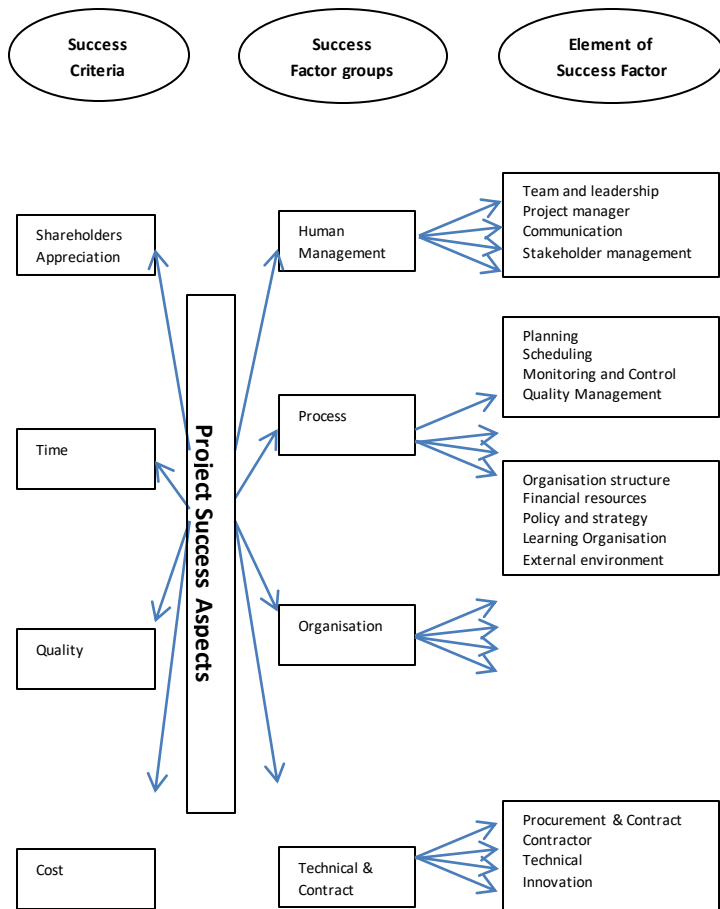
- The first factor group, '**Human management**' contains four factors, namely, team and leadership, project manager, communication and stakeholder management.
- The second factor group '**Process**' comprises planning, scheduling, monitoring and control, quality management, and risk management.
- The third factor group '**Organisation**' comprises organisation structure, financial resources, policy and strategy, learning organisation, and external environment.
- The fourth factor group '**Contract and Technical**' comprises All factors were reasonably reliable.

Based on the literature review, the various dimensions of project success, comprising the success criteria and success factors, are tabulated in the following Table.

Project Success Criteria	Project Success Factors
1. Stakeholders' and Shareholders appreciation 2. Completes within Time 3. Meets the required Quality 4. Completes within Cost	1. Team & Leadership 2. Project Manager 3. Communication 4. Stakeholder management 5. Planning 6. Scheduling 7. Monitoring and Control 8. Quality Management 9. Risk Management 10. Organisation structure 11. Financial Resources 12. Policy & Strategy 13. Learning from experience 14. External Environment 15. Procurement and Contracts 16. Contractor 17. Technical 18. Innovation

**Figure # 11: Project's Success Criteria / Factors**

As explained above, the concept of project success comprises the two dimensions of **‘What to achieve’** and **‘How to achieve’**. Consequently, this study defines project success as achieving the success criteria of stakeholders' appreciation, completion on time, within cost and quality through the success factors of human management, process, contractual and technical, and organisation. This is shown diagrammatically in the following figure.



**Figure # 12: Project Success Components.**

### **Conclusion Out-results:**

As the objective of this study is to give a better understanding of how the Modern Project Management System work processes interact and integrate for effective projects, sure no one will become an expert after reading this study or another 10's, so for anyone who would like to be an expert in this field, he should practice the project management, being in field, work hard, interact, align with the PMT, get more specializing training in his area of work. By end it is strongly recommended to the PMT members to take in their consideration the following **Key Actions/Notes** which listed based on the Process Groups for more success Project Management:

#### **Defining:**

- ❖ “Start early even with a limited information to understand the opportunity and the risk”,
- ❖ “Definitions proceeds to optimization as more information is gathered”.
- ❖ “Get the required definitions for the execution phase (procured equipment/materials, and the constructed asset)”.

## Planning:

- ❖ “To begin early at the evaluation phase with development of project roadmap and Deliverables Authorities Matrix”.
- ❖ “Planning deliverables are living documents”;
- ❖ “Proper Planning will provide the basis of team alignment, interface, interact and project control”.

## Organising:

- ❖ “Assembling high performing integrated owner team includes all key stakeholders and interfaces authorities”.
- ❖ “Select a capable contractor for the required scope”.
- ❖ “Align with your team to understand and utilize the processes to monitor, appraise, facilitate and correct the contractor’s work”.

## Directing:

- ❖ “PMT is the responsible for achieving the business objectives not contractors or supported teams”.
- ❖ “Pay an attention to the relationship SHE&S, Quality, Cost & Schedule”

## Controlling:

- ❖ “Monitor the key metrics at high level but bore down quickly to details to help identify root cause(s)”
- ❖ “Apply all key process”.

And at last based on my experience would like to say:

“**ALIGNMENT** is the **Golden** word in project management field”.

## Future studies / researches:

For the planned Future researches and study in congestion of the developed studies and articles under the subject of Project Management should be done in order to go in further details in Project Management’s Principles and aspects.

Planned Studies and Researches:

- ❖ Research on Brownfield Project Management System.
- ❖ Research on Project Execution Business Risk Assessment.
- ❖ Project Management Applications & Business Analysis (Managing Projects with applying a Continuous Improvement).
- ❖ Experience Base; Strategies for Project Recovery at Risk.
- ❖ Experience Base; Research on Development of Project Management Toolkit.

## Abbreviations:

AC	: Advances Commitments
APV	: Actual Profit Value
AFE	: Authorized for Expenditure
CO	: Change Order
COR	: Change Order Request
CRA	: Constructability Risk Assessment
DBM	: Design Basis Memorandum
DRM	: Design Risk Management
DRA	: Design Risk Assessment
EPEP	: Early Project Execution Plan
ECP	: Estimate Confidence Package
EPC	: Engineering Procurement and Construction
EPCM	: Engineering Procurement Construction and Management
FEED	: Front End Engineering Design
FAT	: Factory Acceptance Test
HAZOP	: Hazard Operability Risk Assessment
HAZID	: Hazard Design Risk Assessment
MoC	: Management of Change
PCI	: Procurement Construction Installation
POS	: Project Objectives & Strategies
PEP	: Project Execution Plan
PDM	: Project Development Memorandum
PMT	: Project Management team
PCP	: Project Control Plan
PQP	: Project Quality Plan
PV	: Planned Value
QA/QC	: Quality Assurance / Quality Control
RFQ	: Request For Quotation
SAT	: Site Acceptance Test
SME	: Subject Matter Expert.
PERT	: Program Evaluation Review Technical
CPM	: Critical Path Method
C/SCSC	: Cost and Schedule Control System Criteria
Project KPI	: Project Key Performance Indicator
CAPEX	: Capital Expenditure
OPEX	: Operation Expenditure
NPV	: Net Profit Value
ROI	: Return of Investment

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