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Modern Project Management System and Project Success Aspects

Key Principles of the Project Management 7th – 12th

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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	• Gantt Chart • Fayol • Juhah's Guideline for project plan
50's	CPM	• PERT • Role of Project Manager
60's	Life-Cycle Costing	• Cost and Schedule • Control Systems • Quality Assurance • Value Engineering • WBS • Explosion of Civil Works
70's	Soft skills (but still tools and techniques are the main focus)	• Matrix organisation • External factors
80's	other disciplines (QM, simultaneous engineering)	• Management by projects
90's	Textbooks and Standards	• Strategic relevance • Dissemination in all sectors

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 priorityonthe 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 abouttime orscope. 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**").

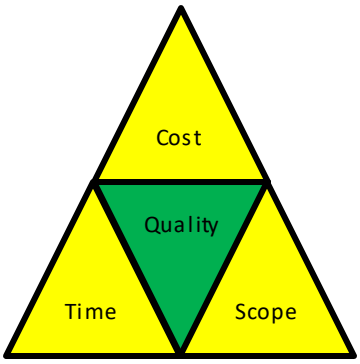

Figure # 02 Golden Triangle.

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.

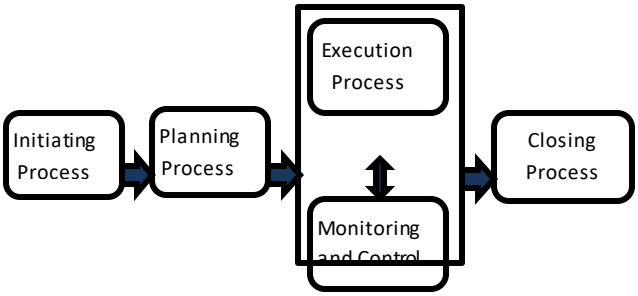

***Figure #03 General Project Management Process Groups**.

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:

Seventh Principle:

Safety Healthy Environment and Security:

"SHE&S is everyone responsibility"

PMT Safety Principles:

- ✓ Delivering Project Safely
- ✓ Each member in the PMT has to lead Safety in the workplace
- ✓ Incident Free workplace
- ✓ Safe behaviors improve performance

Any Project has the possibility of an incident or emergency case happening. No Project Management System can give a **ZERO Incident**; therefore the PMT should be prepared for that, by developing an Emergency Preparedness and Response plan, with considering the follows:

- ➢ Risk Assessment and Issues Management System
- ➢ Emergency Preparedness and Response Plan
- ➢ Incident notification and Reporting
- ➢ Internal and External Communication (addressed in the Interface Management Plan)
- ➢ Exercises

Eighth Principle

Information Management and Reporting

Information Management is a work process which provides an essential support to projects by ensuring the project management team has access to all documents and data as required based on the information classification (Common for PMT, Confidential or restricted distribution information) and provided authorities.

The project documents and information normally it has to be categorized and classified based on:

- ➢ Document / Information Sensitivity Security Level (PMT use only, Confidential or restricted distribution).
- ➢ Document / Information Communication purpose (Approval, Review or for information)

PMT has to maintain the reporting process in place, to insure the alignment in place between all Internal and External Project Team members, this will keep the stakeholders / shareholders informed to avoid any blackout periods or surprises, which will support the controls on project safety, quality, cost, schedule, etc. the main reports can be categorized as follows:

- ➢ Progress Reporting: Routine Reports, covering work progress, Safety, Quality, Cost, Schedule and KPI's.
- ➢ Check Point reporting: Alignment with the stakeholders upon the completion of each phase of Project, covering the project elements and work processes with issues register update.
- ➢ Close Out Report
- ➢ Specific work process report which include planned vs. actual base, overdue issues delay the completion of the work process, plan vs actual achieving final status, overdue action from each party, etc.

Ninth Principle

Quality Management Process:

Quality means "conformances to the specified requirements (Industry Standards, Government Regulation, Project Specifications and owner standards) which mean ensure no broken links in the chain". The Quality can be achieved by placing a process of Quality Assurance and Quality Controls:

- **Quality Assurance:** Action to make sure quality requirement will be met, this can be achieved by developing a proper planning and conducting Assessments and Quality Audit as required then improve the process in-where need.
- **Quality Controls**: Here the in-charge member from the PMT (Quality Control Engineer) to conduct the verifications activities (Review, Inspection and Tests) and then correct the non-conforming works.

Quality as Modern Project Management Element has been placed for the following purpose:

- ✓ Ensure Project Executed in conformance with established Technical Requirements / Job Specification
- ✓ Ensure compliance with QA/QC expectations.
- ✓ More globally. Fitness for End Use, utilizing the project management system helps to ensure project meets shareholder and business requirement.

Planning of Project Quality Process has to start as early of development planning phase (during evaluation phase), so the execution of the quality Assurance and quality control activities occurs throughout the project life-cycle, by end delivering quality project is everyone in PMT responsibility.

The in charge Quality-PMT member has to insure that the a proper quality input has been addressed in the Project Documents and Deliverables and provide the required definitions: PEP and PQP, also Quality Engineer has to work closely with the contractor in development of the contractor Quality Management Plan and Inspection and Testing Plan.

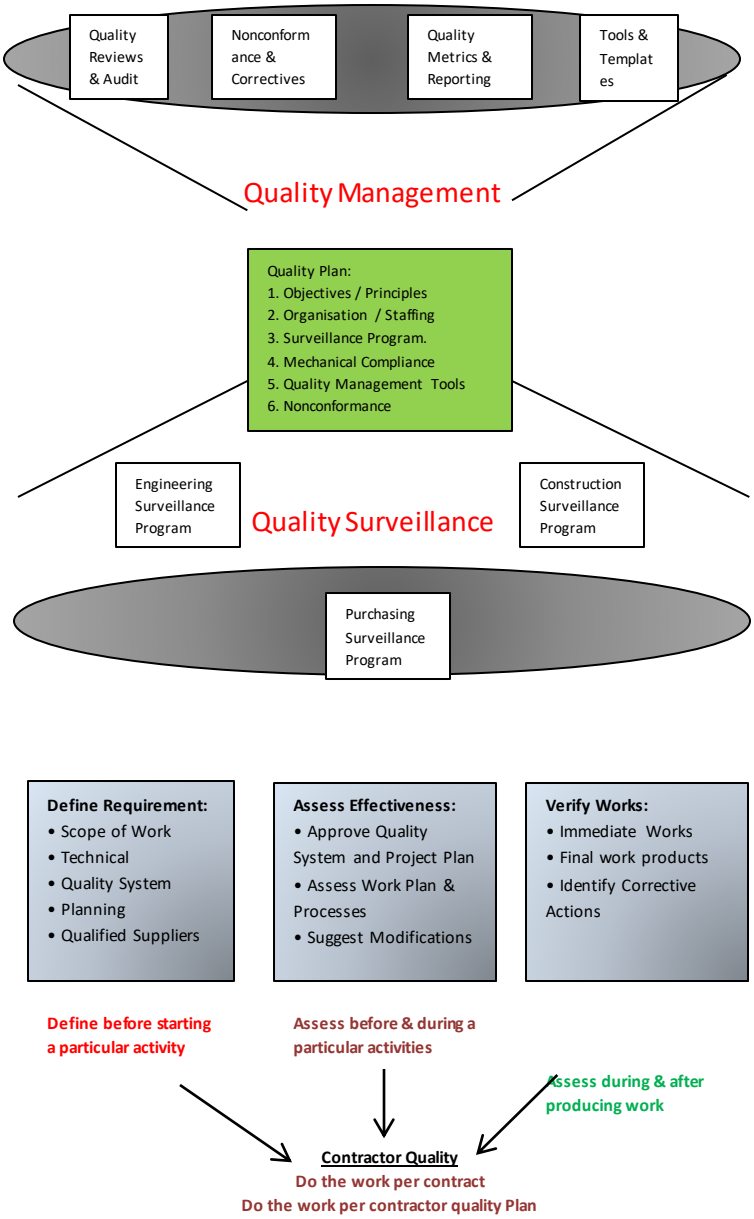

Figure # 08: Quality Management and Surveillance Process

Tenth Principle

Learning and Continuous Improvement:

Rework means **waste** Time and Money, if any one did a mistake he is going to addressed in his mind as a lesson learned and no one like to repeat his mistake, and it's better to learn from other and this is what successful organization doing by addressing their own Lessons Learned and communicated with the others to avoid repeating their mistakes, also they are not just addressing the Lessons Learned also addressing their Best Practices were things done well, Many of the organization they do have their own Data Base which contains their Lesson Learned and Best Practices (which called Continuous Improvement Data Base) which can be a simple tool for gathering and storing knowledge.

This CIDB will serve the knowledge transfer by giving an access to the PMT members, so they could gain the required knowledge from others experiences, then could capture and share what they get, so it will come the following benefits:

- ✓ Repeat Good Work Practices.
- ✓ Avoid Repeating Adverse Work Practices.

From this point while we are looking to be the best we have to assess our performance in project execution and management, that **did we do the project right?,** this assessment can be conducted based on the captured and applied Lessons Learned and the captured Best Practices.

Assessment of Project has to be in place and to cover all project management element and work processes such as Development Planning, Engineering Evaluation, Brownfield Project Interfaces, Contracting, Execution, Construction, Quality, Information Management, Safety,,,etc.

Eleventh Principle
Fabrication and Construction:

First let's highlight the Myth and Fact about this element and work process:

Myth: A Fabrication and Construction activity occurs only in execution phase (which is the 4th stage in general Project Life-cycle, please note Diagram # 04)

Fact: A Fabrication and Construction activity start in Planning Phase and continues through into Operation Phase; (From Phase #2 to Phase #5 as per the General Project Life-Cycle Diagram).

Based on what we have highlighted, I would like to screen the construction's roles and responsibilities through project phases:

- **Development Planning Phase:** Providing input of key execution issue (logistics, risk scenarios, economic, permits,,etc)which will considered as an input for the concept or alternative selection, after the evaluation and selecting the concept construction members are responsible to provide the input and assist in estimating of cost and schedule assist in developing the project execution strategy and contracting strategy).
- **Definitions Phases:** Constructability Review, Construction Plan, Input to update the project execution Plan, Assist in Contracting, Assist in development of the classified estimate package for Cost and Schedule,
- **Detailed Design Phase:** Finalizing Construction Plan, Identifying Execution Vulnerabilities, Risk Management Plan, Manage the construction Contracts, Site Team selection and Logistics supervision.
- **Construction Phase:** On site management and oversight responsibilities, manage safety quality and project construction reporting.
- **Operations:** Assist in Commissioning, Hand-over and final documentation.

The most familiar addressed construction challenges form Lessons Learned point of view is: Key SHE challenges, Workforce Challenges and Construction Objectives and Alignment.

Twelfth Principle
Project Completion and Close Out:

System Completion is a rigorous and systematic process facilitating the transition of project through the following phases:

- **Engineering**
- **Construction**
- **Commissioning**
- **Start-up**
- **Performance Testing**

System Completion is not another name of Hookup, commissioning or start-up.

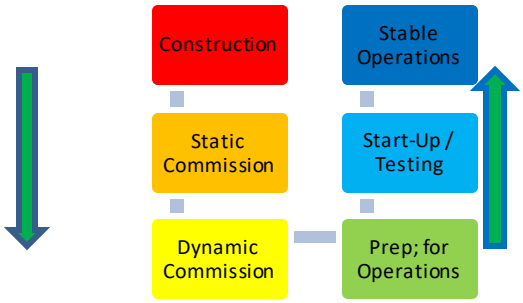

Figure # 09: System Completion Execution Process

Typical Challenges during system completion processes and the PMT responsible to plan properly execute project in alignment with other stakeholders and shoulders and other interfaces parties to avoid any unexpected issues, which can be describe but not limited to the follows:

- Safety
- Inconsistent Definitions
- Roles and Responsibilities (Internal and External)
- Contractor capabilities
- Vendor Support
- Preservation
- Spares
- Permitting (what are the requirements to operate the developed asset or facility?)

Therefore PMT responsible to develop a proper System completion Plan in consistent with the Project Execution Plan, Interface Management Plan, Issues Management Plan, Construction Management Plan and other required definitions, and here I would like to highlight the following notes:

- ✓ Alignment with the Management, this to describe how control of systems completion is to occur
- ✓ Execution Team has to emphasis on early planning and keeps working on this work process to provide proper described processes to complete to achieve steady state operations.
- ✓ PMT has to develop the work packs and containing proper definitions for specific system completion works (Plan and Processes)

PMT are responsible in managing risks during system completion, as safety risks normally are higher during the completion process for personnel and safety. PMT would be able to manage these increased risks by proactive planning, good coordination and communication, developed definitions that fit for purpose with high level safety and technical surveillance.

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)

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

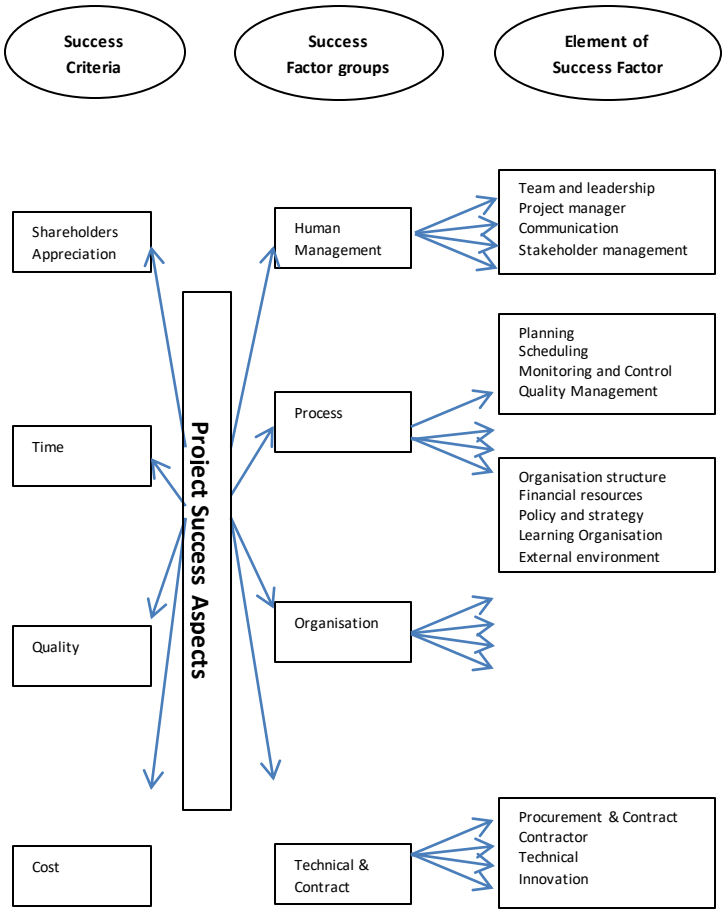

Figure # 12: Project Success Components.

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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