MSc Program
Engineering Management

The Challenges and Barriers in Traditional and Agile Project Management Framework and Strategies Implemented by Successful Multinational Companies to deal with these Problems.

A Master's Thesis submitted for the degree of
"Master of Science"

supervised by
Dr.-Ing. Thomas Duda

Dipen Bhavsar, B.Eng

11936039

Vienna, 24.03.2021

Affidavit

I, **DIPEN BHAVSAR, B.ENG**, hereby declare

1. that I am the sole author of the present Master's Thesis, "THE CHALLENGES AND BARRIERS IN TRADITIONAL AND AGILE PROJECT MANAGEMENT FRAMEWORK AND STRATEGIES IMPLEMENTED BY SUCCESSFUL MULTINATIONAL COMPANIES TO DEAL WITH THESE PROBLEMS.", 87 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted the topic of this Master's Thesis or parts of it in any form for assessment as an examination paper, either in Austria or abroad.

Vienna, 24.03.2021

_____
Signature

Abstract

With globalization, unpredictability in business and project management has been increased. Many direct or indirect external or internal factors have affected the successful execution of multinational companies' cross-border projects globally. According to the Research Organizational Culture, Socio-Economic Factors, Cross-National Culture, and Top Management ideology influence the global project team's performance. The aim of this research is to simplify and document traditional and agile project framework challenges and how the multinational companies implement strategies in consultation with their PMO (Project Management Office) to drive the project to success. International companies have both project frameworks in place to their portfolio categorized based on their business segment. They efficiently accomplish the desired project performance and results and justify the project objective despite the varying dissimilarities in the project teams' challenges in the traditional and agile project framework. The Project performance evaluation technique help identify the success factors of the efforts taken to mitigate the challenges and barriers in the projects. We examine the moderating strategies thoroughly and signify the main consequence of applying the unique methodology to achieve acceptable results, which can be further exemplified as a reference for other industries. The study's outcome will be resourceful to the small-middle scale industries to conduct and conclude their projects to the success despite the obstacles and constraints to increase the project success ratio and attain sustainable industrial growth.

Preface

This dissertation is the final part of my Master of Science in Engineering Management at Vienna University of Technology (TU Wien), Vienna Austria.

The dissertation work was completed in supervision with Dr.-Ing. Thomas Duda. The research is based on the project management strategies in a globally successful company (the name of the company is not mentioned for the confidentiality and privacy reasons). The topic of the research is the very deep interest of me as a researcher, my supervisor and the organizations.

Almost all of the work is done by deep research, study, observation, and anlysing the case studies. The research work is carried out from December 2020 to March 2021.

I would like to thank everyone who has contributed directly or indirectly with valuable information and facts to this dissertation.

Our Academic program director Univ.Prof. Dipl.-Ing. Dr.techn. Peter Kopacek and my supervisor Dr.-Ing. Thomas Duda's guidance, consulting and support throughout the study gave me motivation to make my research possible.

I also thank my family and my colleagues for correcting me and providing their views and moral support during the research.

Dipen Bhavsar
Vienna, 2021

Introduction

Project Management (PM) is a discipline that underpins much economic activity in an organization. Projects drive the business in industries that vary in volume and complexity according to the type of industries such as pharmaceutical, aerospace, oil & gas, and construction. Almost every organization selects the right project management methodology aligning to their business strategy in general. Different project management methodology put stress on organizational structure, processes, market strategy, senior management expectations, and the competencies of the project performing teams.

Traditional project management methodology emphasizes rigid planning and tight command and control. At the same time, the agile approach focuses mostly on flexibility, team collaboration, and leadership. Traditional methods emphasize analysis and planning in the early project phases, making assumptions and estimates of cost and time before the other factors are known. These assumptions build on models and templates, lessons learned from previous experiences. In contrast, agile methodologies focus on adapting the situation, making it challenging to develop initial assumptions and time and cost estimations. As a result, these projects are capable of dealing with changing requirements simultaneously; they are very prone to scope creeps, thus increasing the risk of budget overruns.

Every project's success and failure rely on several factors that directly or indirectly impact the project, and they are from internal or external project environment in an organization. These factors have a potential impact on a project that defines a project's success and finally of the business to organizations. Thus, every organization has to build its strategy for the project, which can be the backbone of a project's success. Organizational project strategies should be aligned to the ultimate business strategies, which can generate potential estimated business growth. In large organizations that have globally running complex projects have several additional critical external factors considered before the project initiation. Strategies for different projects in the same organization changes based on how the project is initiated and developed, and it has several variations based on their methodology. As an instance, the traditional methods have a lot of intra-dependencies in a larger organization. On the other hand, agile methodology novel deliverables, which has customer satisfaction risk factor.

1 Introduction to Project Management

1.1 What is Project Management?

Project Management (PM), by definition, can be determined as the application of tools, skills, information,and analytical techniques to the temporary endeavor to achieve the overall project requirement. PM term evolved over the years and can be detailed briefly as below:

1.1.1 History of Project Management

Project management is not new; It had been in place for hundreds of years; few examples of the project outcomes include:

- Taj Mahal
- The great wall of China
- Humans are landing on the moon.
- Development of the commercial airplanes
- First-ever made computer.

The outcome of these projects results from the leaders and managers applying project management best practices, processes, principles, tools, and techniques at work. The managers of these projects used a specific set of critical skills. They applied their knowledge to satisfy customers and other people involved in and affected by the project being taken up.

"For many centuries, project management has been used in some elemental form to develop, change or cope with the change in civilizations. Change in a positive sense is triggered by applying organizational action that results in the utilization of resources to create the desired product, service of the organizational procedure. The change also may be meeting uncertain circumstances to identify and execute actions to obtain the most promising outcome. project management, in all form, has been used for periods to plan, for, implement and meet change" (Cleland and Gareis, 2006)

The professional management discipline we know today as "Project Management" was formally recognized. Project management progressed into a profession by the advancement in technology and science. It was then profoundly accepted that a project manager needs a particular set of project-specific skills, and those may change as the organizational challenges evolve.

The Primary focus of project management shifted to the project goals, the methods, and managerial resources required in order to achieve the objectives of the project. However, there came close attention to the close interrelationship between the specialist methodological aspects such as (planning, controlling) and behavior-related aspects such as (leadership, team development). A further aspect considered is the integration of the project into the prevailing environment. In this context, the collaboration between the organization and the project environment is given special attention.

In 2008, Project Management Institute (PMI) published a Project Management Body of Knowledge (PMBOK) guide to simplify the Project management fundamentals in order to plan and implement a project management environment within an organization. The PMBOK guide consists of different Project management plans used throughout the project lifecycle simultaneously or one after the other as and when required during the project, as mentioned below.

- Project Integration Management
- Project Scope Management
- Project Schedule Management
- Project Cost Management
- Project Quality Management
- Project Resource Management
- Project Communications Management
- Project Risk Management
- Project Procurement Management
- Project Stakeholder Management

1.1.2   Term "Project."

Many organizations and publications have defined various definitions for the term Project, but probably the most promising and authoritative term is given in the 'Guide to Project Management,' According that. ''A unique set of co-ordinated activities, with a definite beginning and ending points, initiated by individuals or organization to achieve specific and measurable objectives within a defined schedule, cost and performance parameter''. Kerzner and Pinto (2007) says that a project is a relatively unique event in business performance that develops its own rules distinct from the line organization

The PMI's definition in the PMBOK is:

"A project is a momentary endeavor commenced to create a unique product, service, or result. The temporary nature of projects indicates a distinct beginning and end. The project is considered completed when the defined project goals are obtained, or the project is terminated by the sponsorers. Temporarily it does not certainly mean short. Temporarily does not usually apply to the product, service, or outcome created by the project; most projects are undertaken to develop a lasting conclusion. Projects can also have collective, economic, and environmental impacts that far outlast the projects themselves (PMBOK guide 2008 edition)

The Association of Project Management's definition is:

"A unique set of harmonized activities, with specific starting and finishing points, commenced by a specific or organization to meet specific goals within defined time, cost and performance limits" (Grundy, 2000)

1.1.3 The term "Project Management." And their Framework

Project management applies processes, methods, skills, knowledge, and experience to achieve specific project objectives according to the project acceptance criteria within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget. Project management always has defined results and the time schedule ane because of that, it requires technical, leadership, and management skills together with organizational business concepts.

The PMI's definition in the PMBOK for "Project Management" is:

"Project management is applying knowledge, skills, tools, and techniques to project activities to meet the project requirements. According to PMBOK, Project management consists of 42 logically grouped project management processes and 5 Process Groups. These 5 Process Groups shown in Fig.1 are:

- Initiating,
- Planning,
- Executing,
- Monitoring and Controlling, and
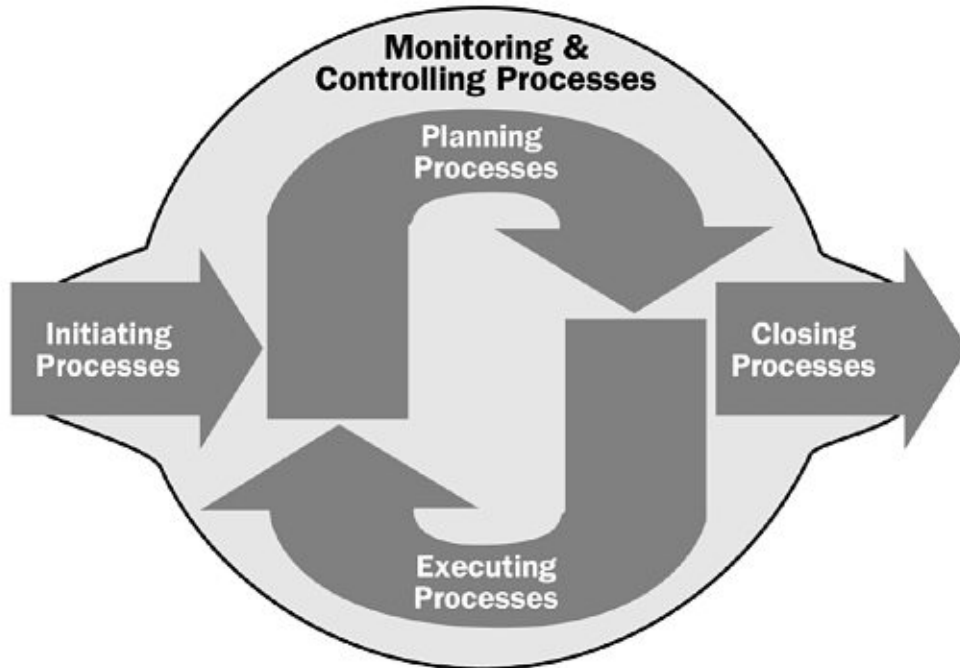- Closing." (PMBOK guide 2008 edition)

Fig. 1: Project Management Process Groups, Project Management Institute (PMI), (PMBOK® Guide 2008)

Project Management is all about identifying requirements, developing specific and achievable objectives, mitigating the competitive requirements from the internal and external stakeholders and still ensuring that the purpose of the project is achieved. Unless there is a scientific approach to manage the project specific tasks, it would be difficult for the organization to execute the projects with the schedule, budget and required quality to deliver the desired project results, and this can only be achieved if there is a solid framework of the project management in the organization exist.

Project management provides the structure to manage the project commitments and the delivery of the aggreed project results. The Project management methods provided in the PMBOK and allied International Project management journals gives the organizations a command over the project environment to mitigate the constraints and determine the project success, without the use of project management, the organizations would find an unpredictable situations to loose the control over the projects which in turn can result in huge losses.

In conclusion, the most appropriate definition of "Project Management" is the process of executing a project by enforcing a organizational framework, strategies, and applying a set of tools and knowledge to meet the project goals.

1.1.4 Benefit of Project Management

The introduction about ''project' and 'project management,' clearly describes the importance of project management in business and the amount of potential advantages that can be attained by employing professional project management. It is essential for every company to know why they need to imply project management and the benefits they can get from successfully implemented projects within a framework.

In literature, it is described how the organizations can get the benefits through the implementation of PM:

- Project Management has a direct relation to the project success by increasing efficiency through the human effort in the organization. Short-term and long-term results can be compared by their efficiency in the execution to achieve the end results. The value of the project can be justified by means of customer satisfaction, which aligns the project output with the organization's overall business strategy, which in turn gives a return on investment (ROI).
- A modern competitive market demands faster execution and desired results of the project in order to sustain in the competition. Hence, the inclination towards employing a Project management framework to their organizational strategy gives them an advantage over the others. Project management can reduce the life cycle of the project or product and, in turn, gives faster results.
- Reduction in execution time increases faster product delivery rate to the customer.
- The project management provides better flexibility to imply effective strategies for every project, which are suitable for all kinds of businesses.
- Emergence of global markets": the more significant the market, the more customers, but also the more competition.
- An economic period marked by low inflation": Low inflation decreases companies' possibility to keep up profitability and to pass on cost increases. Therefore, cost efficiency becomes more essential, and failure of projects causes more damage.
- Creating complex projects feasible.
- Project results are achieved by means of quality assurance
- Promoting teamwork for the acceptable project result
- shorter project durations and high accuracy in project planning
- cost savings by means of preventing access penalties and interest payments
- transparency in project reporting and documentation.

1.2 Project success factors

In the following chapter, different approaches and findings of the factors that lead the project to its desired success are discussed.

The ever more frequent use of projects in all fields has increased the importance of efficient and effective project management. Considering the direct relationship between achieving project objectives and the sustainable development of an organization, aspects related to project success are topics of significant interest in project management literature. Project success has been defined as achieving the goals outlined and complying with a predetermined time, cost, and scope (PMI, 2013).

In the practices of project management, the reality sometimes seems even more complicated (Mir and Pinnington, 2014). Moreover, several researchers argue that success criteria should now be linked to the sustainability constraints, expanding these parameters to include social and environmental impact and time, economy, and quality. Furthermore, defining project success is not often easy because the literature suggests that stakeholders have different perceptions of which factors contribute to project success.

1.2.1 Project Management Success factors

Cooke-Davies, 2002 in their research analyzed 136 projects executed between 1994 and 2000 by a total of 23 organizations. These projects having a budget ranged up to $300 million and approximate ten years of duration. The research suggests there was a correlation between the schedule delay and cost escalation when there was a significant delay in the schedule with overall cost increase when compared with the different projects. (Cooke-Davies, 2002)

The noticeable result by the analysis was that when schedule delay and cost increase was compared for individual projects, there was an estimated strong relationship between the two, but only a small amount of the cost increase was reported for by schedule delay. This is exemplified in Fig. 2, where each point on the chart shows one of the projects and its accomplishment versus schedule (on the x-axis) and cost (on the y axis).
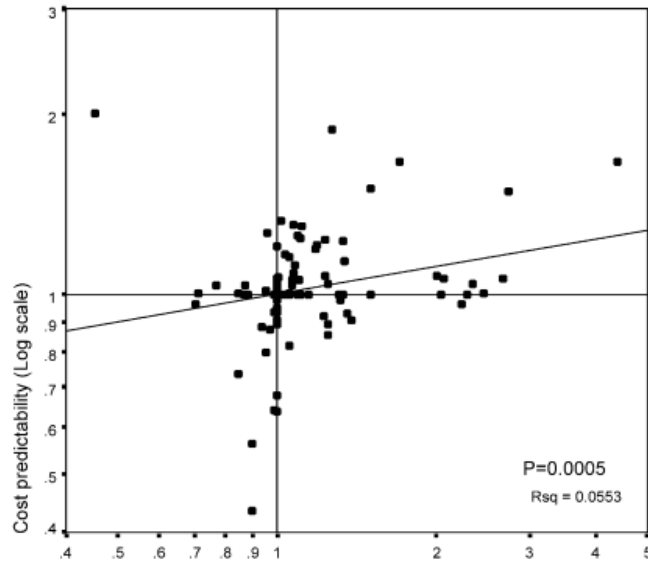
Fig. 2: Relationship between cost predictability and time predictability (Cooke-Davies, 2002).

Cooke-Davies, 2002 made an observation from the study that the mean performance against increased budget (4% cost increase) is considered better in comparison to the mean performance against schedule increase (16% delay). The methods are significant when the project management practices and project management processes are correlated with the overall performance.

Cooke-Davies 2002, derived the following success factors for project management success:

F1: Project risk management awareness

F2: Maturity in the organization's processes for risk ownership.

F3: Maintaining Project risk register.

F4: Up-to-date risk management plan.

F5: Project documentation as an organizational responsibility.

F6: Shortening the project duration.

On the other side, those that compare to schedule implementation are:

F7: Allow changes to a scope only through a mature scope change control process.

F8: Maintaining the performance measurement baseline.

Cook-Davies argues that there is a significant measurable improvement in project success against the specific criterion in each of these cases. (Cooke-Davies, 2002)

1.2.2 Leading to a Successful Project

Cooke-Davies focused on two aspects of the project initiators and the desired benefits of the projects, for which they analyzed six project management bodies of knowledge with 60 core components that are common for all the project managers. These components are further grouped into eleven topics that are further broken down for the reviews in order to determine the success of the project.

1: Operation management provides vital support to the project managers and project teams to achieve desired Benefits of the projects, as shown in Fig. 3.

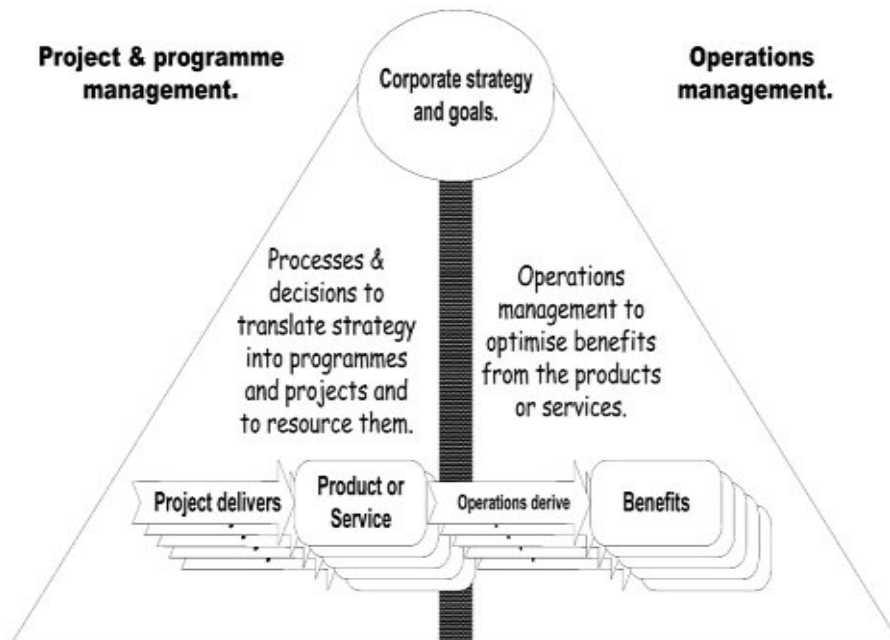Therefore, close co-operation between the two sides is necessary.

Fig. 3: The significance of project management and operations management working jointly to deliver valuable change from projects (Cooke-Davies, 2002).

2: There is a difference between project management success and project success because of their control methodologies.

The below described ninth project success factor is critical in addition to the above eight success factor:

F9: The Project management and core management function in mutual co-operation to achieve both benefits and management processes (Cooke-Davies, 2002).

1.2.3 Consistent Project Success

Consistent project success is the result of combining both project management success and project success to organizational success by means of imposing a new set of processes and practices. The corporate strategies and decisions are included in the project management practices as shown in the following Fig. 4.
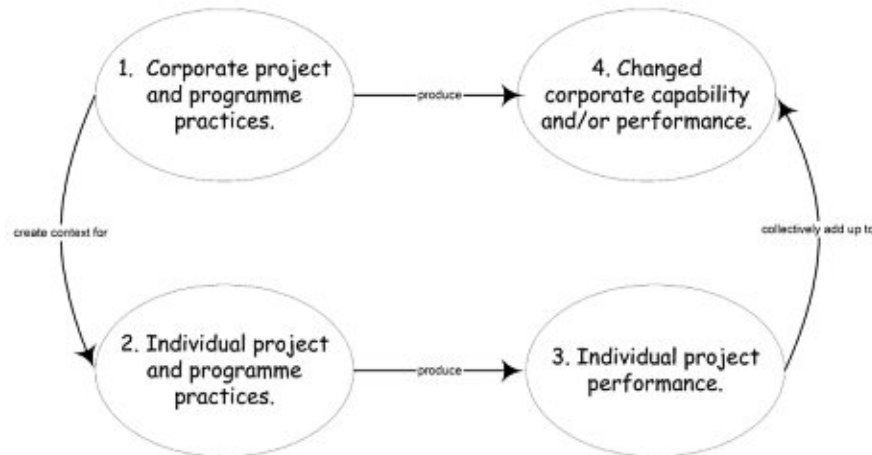

Fig. 4: The corporate context for project success (Cooke-Davies, 2002).

The following success factors are critical for large organizations to achieve consistent project success:

F10: Portfolio- and program management methods that permit the organization to source fully a suite of projects that are thoroughly and energetically matched to the corporate strategy and business intentions.

F11: A strong collaboration of project, program, and portfolio environment in an organization that supports the current project accomplishment and expected future success, so that project, portfolio, and corporate outcomes can be associated with the organization's business strategies. Since corporations are gradually identifying the need for "upstream" measures of "downstream" financial achievement through the implementation of reporting alongside such strategies as the "balanced scorecard," it is crucial for a similar set of metrics to be established for project performance in those areas where a verified link exists amongst project success and corporate success.

F12: An efficient method of "learning from experience" on projects that merges explicit understanding with tacit expertise in a way that encourages people to learn and to implant that learning into continuous improvement of project management processes and practices.''

These 12 factors are Cooke-Davies' answer to the question of which factors are critical to project success. (Cooke-Davies, 2002).

1.3 Project Management in Small & Medium Enterprises (SMEs)

This chapter focuses on the important aspects of project management for SMEs, where most of the SME functional managers still consider project management as using a Gantt Chart and displaying the time and sequence of tasks. However, project management practices in SMEs can produce better results than expected.

Most of the research on the market tends to make project management look complicated and overwhelming to most managers of SMEs. It may include a substantial number of different knowledge areas, processes, methods, tools & techniques. All the large organizations are comprised of full-time professional Project managers and full-time working project teams. However, this research and study shall illustrate the importance of the business case, ROI, and alignment with the company strategy. The tailored project tactics suit SMEs to achieve success in their projects.

1.3.1 SMEs Attributes

The classification of an SME has continuously varied over time, and there has always been a lack of coherence about what defines a Small or medium enterprise (McAdam, Reid, et al. 2005). According to the classification in literature, an SME must consist of fewer than 250 employees, a turnover of at least € 250 million or less, and an annual balance sheet not more than €45 million. The above definition dictates the potential relationships that exist between SMEs and the other enterprises defining three different categories of SMEs – autonomous, partner, and linked.

Most SMEs tend to be autonomous the meaning that they are entirely independent and have only minor partnerships. SMEs demonstrate both advantages and disadvantages when compared with larger organizations or MNCs. (Audretsch, Prince et al. 1998) Represented the difference between the smaller and larger firms, that the smaller firms have a significant amount of flexibility and proximity to the customer and an advantage for customization and modernization. SMEs pursue the markets where their advantages have value, and they are not in direct competition with their potential complements. However, despite their benefits, SMEs have limitations in terms of the economics of scale, scope, and learning.

Research on the skills of project managers in small and medium enterprises (Ledwith 2004) showed that project managers in small enterprises were weak in the areas of motivation, marketing, and management. Small enterprises demonstrated limited or no use of project management techniques and were not benefiting from project management in terms of increased new product success. However, by improving project planning, establishing clear project management philosophy can enhance the performance of small enterprises and can develop their project management potential for internal growth.

1.3.2 Project Management for SMEs

Project Success:

Project management has been concerned with project success, and a considerable amount of research has been concluded on that matter. There is an increasing number of books, papers, and articles written specifically about project management for SME for project success. Project Success is determined when the project achieves the technical performance specifications and mission to be performed and if there is a high level of satisfaction regarding the project deliveries among the key members of the project team and the key users or clients of the project effort. It is crucial to carry out a comprehensive stakeholder analysis to identify key stakeholders and find out their project expectations.

Project leadership:

Project leadership plays a vital part in project success. Laufer and Hoffmann (2000) indicated that management could produce a degree of predictability, focuses on the system, relays on control, organizes staff, accepts the status quo, and motivate people to comply with organizational standards. Leadership generates changes, focuses on people, relies on trust, aligns people with direction, challenges the status quo, and inspires people to change. There is a good impact of leadership on the projects; it requires dedication and time commitment to drive the project to success.

Success Factors:

Pinto and Rouhiainen (2001) illustrated below success factors with the universalistic approach and considered similar kinds of projects. It is impossible for SMEs to view all the implications of all the research while considering success factors; instead, they have certain limitations for assessing a given set of success factors. The table reveals

the factors to be addressed during the planning phase and also essential to be monitored throughout the project life cycle.

Table. 1: Success factors for SMEs (PMI.org/learning/library/)

1 Project mission	Clearly defined goals and general directions
2 Top management support	Willingness of top management to provide the necessary resources and authority/power for implementation
3 Schedule/plans	Detailed specifications of individual action steps for system implementation
4 Client consultation	Communication, consultation and active listening to all parties
5 Personnel	Recruitment, selection and training of the necessary personnel for implementation
6 Technical tasks	Availability of technology and expertise to accomplish specific technical steps
7 Client Acceptance	Selling the final product to its ultimate intended user
8 Monitoring and feedback	Timely provision of comprehensive control information at each stage
9 Communication	Provision of an appropriate network and necessary date to all key stakeholders
10 Trouble Shooting	Ability to handle unexpected crisis and deviate from plan.
Adapted from Critical Success Factors-A 10-Factor Model, by Pinto and Rouhiainen (2001).	

Business Case:

Most of the SMEs are relatively small, and project failure is likely to mean financial disaster or even the end of the company's existence. Projects that are financially risky or not in line with company strategy should never be attempted without compelling justification. If the project is to have management support, it has to justify in terms of financial return or strategic advantage for the company. Smaller companies should have a serious look at their ability to undertake the proposed project. A company should identify enough resources, money, skill sets, and system know-how and time to conclude the project to success.

2. Project Management Office (PMO) in an Organization

PMO is a widely applied phenomenon in practice without any underlying fundamental theories. The protagonists of PMOs are typically experts and consultants. Hobbs and Aubry launched a multi-phase research book subsidized by PMI, aiming to provide a better insight into PMOs and the changing aspects bordering them in their directorial context and develop theory. Aubry, Hobbs, and Thuillier 2008 suggest a historical methodology for identifying PMO: "The analysis of the organizational activities that are behind the variability of PMOs gives a better tactic than aiming to find what is incorrect with the current PMO and the pursuit for an ideal design." Hobbs, Aubry, and Thuillier 2008 pressure the significance of the organizational framework as PMO is entrenched into the present organization and both co-develop.

Studies show that PMOs are often transitory organizations and are either dispersed or subject to radical conversions after quite a few years (Hobbs, Aubry, and Thuillier, 2008). Nevertheless, /Hurt and Thomas 2009), in their exploration program, differ that this is a pessimistic issue and form an unconventional view that PMO still can create and support value for organizations. Pellegrinelli and Garagna 2009, verify that PMOs are "agents and subjects of change and renewal rather than stable, enduring entities" and present the idea of creative obliteration of substitute one form by another and creation of new importance.

2.1 Purpose of PMO and its Organizational Benefits

More Than A Few literature sources discuss the intentions and motives behind the formation of PMO.

Dai and Wells (2004) name the following motives for setting up a PMO: enhancing all components of project management and realizing a common project management approach (through standards and methods); more effective use of humanoid and other resources in several project environments; and refining quality and customer fulfillment.

The most obvious reasons for the establishment of PMO corresponding to Dinsmore and Cooke-Davies (2006) are to stereotype project management methodology, enhance information flow, and manage control systems over the projects run simultaneously. Andersen, Henriksen, and Aarseth (2007) refer to considerable variations in how projects are run, lack of skilled project managers, difficulties with

overrunning timing & cost in projects, and lack of complete methods concerning a project portfolio management as sparking elements of PMO realization.

Noticeably, Dai and Wells (2004) found reliable testimony that project management specifications and approaches related to project execution. Milosevic and Patanakul (2005) also found that regulated project management (especially tools, methods, and power) may lead to project success. Thus, allocating project management regulation responsibility to PMO may lead to the goal of project management progress.

Hobbs, Aubry, and Thuillier (2008) recognized initial drivers of execution and reestablishment of PMOs to be organizational pressures: economic (related to project performance and PMO cost), political (problems of influence and controller over projects), client relationship, standardization of project management method against flexibility, rising or dropping organizational capability to achieve tasks. Additionally, the authors spotted a substantial extent of mimicry as a primary drive while establishing PMO.

Furthermore, the research for a reason leading to realization or reconfiguration of PMOs by Aubry et al. (2010) resulted in the expansion of typology of drivers of PMO variation: drivers from the peripheral framework (such as industrial/market aspects) and drivers from organizational framework linked to project management methods (such as standardization and control problems), human resources (such as project management skills growth), organizational framework (e.g., customer, stakeholder affairs, and change in approach), project execution, and internal organizational measures (company restructuring, top management transformation, or new PMO Officer).

In a nutshell, various causes lead to the formation and revolution of the PMOs, but the general objective of PMO stays consistent: it is enhancing the excellence of project management.

2.2 PMO Implementation

MORRIS & JAMIESON (2004) said that the implementation of PMO is a growing trend in global organizations. PMO has the primary importance in the following.

- Highest level of strategic planning support of management in organizations, program & portfolio management with planning, reporting & controlling.

- Methodology, reports, templates & forms, tools & techniques development.
- Implementation of best practices, techniques & software related to Project management, guidance, guidelines & support standards.

The PMO methodology is efficiently used in developing formal procedures, database, data collection, analysis, information collection & distribution, the risk management guidance, procurement, quality, and other knowledge are in project management with documentation and communication discussed in VALLE (1997)

PMBOK guide (2017) of PMI considers the PMO (Project Management Office) – a pioneering concept for the successful execution of the best practices of Project management in the formation and advancement of standards and procedures for project management in organizations as well as evolving corporate governance practices and financial outcomes for effective unified planning and control of projects, the crucial parameters of success for advancing the management processes.

The relevant factors for the implementation of PMO are classified into the four categories mentioned below:

1. Organizational Factors

- PM maturity in the organization:

    The maturity model of PRADO (2006) concludes that Project management maturity has a significant role in the management culture. It defines the standardization of data collection, processing, systematic decision making, and representing the standardized reports.

- Top-down commitment:

    The top-down commitment is the essential support to the senior management for the successful implementation of the PMO, says DINSMORE (2003). CRAWFORD (2002) showed that the performance be contingent solely on the incentive and award, providing adequate means of resources for skill enhancement & training. The execution of the PMO is part of the culture of project management, and it comes from the top management by itself.

- Power of PMO:

    LETAVEC (2006, p 241) states that the successful implementation of PMO relies on the power given to the PMO, the activities of PMO defines how the

optimization of the organizations' resources, making decisions that influence the organization when project managers surpass functional managers who are the ultimate leaders of the pools of resources in order to enhance skills and lend them to the project where PMO holds the power of acquisitions, procurement, contingencies, tools & techniques.

- Competences of the PMO members:

RAD & LEVIN (2003) defined that the organizational and individual Competencies are crucial in the implementation of the PMO concerning to the results and the ability to apply the knowledge to achieve goals. The members of PMO should possess different identified skills. Customer feedback, measurement and documentation, and recognition of the results of the PMO are part of the competence of the PMO members.

2. Structural factors and the organizational structure

- Position of the PMO in the organization:

KENDALL & ROLLINS (2003, p 35) mention the importance of the positioning of the PMO in the hierarchy and in organization charts. PMO at the appropriate higher level together with the senior executives supports the decision-making process. At the higher level in the organization chart, it is linked to the flow of information, data collection & accountability.

- Size of PMO:

LETAVEC (2006, p 212) mentions the size of PMO depends on its position in the organization's chars. Their functions, positioning, and sizing are considered while implementing the PMO. The size is defined to fulfill the purpose, the scope, and the results, and the functions to be performed.

- Structures of the organization by projects:

CRAWFORD (2006, page 257) indicated that the PMO is linked to the adequate perceptions of the projects of the organizations. The PMO gives the foundation to the projects and its structure to provide best practices in the Project management environment as well as project controls and integrated systems.

- Structures Information systems:

DINSMORE (2004, p 49) dictates that the excellent communication between the professionals of project, the decision made by the senior management, sharing of the information among the members of project teams in a particular project or across multiple projects, a department or a business unit are performed by Information systems employed in the organization.

3. Strategic Factors and the knowledge management

- PMO in strategic planning:

KENDALL & ROLLINS (2004) define that the PMO, with its strategic approach, minimizes the conflicts for resources; it manages the programs and portfolios,

which are the sets of projects in the organizations. The organization, with its clear business vision, may align PMO to the strategic planning in order to transform the benefits of the projects.

- PMO in Knowledge management:

CROWFORD (2006, p 179) relates PMO to project management and Knowledge management because PMO consolidates the knowledge at the closure of projects, particularly the capture and analysis of lessons learned. PMO serves the purpose of a knowledge database for the project managers and team members in order to manage programs and portfolios. It gives visibility into project resources in the organizations. PMO standardized the process for the whole Project environment in the organization.

- Internal & External Benchmarking:

BOLLES (2002, p 96) states the internal and external benchmarking as the standard ''best practices'' and the world-class references for the organizations in order to lead to higher performance.

- Performance Metrics:

BOLLES (2002) indicated that the PMO measures project performance in order to determine the ability of the project teams and organization to complete projects on schedule and within cost limits. PMO's goal is to achieve the project objectives successfully together with the methodological guidelines of Project management with system performance metrics.

4. Personal factors, the human factors

- Implementation of PMO as a Project:

KENDALL (2003, p 33) emphasizes the importance of the value propositions of the project to implement the PMO. PMO helps to achieve corporate goals that are aligned with project objectives, and They show the project results to stakeholders and senior management.

- Time Factor for implementation:

LETAVEC (2002, p 41) emphasizes the importance of the timing in implementing PMO; It is essential for PMO to dedicate adequate means of timing for implementation.

- Recognition and reward:

According to RAD & LEVIN (2003, p 150), the recognition and award system encourages project team members to meet and exceed specifications and shared goals of the projects.

- Internal Integration of People:

CRAWFORD (2002, p 80) analyzes the importance of integration of people concerned in the implementation of the PMO together with the people involved in the projects of the organizations. The success of the PMO relies on the

17

degree of integration across the PMO because, in a particular project, a significant part of the organization is usually involved. The PMO has strong relationships with the sponsors and stakeholders at various levels, including the requirement collected for the analysis and distribution of the result.

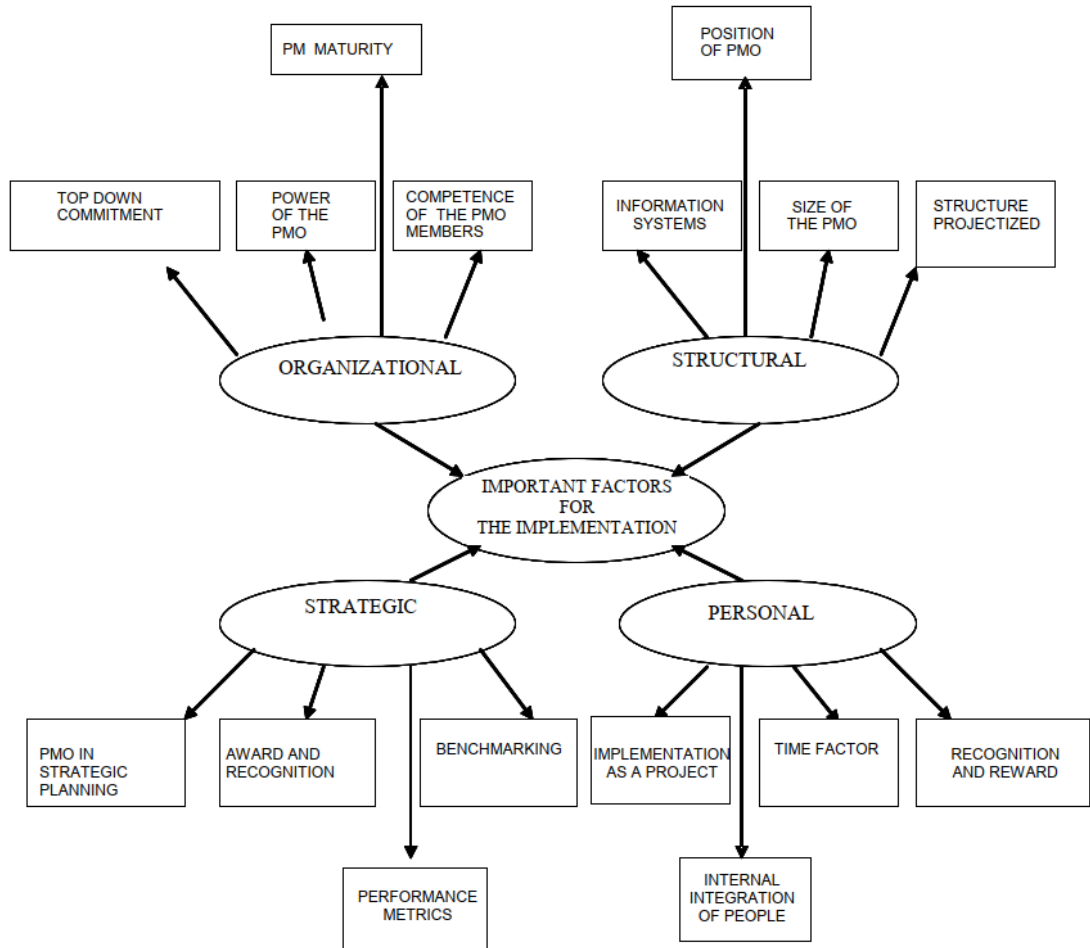As shown in Fig. 5, the model for the implementation of PMO in organizations with the critical success factors.

Fig. 5: PMO implementation factors (ICEC IX World Congress, Federal University Fluminense – Rio de Janeiro -Brazil))

2.3   PMO Life Cycle

PMOs within an organization develop in terms of responsibilities, size, members within, organizational location, and the level of authority. In order to demonstrate the PMO evolution, (Hill, 2008) referenced the five-stage competency model of PMO as mentioned below.

1.   Project Oversight
2.   Process Control
3.   Process Support
4.   Business Maturity
5.   Strategic Alignment

The five-stage of PMO shown in Fig. 6 represents an advanced competency and advancement of the functionality that can be achieved in order to fulfill the needs of the project management environment and the strategic business objective of the particular organizations. The higher stage PMO is matured enough in terms of achieving competencies from the lower PMO stages.

PROJECT OVERSIGHT	PROCESS CONTROL	PROCESS SUPPORT	BUSINESS MATURITY	STRATEGIC ALIGNMENT
Stage 1 PROJECT OFFICE Achieve project deliverables and objectives for cost, schedule and resource utilization ■ 1 or more Projects ■ 1 Project Manager	**Stage 2 BASIC PMO** Provide a standard and repeatable PM methodology for use across all projects ■ Multiple Projects ■ Multiple PMs ■ Program Manager ■ Part Time PMO Support Staff	**Stage 3 STANDARD PMO** Establish capability and infrastructure to support and govern a cohesive project environment ■ Multiple Projects ■ Multiple PMs ■ Program Managers ■ Director/Senior Program Manager ■ Full Time and Part Time PMO Staff	**Stage 4 ADVANCED PMO** Apply an integrated and comprehensive project management capability to achieve business objectives ■ MultipleProjects ■ MultiplePMs ■ Program Managers ■ PMO Director ■ Dedicated PMO Technical and Support Staff	**Stage 5 CENTER OF EXCELLENCE** Manage continuous improvement and cross-department collaboration to achieve strategic business goals ■ Multiple Programs ■ Vice President or Director of Project Management ■ Dedicated PMO Technical Staff ■ Enterprise-wide Support Staff

Fig. 6:   Five-stage PMO Competency continuum model (Gerard M. Hill. -- 2nd.   Project management—Handbooks)

However, in a recent descriptive study of ESI International (2011), it was stated that currently, most PMOs are not functioning at the Strategic level. A few of the initial stages of PMO maturity are:

Stage 1: Collect and represent project status.
Stage 2: Develop & implement standards, methodologies, and procedures.
Stage 3: Allocate, manage and control the resources.
Stage 4: Manage the interdependencies between the projects & programs.
Stage 5: Analyze and report on project ROI and benefits.
Stage 6: Manage portfolio objectives to the strategies.

2.4   PMO Responsibility

PMO being an organizational entity mainly responsible for centralizing and coordinating the management of projects or programs or both together. PMO aims the coordinated & directed planning, prioritization, and execution of projects, subprojects. Those are the parts of the organization's overall business strategies. PMO is accountable ensures to allocate the right personnel to the project in order to end the project successfully.

PMO is authorized to make the decision during the project initiation phase together with the senior management and possesses the power to authorize the project

proposal officially or can decline the project proposal aligning to the organizational business strategy.

Some of the critical functions of a typical PMO may look like, but are not limited to:

Group 1: Monitoring and Controlling Project Performance:
1. Develop and maintain a project scoreboard.
2. Implement and operate a project information system.
3. Monitoring and control of project performance
4. Report project status to upper management

Group 2: Developing the Project Management Competencies and Methodologies:

1. Providing a set of required tools
2. Mentoring the Project Managers
3. Developing competency through training
4. Promoting project management within the organization
5. Develop and implement the standard methodology.

Group 3: Multi-Project Management:

1. Identify, select and prioritize new opportunities.
2. Manage one or more programs and portfolios.
3. Allocate resources between projects.
4. Coordinate between projects.

Group 4: Strategic Management:

1. Network and provide environmental scanning.
2. Benefits management
3. Participate & implement strategic planning.
4. Provide advice to senior management.

Group 6: Organizational Learning:

1. Implement and manage a risk database.
2. Execute and control a database of lessons learned.
3. Conduct project audits.
4. Conduct project reviews.
5. Manage archives of project documentation.
6. Monitor and control PMO performance.

2.5   PMO Values

Effective PMO can bring value to an organization by addressing specific problems of project management; once those problems are approached and resolved, the meaningful value by changing their goals, objectives, structures, and processes. Below are the ten areas where PMOs contribution can be noted the most:

- Consistency: of the best practices, terminology, and procedures.

- Visibility: the general overview of the status and progress of the portfolio
- Transparency: Unbiased audits, recommendations & facts
- Quality: Match the acceptance criteria and fit for the purpose
- Assurance: Decision making, assumptions, estimations
- Predictability: Long-term planning of cost, resources & time
- Accountability: Clear definition of roles & responsibility.
- Alignment and focus: Priority and initiative towards organization strategy
- Organizational Learning: Collect a knowledge database on what to replicate and what to avoid in the future.
- Resilience: Exploring dependencies, risks & opportunities.

Depending upon the positioning of the PMO, it can act as a bridge between strategical planning and execution, as shown in Fig.7. PMO does not even support the implementation of the strategy through the delivery of projects and programs, but they also shape the strategy by actively engaging in strategic planning.

Value Creation Process:
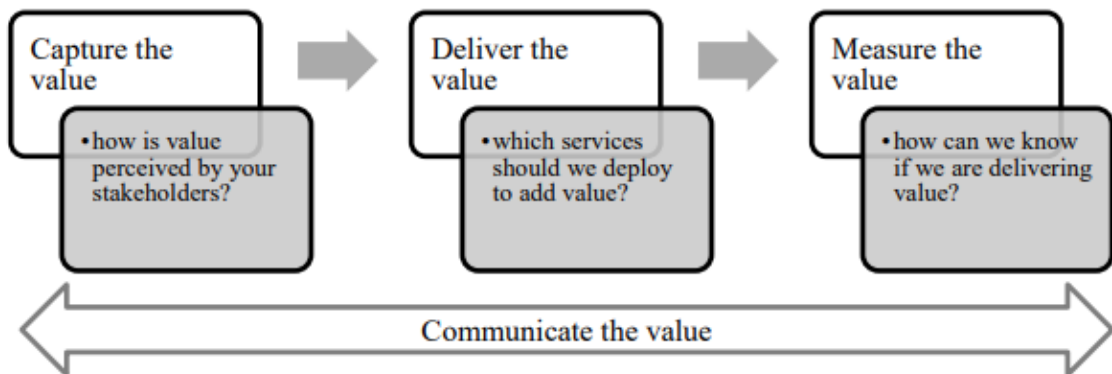
Fig. 7: The PMO Value creation process (PM World Journal, Vol. IV Issue IX – September 2015)

- **Capturing Value:**

It is essential for the PMO to understand the expectations of their critical stakeholders towards PMO, the views of the stakeholder, what really matters to keep the stakeholders happy and actively involved in the project. The PMO needs to actively engage with their customers, create shared ownership to understand their perspectives towards the project.

- **Delivering Value:**

All PMOs have their own limitations, and very few deliver all the values as desired at once. Thus, PMO grows with the phased and incremental approach aligning the

project management maturity in the organization, as shown in Fig. 8. Even when the PMO is on the desired maturity level, most PMOs put continuous value addition specifically by changing and reinventing themselves aligning to the organizational strategy.
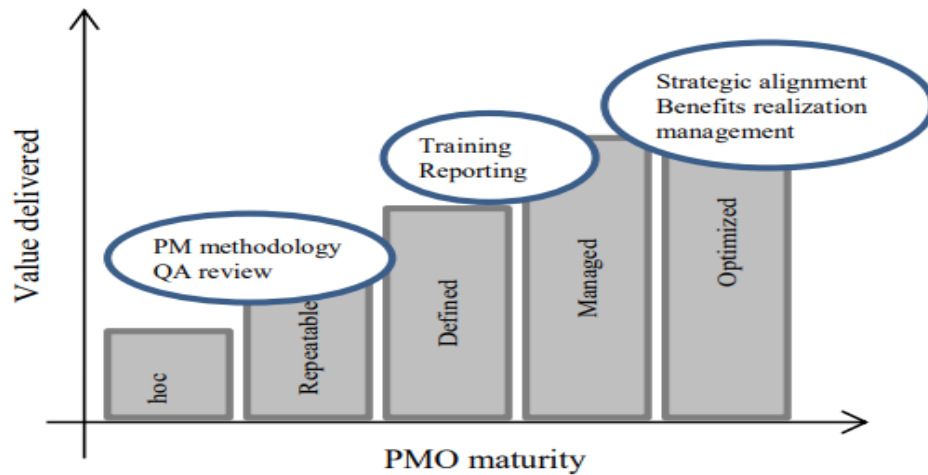
Fig. 8: PMO value Continuum: (PM World Journal, Vol. IV Issue IX – September 2015)

- **Measuring Value:**

The value addition made by the PMO is measured by the critical metrics referred to as Key Performance Indicators (KPI). It gives an indication of how successfully an individual team or department, or organization is operating. There are a few critical KPIs that every PMO measures within their responsibility, as mentioned in the below table.

Table. 2: PMO influence on KPIs (PM World Journal, Vol. IV Issue IX – September 2015)

Business Drivers	Examples of KPIs
Value to business and Portfolio Management	▪ Planned ROI vs actual ROI ▪ Planned benefits vs actual benefits ▪ % of projects aligned with strategic objectives ▪ % of projects stopped or cancelled ▪ $ at risk
Productivity and Efficiency	▪ % of resource utilization ▪ % of billable hours ▪ # of FTEs by project ▪ # of projects by project manager
Project Delivery	▪ % of projects on time ▪ % of projects on budget ▪ # of high risks active by month ▪ # of issues escalated by month ▪ # of change requests by project
PMO Performance	▪ Satisfaction score from key stakeholders regarding PMO services ▪ % of projects following the PMO methodology ▪ % of audited projects ▪ # of hours of training provided

Communicating Value:

Communicating the value is as important as defining the matter to the PMO to their relevant stakeholders. PMOs obtain and continuously show their value in order to build reliability, trust, and accountability by reporting periodically about the progress of KPIs of the project performance, also on the effectiveness of the PMO itself by establishing regular discussions with the Sponsor. (Silva and Bouter, 2015)

2.6 Challenges for PMO

In a report of a Practitioner-oriented publication, it is suggested that the failure rate of PMO implementation is beyond imagination. According to a survey of 750 companies, 75% of the organizations who establish a PMO shuts it down within three years because of the inability of demonstrating and added value. Additionally, Hobbs & Aubry (2007) reported that almost 50% of the PMOs were proved to be costly as compared to their contribution to the project and program performance. In the majority of the cases, PMOs are unstable structures for the organizations to be implemented.

Factors such as clear mission, an agreed-upon structure, and scope of governance rely on the success of a PMO implementation. Kendall & Rollins (2003) suggested seven factors that lead to the failure of a PMO.

1. Undefined PMO value proposition.
2. PMO's decision impact on Project delivery.
3. PMO, too authoritative
4. PMO at the lower organizational level
5. No senior functional managers involvement.
6. PMO overheads
7. PMO's Micromanagement of Projects.

Additionally, the main challenges while operating and managing the PMO are related to the lack of a defined project management methodology, project resources untracked, not being capable of making project's crucial decisions, conflicts between functional managers, and departmental specific priorities.

3.   Project Management Frameworks in Large organizations

3.1   Waterfall Project Management Framework

The waterfall methodology is the sequential or linear approach to software development. The whole project is broken down into a logical and sequence of tasks with the highest possible level of a grouping called *phases.* The phases are completed in sequence and contain formal exit criteria.

3.1.1 What is Waterfall Model?

The waterfall model is the classical model developed and prioritized in the system development life cycle process to establish a system with a linear and sequential approach. The model itself develops systematically from a phase to another phase in a downward pattern. It is distributed into multiple stages, and the output of the stage is used as the input to the next immediate phase and so on. As shown in Fig. 9, the phases are executed in sequence and are dependent on each other, and this means it is not possible to overlap the phases.
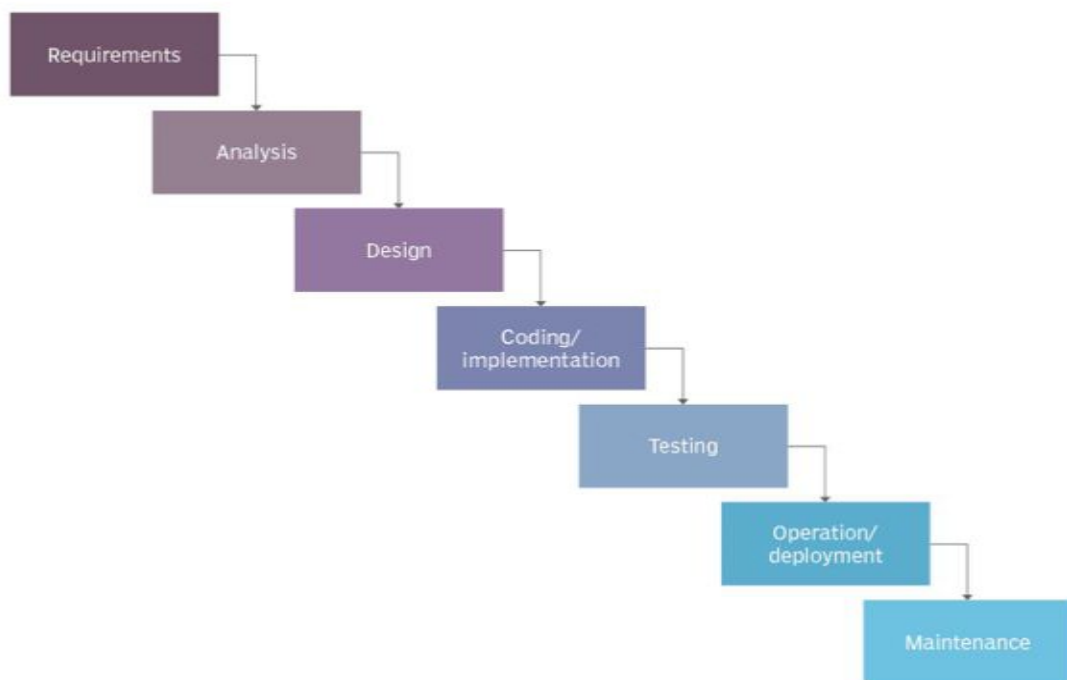
Fig. 9: The Waterfall Model (waterfall-model)

The sequential phases in the waterfall model functions as the following:

1. Requirement gathering: All the possible requirements are collected and recorded from the key stakeholders in the product/project requirement document. During this phase, input material to the product being made is marked, studied, and finalized. Final hardware and software requirements of the product are captured.

2. Analysis: The requirements are assessed and prioritized based on that schemes, models, and business objectives are derived. The investigation is divided into two parts, namely:

- Requirement gathering & analysis: All the requirements and the information of the product are gathered from the stakeholders for analysis. During this process, all the errors and incompleteness, and inconsistencies faced during the requirement gathering related to the product development are eliminated.

- Specifications: Analyzed requirements are documented in the product specification document. It is then the standard reference for the product between the development team and the stakeholders. Any changes to the specifications are further analyzed and updated in a timely manner.

3. System design: After a thorough analysis, designing of the architecture is defined. The requirement specifications are studied and verified in detail during this phase. The final outcome of this phase is the overall architecture of the product, which remains constant until changed and approved.

4. Implementation: System implementation follows the designed architecture of the system in the small and manageable units with functional testing. Once the system design is fully verified, the implementation phase is carried out. The Smaller and manageable units of the product designs are developed during this phase. Each unit during this phase undergoes development and functionality testing. Each tested unit is then called functional modules.

5. Integration and testing: Each developed module is tested in this phase of the development. During the testing and implementation, any flows or errors in the design were checked. The testing phase is executed in order to obtain the stability and feasibility of the product design. Depending upon the product, there are mainly three different types of testing activities carried out during this phase:

- Alpha Testing: This part of the testing is carried out by the internal development team of the product development organization.
- Beta Testing: This part of the testing is carried out together between the internal development team, client's team, and authorized third-party verification and testing team.
- Acceptance Testing: Once the above testing phases are successfully completed, the final acceptance testing is carried out by the customer. The design over the product is made; it is either accepted or rejected. Any errors are reported, and the effect goes under the re-development phase again.
6. Deployment of the system: The system goes under the production environment after all the functional and non-functional testing is completed.

7. Maintenance: Once the product goes under deployment by the customer, any approved modifications to the product, any changes to the attributes related to the product performance issues to the systems are corrected. Problems and faults in the system post-release are fixed, and the new version of the system is released as required. The customer provides timely and scheduled maintenance and support for the product.
There are three basic types of maintenance during this phase.

- Corrective Maintenance: The errors in the design and development phases encountered during the initial development phases are corrected during this phase.

- Perfective Maintenance: For any performance and functionalities, enhancement types of maintenance are carried out based on the customer request during this phase.

- Adaptive Maintenance: Any update or upgrade in the overall system in order to enhance the system performance is carried out during this phase. This phase is critical to boosting the system performance.

3.1.2 Benefits of Waterfall Model:

The waterfall project management framework has the following vital benefits once used in an organization:

- Waterfall methodology is relatively simpler to implement and needs a minimum number of resources while implementing.

- At the end of each phase of this method, there is actual output, and hence it has high visibility of the project. It is easier to demonstrate overall project progress.

- It is easy to determine the starting and completion time of each phase, and hence it is easy to forecast the deadlines at both internal and external levels in order to show high visible outputs.

- Creating a template for products such as methods of analysis, design, testing, and maintenance is relatively simpler to define.

- The waterfall method is more preferred in projects where quality is the highest priority as compared to project schedule and cost.

3.1.3 Limitations of Waterfall Model:

The waterfall method has the following limitations once it is implemented within an organization:

- The Waterfall method may sometimes create confusion in real projects because some of the sequential flow and iterations are managed indirectly.

- Often it is difficult to gather the explicit customer requirement. Therefore, the precise specifications are difficult to freeze. In those scenarios, a baseline approach is generally followed, where the output of each phase is carried forward to the next consecutive phase.

- In long-term projects where technology changes rapidly, it is challenging to change the frozen software and hardware during the project.

- This method is solely dependent on the client; if they can't provide the absolute requirement, It is challenging to determine the product specifications.

- Each phase of this method is interdependent, and therefore any change in any of the stages can cause consequences to the original project plan.

- Once a particular phase is completed, it is complicated and expensive to return to that phase. (Waterfall Model | Different Phases with Advantages & Disadvantages, 2021)

3.2   Agile Project Management Framework:

3.2.1   What is the Agile Model?

Agile Project management methodology refers to the technique of handling every project differently and the existing methods to be tailored to best suit the project requirement. Within the Agile techniques, the tasks and activities are divided into smaller and more manageable time boxes in order to deliver specific features of a product in a release.

Every product is distributed to an Iterative approach, and the product is developed progressively at the end of each iteration. At the end of the final iteration, the final product with the required feature is being delivered to the customer.

The following Fig.10 illustrates the graphical model of the Iteration approach:
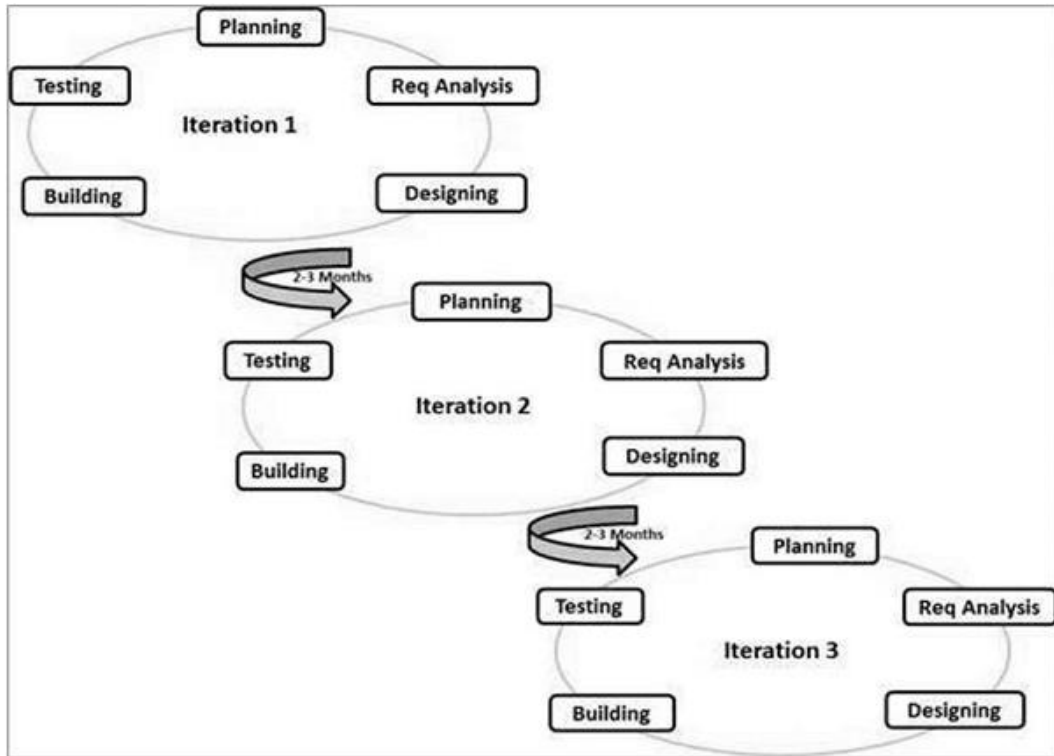
Fig. 10: Iteration approach (Agile Iteration Model)

The Agile methodology is based on the adaptive software development methods where there are no detailed planning and no clarity. There is only clarity on future tasks with respect to the desired features of the product to be developed. The working team adapts feature-driven development and frequently changing product requirements. The product is subject to go through frequent tests, the release iteration, and mitigating the risk of product failures in the future.

3.2.2   Benefits of Agile Model:

The agile methods are accepted and used in software development for the following benefits:

- The agile methods are most practical and realistic in software development.
- It promotes teamwork and cross-functional training.
- Product functionality is developed rapidly.
- Each iteration is developed with minimum resources.
- Agile methods are more suitable with changing requirements.
- Agile methods have minimum rules, and documentation can be easily adapted.

- It is straightforward to manage in the whole process and gives flexibility to development teams.

The Agile model is the most flexible and practical methodology to implement in the current modern industries of all kinds because of the above advantages.

3.2.3 Limitations of Agile Model:

The Agile methods have the following limitations that need more improvisation in the methodologies themselves.

- The agile model is more suitable for handling projects with more flexibilities.
- There are certain risks of maintainability, sustainability, and extensibility employing this method.
- An agile leader, scrum master, or Agile PM is always required in order to plan this methodology. Without them, it is impossible to accelerate the project.
- It depends heavily on customer/client interaction, and therefore if the customer is not clear about the requirement, the development team may be driven in the wrong direction.
- There is a very high amount of individual & personal dependency since there is minimum documentation generated.
- Because of lack of enough documentation during the project execution, it is very challenging to transfer the technological knowledge to the new team members. (SDLC - Agile Model -, 2021)

3.3 Hybrid Project Management Model:

The hybrid project management, as the name suggests, tries to combine the traditional Waterfall Project management methodologies and the Agile Project management methods in order to create a new project management methodology. Where, the Hybrid methods try to employ the Work breakdown structure (WBS) from the waterfall methods with the speed and lean advantages from the Agile methods for new Hybrid methods, which is considered to be more detailed and faster in execution. The Hybrid model is as easier to employ for a project as the other project management methods.

A hybrid project is typically managed by a project manager by using Work Breakdown Structure (WBS) methods and has the overall project responsibilities.

The scrum masters act as support for the project manager by executing the sprints for the particular activities.

The project manager ensures continuous team collaboration for ongoing reporting, analysis, and customer or management review.

Roles and responsibilities in the hybrid project model:

- The hybrid model is independent of the organizational management structure and hence really never requires a formal project management office (PMO) as the PMO adds another level of bureaucracy, delays, and costs to the projects.
- The project manager within the hybrid model is considered the business owner of the project and also acts as a product manager.
- The responsibilities of the different segments of the project are shared between the Project Manager and Scrum Masters throughout the project.
- The Project Manager is primarily concerned with all the front end of the project flow, such as product requirements, customer feedback, WBS, and resources.
- Scrum Masters are fully responsible for the backend of the project flow, such as backlogs, releases, and sprints.
- The Project Manager defines a team inclusive of the Scrum masters and the other team members.
- Each Scrum master then later defines their teams based on the requirement of the project and the time frame of the delivery.

The following schematic Fig.11 represents the hybrid project management flow in a project.
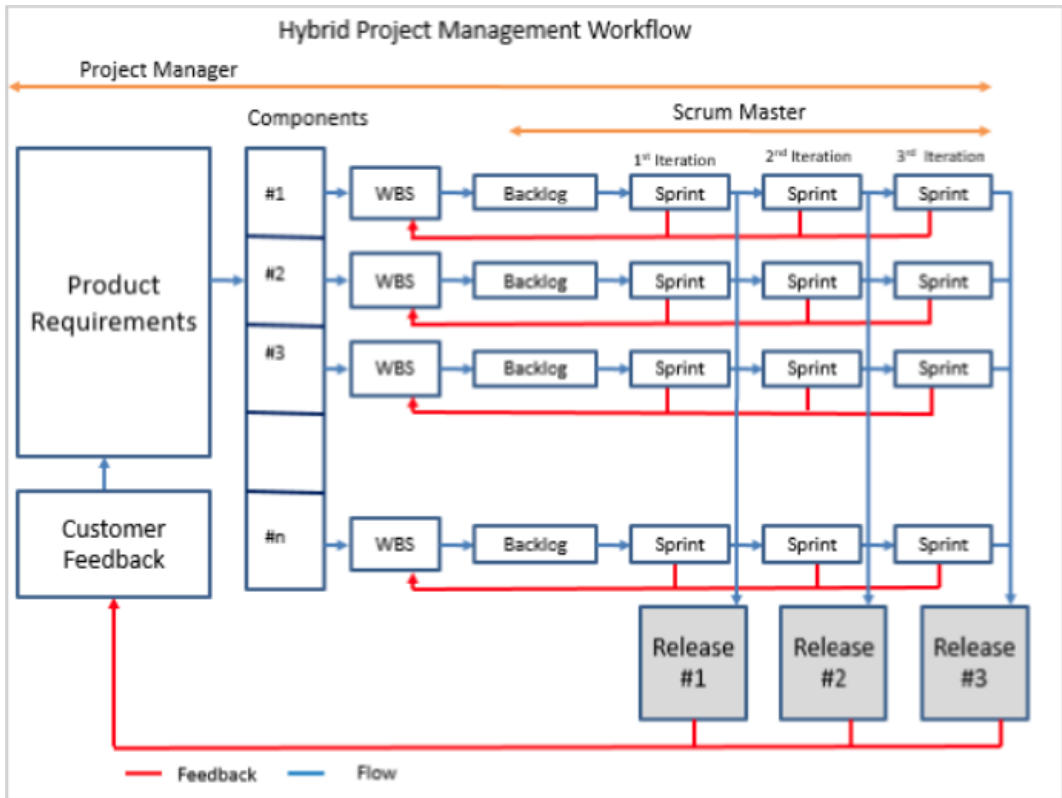
Fig. 11: Hybrid Project Management Flow Schematic (Hybrid Project Flow Schematic)

Definitions:

- Components: The individual building modules are driven from the product requirement description. The products such as mobile phones, which have electronics, display, WIFI, and other software components. At the same time, A Software product may have UI, Business logic, and communication components.

- Track: The overall product development and release of each component are planned through a specific development path. Some tracks can be shorter or longer based on the product.

- Backlogs: The Tasks for each component and the tasks for each sprint are derived from a list called Backlogs of the same track. Scrum masters and project managers add or modify the current backlog during the execution.

  Sprint: Typically, 4-8 weeks long product development, including development, testing, and deployment, is considered as a Sprint. Each track has its own sprints and backlogs. Many sprints from different tracks may run in parallel.

- Project Teams: Each project team consists of dedicated team members. Tasks within the team are assigned depending on the skills and requirements. There may or may not be any sharing of resources across the multiple projects. The team reports to the scrum masters for the day-to-day progress of the project. (Hybrid project management manifesto, 2021)

4   Global Project Business Excellence Model:

4.1   Organizational Strategy for Project Business:

The Global Project Business Excellence Model shown in the figure illustrates the shared responsibilities across the whole organization. The CEO at each headquarter of a P&L, or Business Unit that is involved in the Project business has the responsibility (28) to ensure an adequate project environment and to install critical roles. This will support him in implementing the organizational framework and establish the preconditions for achieving the defined corporate benefits.

CEO Principle:

Management responsibility is permanently assigned to single individuals who make decisions and have personal responsibility. The organizational Managing Board is the company's sole management body. Regulations regarding signature authorizations ensure the separation of duties.

The CEO principles apply to every management function within the organization, even those that are no designated as ''CEO''.

The Profit & losses (P&L) Units have end-to-end global responsibilities for their businesses, including their operating results (global P&L). The Regional Units are responsible for demand creation and market penetration within the strategic framework of their businesses. This includes explicit responsibility for local customer relationship management (CRM) and the optimization of the regional organization. As s result, they implement the business strategies of the P&L Units and the regulations for company functions in their geographical areas. As ''global entrepreneurs,'' the P&L Units, as well as their breakdown in business Units, have final decision-making authority in business-related matters.
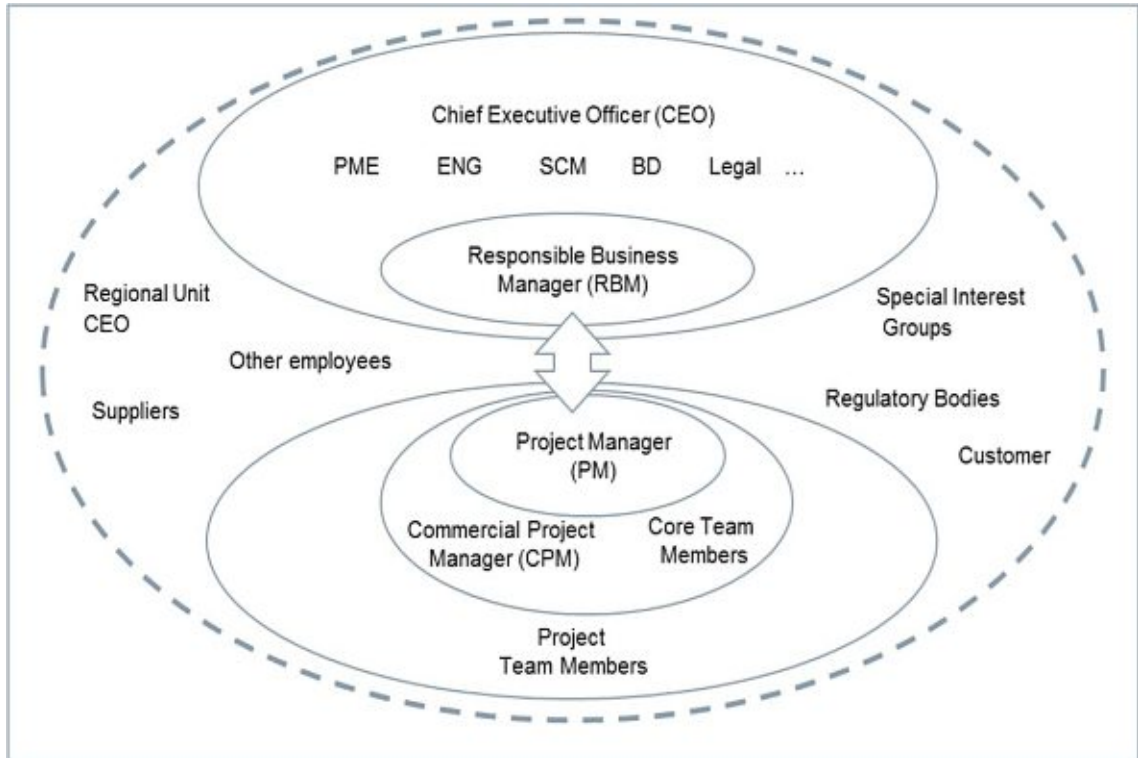
Fig. 12: Interaction between organizational and project environment (Company's Internal Project Structure)

As shown in Fig. 12, the Chief Executive Officer (CEO) needs to ensure that framework as described in this chapter is applied through Project Management Excellence (PME), Engineering (ENG), Supply Chain Management (SCM), and other essential support functions to enable the responsible Business Managers (RBM) to perform their roles described in the above figure.

Following are the roles of a Responsible Business Manager (RBM)

- The primary role of the RBM is to ensure the immediate interaction of the Organizational Unit with the project. He also fosters the implementation of the following activities by securing the fulfillment of the project business's strategic targets defined by the CEO.
- The RBM, together with the CEO in makes strategic and operational project portfolio decisions.
- Establishing a framework through which organizational standards for project management can be implemented and continuously evolved.
- Contributes significantly to the assurance of the in-time allocation of necessary competencies in individual projects.
- Forster's continuous improvements in projects and enables a learning culture.

34

- RBM has the responsibility to develop PMs throughout the project execution.
- Assures an effective and efficient collaboration and adherence to the principles of cross-organization and cross-border projects.

A clear understanding of the value proposition leads to a successful implementation of the business strategy for project business and early identification of the essential capabilities needed, as shown in Fig. 13.
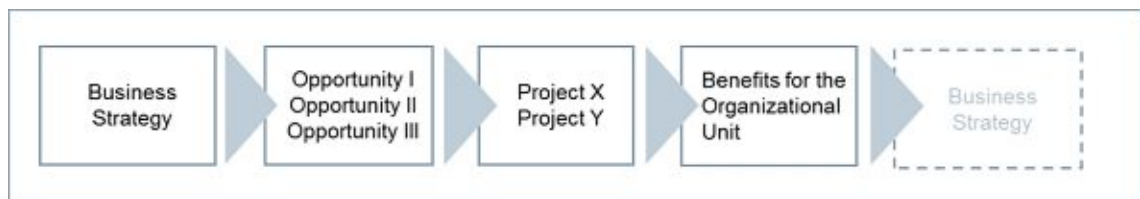
Fig. 13: Business Strategy implementation Cycle (Company's Internal Business Strategy Model)

Based on this strategy, the CEO can address several areas of the project portfolio and project types by:

- Managing the project portfolio (described in next segment)
- Providing guidance in strategic action fields (e.g., market penetration strategy, claim and negotiation strategies)
- Providing input for competency management
- Evaluating the implementation of the business strategy.
- Promoting the PM approach and tailoring it to business needs.

The RBM contributes to excellence in project business and project management by:
- Communication the tailored business strategy for project business to your project teams.
- Using the business strategy for project business as the basis for identifying opportunities and executing projects
- Utilizing information from won and lost bids and execution projects to improve the business strategy for future proposals and projects.

Organizational Management System

The organization system implements the organizational principles taking into account all applicable legal requirements. As part of it, the Managing board establishes rules for the exercise of management responsibilities. These rules apply to all units of the organization and its Affiliated Companies. The organizational Management System

distinguishes three types of reporting lines within an organization – Local, business, and governance – and defines them as follows.

Table. 3: Organizational Management System reporting lines types. (Company's Internal functional Structure)

The CEO principles are implemented in the Organizational Management Systems via three management models:

- **Typical Management responsibility**

As a rule, management responsibilities are clearly defined by the organizational structure. As part of their responsibilities, the heads of organization units (or, for managers, the leaders of the superior organization units) will always have business / functional responsibility for the employees assigned to them. In this capacity, they will make decisions regarding personnel measures and implement these measures in accordance with the applicable labor laws.

- **Shared Management Responsibility**

For managers, the following applies: In addition to management by the head of the superior Organization Unit, specific management tasks may be performed by another functional or business manager in accordance with the local, business, and governance reporting lines described above. A business reporting line is a prerequisite in shared management responsibilities for an overview of allowed

reporting line combinations. Further, there can be only one reporting line for business, governance, or local topics. The managers involved share management responsibility and make decisions regarding personnel measures by mutual consent. The manager within the business reporting line is responsible for the final decision. In this management model, the managers involved must ensure that the goals defined for individual employees are consistent with one another. Employees must report any possible conflicts in their goals.

- **Divided Management Responsibility:**

For managers in particular, to external legal requirements, specific management tasks may be performed by a functional manager who is not the leader of the superior Organization Unit to which an employee is assigned. The manager is responsible for line management and makes the final decision regarding personnel measures.

4.2 Project Portfolio Management (PPfM):

Project portfolio management is primarily different from project and program management. Project and program management are about, by definition, execution and delivering desired outputs. While in contrast, Portfolio management focuses on selecting and executing suitable projects at the right time by investments. It employs different techniques and tactics than Project and program management.

Good portfolio management can enhance business value proposition by aligning projects with an organization's strategic direction, utilizing the best of their resources, and creating synergies between projects. Portfolio management plays a vital role in Project Management in an organization. Therefore, the CEO of an organization has to address the following terms in order to align the portfolio to the overall organization strategy.

- To define the framework for governing project portfolios, including criteria for selection and prioritization.
- To direct project portfolios in line with the business strategy of the Organizational Unit.
- To define objectives and targets for the individual portfolios and continuously optimizing their elements.
- Challenging bid proposals and deciding about bids and their strategic fit.

- To respond to significant portfolio risks.
- Defining a review system based on standardized key indicators.

The Responsible Business Manager (RBM) ensures the implementation of the portfolios by:

- Implementing the framework for governing project portfolios
- Managing the stakeholders in a project portfolio in a collaborative way
- Monitoring and influencing the efficient utilization of all the resources within a project portfolio
- Exploiting the synergies of projects managed within a portfolio.

Vigorous project portfolio management fosters the exploitation of global benefits for the organization.

Effective project organizations prioritize their resources on the best of their projects rather than the projects that are good but not good enough. Portfolio management is the correlation between strategic planning and the execution of the projects for achieving the objective effectively.

Fig. 14 shows the five principles steps of the portfolio management process to breakdown the project selection criteria into more detail.
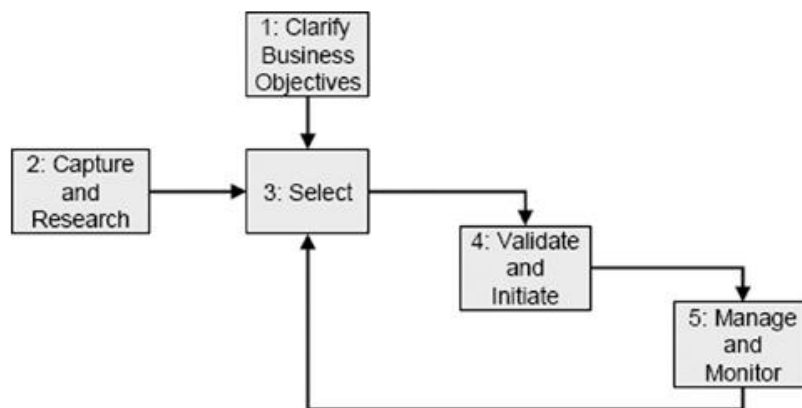
Fig. 14: Portfolio Management Process Follows five steps (PMI.org/learning/library)

1 Clarify business objectives.
2 Collect and research requests and ideas.
3 Select the best projects by identifying different parameters.
4 Validate portfolio feasibility and initiate projects.

5 Manage and monitor the portfolio (PMBOK guide 2008 edition)

Project Portfolio Management Analysis (PPMA) provides transparency of the project business capabilities (do the right things), as illustrated in Fig. 15.
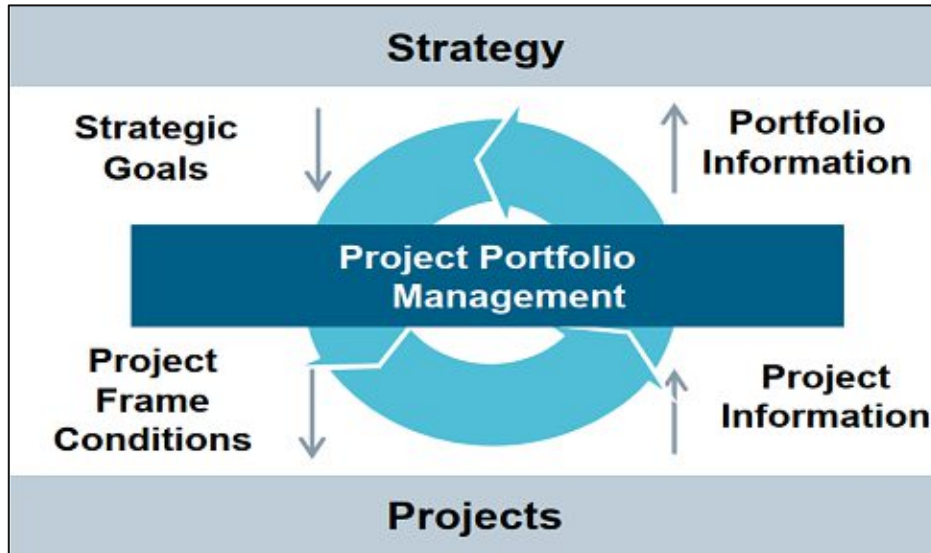
Fig. 15: Portfolio Management relation to the project business (Company's Internal Project business relation)

Typical Challenge:

Managing and aligning a set of projects that focus on a common goal and might be distributed to different locations requires specific approaches: PPMA enables project business organizations to

- Identify and manage dependencies, avoid double work and exploit synergies of projects to improve performance significantly.
- Optimize, develop, plan, and make the business more profitable.

Deliverables:

Analysis of the project portfolio management of an organization In all business domains, worldwide in headquarters and regions.

Solution approach:

- Analysis and evaluation of project portfolio management with standardized methods
- Focus on customer projects, initiatives, and internal projects.
- Extensive project management know-how, project and process analysis, and improvement projects worldwide.

Customer Benefit:

- Bridging strategy and operational business by project portfolio management
- Globally coordinated projects supporting common goals
- Exploit synergies and avoid double work of projects in the portfolio.

4.3 Project Business Governance:

In recent years there had been a gravitational pull regarding strong project governance, Because the lack of governance inspired some of the companies to implement the Sarbanes-Oxley Act (Muller, 2009), The bill was a supreme example of governance; it implanted disciplines, regulations, reporting, and oversight for most of the corporations, which further rooted to the project management team within the organization.

The challenge that most of the project managers had faced regarding how to define validate and quantify the ROI in establishing project governance within an organization, as well as determining how to make project governance framework repeatable though dynamic to the project-specific requirements.

The implementation and development of project governance are the keys at the onset of the project. Project governance provides business-specific guidelines to the project manager, and because of that, it is easier for them to manage the project.

However, it is the responsibility of the CEO in an organization to establish the governance framework in order to provide the direction by:

- Implementing a framework for managing and improving organizational standards in alignment with business strategies and market and environment needs
- Establishing a uniformly structured project data repository that emphasizes the business processes critical to the value chain (e.g., Supply Chain Management SCM)
- Ensuring that the targets from key support functions such as procurement & logistic and engineering support the targets of individual projects.
- Creating awareness of Project Security including Asset Classification and Protection (ACP)) and Product and Solution Security (PSS) requirement and their impact on Projects.
- Holding key support functions accountable for providing their deliverables on time, at the highest quality, and within the budget.

- Driving a culture of honesty, openness, trust, and ownership.
- Demanding and empowering the PMs to act like entrepreneurs.

Additionally, the Responsible Business Manager (RBM) equips Project Managers with a sound basis for their projects by:

- Implementing a decision-making framework for managing projects.
- Implementing a monitoring approach to gain transparency of the project's status.
- Regularly verifying process compliance and making Quality Gate decisions.
- Ensuring that issues can be escalated to support the Project Manager.
- Providing the projects with timely access to the relevant expertise and mandatory input.
- Contributing to make-or-buy decisions for the projects.
- Supporting supplier evaluation and management in the organization.
- Driving adherence to legal policies and avoiding unacceptable terms and conditions.
- Communicating defined change orders and claim strategies from the organization.
- Providing defined security practices and access to dedicated experts

Fostering awareness and supporting the project manager on Compliance related aspects in project business.

4.4 People and Competence Management in Project Business:

People and competency management ensure that there are similar values within the teams, departments, segments, and finally within an organization. The moment all the employees know the organization's expectations from them, it will affect their performances. Additionally, the core competencies may be the deciding factor during the overall performance reviews and career development interviews. By indicating the employee qualities in definite terms, it will be meaningful to understand where and how to improve themselves.

Competency management is the effort from the organization towards developing and exploiting employee's core competencies desired for the projects. The organization can only thrive once it is clear what kind of competencies all the employees must possess.

In order to sustain high competitiveness in the market, the CEO enables excellent performance by:

- Establishing a culture of trust and openness.
- Understanding personnel development to be a regular business activity.

- Regularly deriving future project management competency needs from the business strategy and project portfolio.
- Driving and implementing career paths.

The Responsible Business Manager (RBM) equips projects with the right competencies through the following actions, which are centrally defined:

- Providing role descriptions and job descriptions for at least the project core team members.
- Implementing strategic workforce planning (SWP), including gap analysis off required and available skills (including soft skills)
- Inspiring people to develop project management skills.
- Offering appropriate training programs and verifying their effectiveness.
- Developing employees' hard and soft skills.
- Assuring competency retention
- Ensuring the timely availability of the resources and competencies required by the projects.
- Aligning the personal targets in the Performance Management Process (PMP) with project targets, at least for the core team.
- Utilizing a performance-related reward system.

4.5 Project Business Continuous Improvement Process (CIP):

The continuous improvement process (CIP) is a fundamental part of business today, and it is the core strategy of a company. In addition, the study shows that continuous improvement increased a company's profitability and helped produce high-quality and efficient products with fewer available resources. Innovations unfold new opportunities for the organization, and An Innovation serves the purpose of an opportunity to develop and grow the organization's business. The Ideas must be implemented, and inventions commercialized and exploited in the organization's products, production, and administration.

The first most step in the innovation process is to develop and follow a consistent flow of ideas prior to forming actual development projects. The organization's efficiency, competitiveness, and ability to consistently thrive innovations in addition to several different factors on the active involvement of the company's employees.

In order to sustain high competitiveness in the market, the CEO enables excellent performance by:

- Explaining the need for change using respectful and binding communication
- Aligning improvements with the needs of its potential customer and other relevant stakeholders.
- Stimulating willingness to improve at all levels in a persistent way based on consequences.
- Creating an environment for managing improvement activities and projects.

The Responsible Business Manager (RBM) also equip projects with the right competencies through the following actions, which are centrally defined:

- Collecting feedback, identifying the ultimate root causes, and assessing impact, involving essential functions and all relevant stakeholders.
- Utilizing an established process to optimize workflows, standards, tools, and templates.
- Implementing value-adding and risk-mitigating improvements.
- Maintaining a push-and-pull exchange of experiences (lesson learned) between the organization and individual projects.
- Regularly evaluating the adequacy of project management standards and updating these accordingly.
- Utilizing relevant project business assessments or audits to identify potential gaps and implementing derived improvements.

A mindset of continuous improvement fosters a learning organization, increasing performance and customer satisfaction.

The following Fig. 16, illustrates the people and competency management continuous improvement process flow:

Maturity Levels	Process Area Threads			
	Building Teams and Culture	Developing Competency	Motivating and Managing Performance	Shaping the Workforce
5 Optimizing	L4/5: Continuous Competency Integration and Improvement		L 4/5: Quantitative Organizational Performance Management	Continuous Workforce Innovation
4 Predictable	Empowered Workgroups	Mentoring Competency Based Assets		Organizational Capability Management
3 Defined	Workgroup Development (Team Building) Global collaboration Participatory Culture	Competency Management (Analysis and Development)	Career Development	Workforce Planning
2 Managed	Communication and Coordination	Training and Development	Performance, Compensation and Benefits Work Environment	Staffing
1 Initial	Inconsistent People Management			

Fig. 16: People and Competency Management Process model. (Company's Internal People competency development model)

4.6 Cross-Organization and Cross-Border Projects:

Integration of people, systems, processes, and infrastructure across the organization, countries, and world regions provides dynamic teamwork towards gaining mutual goals. A collaborative approach within the projects and interaction in the organization leads to overall performance and satisfaction: stakeholders and participants forsters the quality perception in value, trust, and commitment within the collaboration.

Cross-border cooperation has permanent cooperation between more organizations functioning in different regions. These collaborations have a shared vision, mutual benefits for success. It is the dynamic process in which it is the aim of the corporation to achieve the business relationship to determine the appropriate cross-border legal requirement. These Cooperation are structured in a way that suits the projects which are being executed, and specific requirements are adequately fulfilled by the maturing, strengthening, and prolongation into the long-term cooperation initiative.

Respecting the boundary conditions of the involved entities, the CEO achieves the optimal project results by:

- Providing guidance on the collaboration model in regard to roles and transparent allocation of worldwide responsibilities.

- Early partnering with relevant organizations and regional units to reach an agreement on the work split and the system of collaboration (Business model) in a timely manner.

- Nominating, assigning, and empowering a single overall Project Manager (PM Bid/PM Execution) and World Project Controller (WPC) in the case of overall project lead and cross-organization and cross-border activities (split contract, silent and open consortium).

The Responsible Business Manager (RBM) provides the organization with the basis for effective cross-organization and cross-border collaboration to ensure:

- The Implementation of the New Collaboration Model (NCM) is described below.

- Adherence to ''Business tax compliance, and business partner collaboration

- The involvement of the delegation center and following the delegation guidelines for international projects.

- The application of the Process Adjustment Tax Advice and Compliance (PATAC) process.

Adherence to cross-organization and cross-border boundary conditions is key to sustainable business in the international environment. The following Fig. 17 illustrates the typical New Collaborative Model developed in the organization to lay down the cross-border projects more efficiently.

New Collaborative Model: NCM focuses on International cooperation in Small/Large projects within an organization.
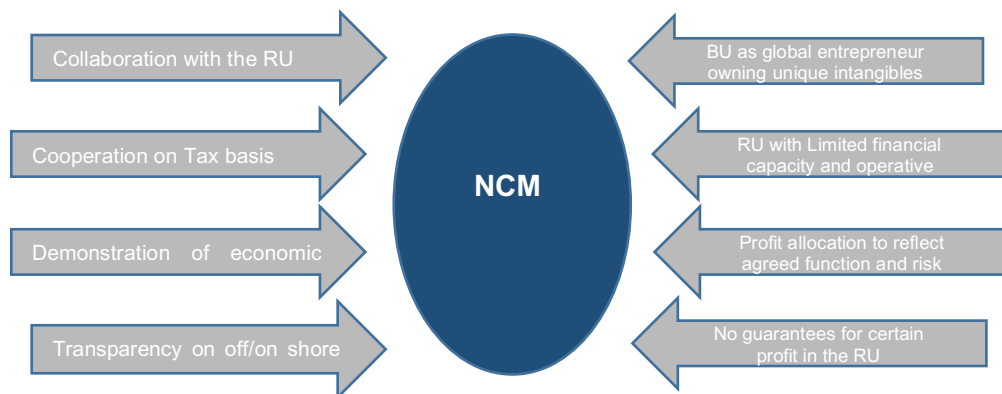
Fig. 17: NCM Model (Company's Internal New Collaborative Model for Cross-border Projects)

Where BU (Business Unit) and RU (Regional Unit) functions as illustrated below:

BU = Entity that has the technical experience and financial power to execute the project.

- Gives substantial contribution to RU by providing the engineering ooff the entire project as well as of the critical project components.
- Provides calculation input based on engineering data and project expertise.
- Supports subcontractor selection (tender requirement)
- BU is the real entrepreneur and takes profit and loss results for the project except for the onshore scope of RU.
- Takes many risks based on the root cause approach and unlimited liability.

RU = Local entity in the country of project execution that is responsible.

- RU is taking only limited risks for project execution.
- Is earning only a limited profit but generally does not assume any losses. (Internal strategy Paper, Updated Version V6.0.13, November 2020)

5 Organization Specific Project Environment

5.1 Organization Environment

The procedures in defining an organization-specific project management plan (PMP) shall determine the project management prerequisites for each project. Based on standards from the organization, complemented by project specifics, the Project management plan (PMP) supports Project Managers (PM Bid / PM Execution) inefficiently collaborating with their organization and transparently communicating the expected contributions to their team and other stakeholders. It is a continuously evolving collection of project plans and a core element of every project. Each plan is only mentioned in the initial phase of its development. As a result, the continuous updates to these plans only appear in the activity list of the respective phase.

The PMP should be initiated in the early sales phase and filled continuously with critical data during the project lifecycles. The right side of the figure below shows the deliverables to be included.

Table. 4: Project Management Plan with key deliverables (Company's Internal Project Management Plan template)

5.2 Business Types

An organization executes projects that vary significantly in types, deliverables, and levels of complexity. The following business types are relevant for Project Management.

- **Solution Projects (Business unit Specific)**

  This business type is characterized by the provisioning of a customer contract-based or industry-specific combination of products and systems (incl. Hardware and software) that typically comprises- but is not limited to-the operations project management, design, engineering, purchasing, constructing, commissioning, installation and integration.

- **Service Projects (Product Specific)**

  This business type is characterized by the provisioning of customer contract-based services to change or maintain the condition of a product, software, or process (including product/software-related support services and professional services). The ongoing services should be based on Service Level Agreements (SLA).

- **Small Projects (Complexity Specific)**

  These projects have the same attributes as the solutions or service projects described above. Small projects are less complex in terms of execution and value creation to the organization and may have low impact risk to the business strategies. They may have little or no initial planning as compared to the other project types. The small projects are most likely to be terminated if the stakeholder engagement is not successfully obtained.

Fig. 18 below is a simplified indication of the three business types in a successful Project organization. It is the basis for the more detailed descriptions of the milestone-based input/output lists.
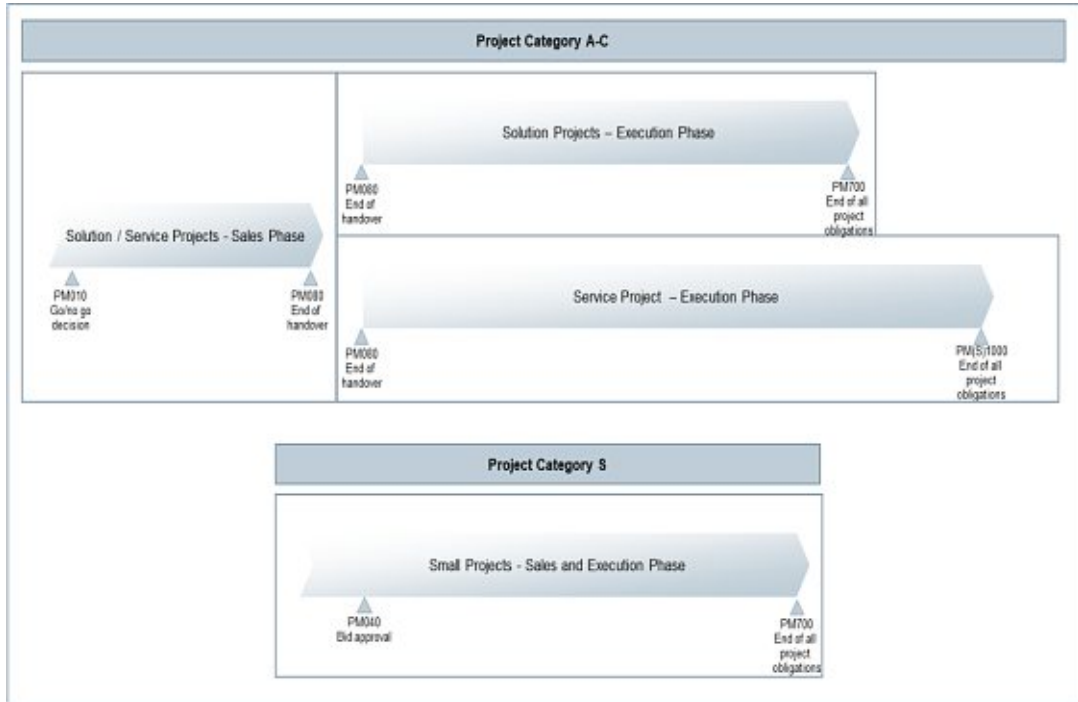
Fig. 18: Specific milestone model for defined business types. (Company's Internal Project Category Model)

5.3 Solution Project:

5.3.1 Pre-Development Phase (Bidding Phase)

The Solution and Service project business unit functions on the mandatory inputs from the Responsible Business Manager (RBM), as shown in the below Fig. 19, The responsibility for the phase ''Lead Management'' lies with the line organization
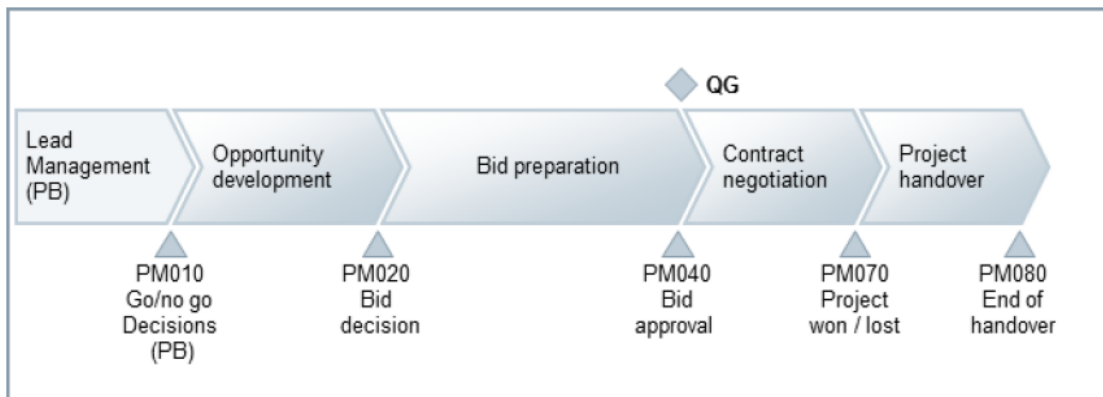
Fig. 19: Solution type Projects Bidding Phase (Company's Internal Project acquisition process)

The following input/activity/output lists describe mandatory elements for Organizational units and Affiliated companies that are implementing project business.

Table. 5: Solution Projects Opportunity Development Phase (Company's Internal Project Management Plan process)

Opportunity Development Phase Enable a bid decision by challenging a defined bid strategy, including Benefits risks competencies		Milestone PM020: Bid decision
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Organizational Strategy • Process framework • Nomination to Responsible Business Manager • Official appointment of Sales Expert/Bid Manager	• Document, evaluate, substantiate lead • Evaluate customer's business situation & competitive environment	• Requirement collection (Including breakdown structure)
• Standard WBS		• Project WBS • Bid WBS
• Customer tender or (RFQ)	• Check legal, commercial, technical delivery feasibility • Check lead for cross-organizational business potential	• Division of responsibility
• Reference solution • List of core competencies • Role description	• Define required Human, and other resources for bid project ad confirm their availability • Identify required human and other resources for execution project and check their availability	• Resource Plan

Opportunity Development Phase		Milestone PM020: Bid decision
Enable a bid decision by challenging a defined bid strategy, including Benefits risks competencies		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Historical Values	• Clarify responsible delegation center • Consider all commercial aspects incl: invoicing, cash flow, financing, bank guarantees • Perform risk analysis • Evaluate and derive the market price and define the target price • Analyze and document stakeholders • Assign project procurement manager (PPM) • Assign Quality Manager in projects • Begin to involve the execution Project Manager • Perform and document bid/no-bid decision	• Project time schedule • Bid time schedule • Expected contract setup • Target costs • Stakeholder register
• Milestone fulfillment and decision documentation expectations		• Bid strategy • Milestone documentation

Once the milestone decision is made, and the organization is going for the Bid, then the following Bid preparation phase commences.

Table.6: Solution Projects Bid Preparation Phase (Company's Internal Project Management Plan process)

Bid Preparation Phase Submission of a successful bid, with the approved risk profile		Quality Gate PM040: Bid Approval
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Lessons learned from previous projects • Certified Project Manager from execution phase involved • Resource Calendar • Project organizational Chart • Standard contract terms and conditions • Tax advice and applicable contract setups • LoA process and documentation requirements	• Hand over from sales team to Bid Manager • Set up and plan bid project • Screen previous lesson learned and implement if applicable • Create commercial, legal, technical, and delivery bid parts and assess feasibility • Identify, classify, and flag requirements • Create project organization • Check security requirements and Asset Classification and Protection (ACP) • Prepare supply chain /logistics concept • Drive Permanent Establishment decision • Perform LoA process • Prepare Project Management Plan,	 • Bid project description • Concept design for the overall technical solution and basic design for critical components • Project organization chart • ACP Business Impact Assessment • List of suppliers • Supply chain/logistics concept • Approved contract setup • LoA risk report • Resource Plan

Bid Preparation Phase Submission of a successful bid, with the approved risk profile		Quality Gate PM040: Bid Approval
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**

• Quality Gate fulfillment and decision documentation expectation	including project-specific output.
	
	  ○ Project overview
	  ○ R&O register
	  ○ Bid WBS
	  ○ Bid time schedule
	• Compose bid (technical, commercial, contractual, delivery)
	
	• Perform and document bid approval
		• Bid documentation (technical, commercial, contractual, and delivery part)
		• Q-Gate fulfillment & decision documentation

Table. 7: Solution Projects, Contract Negotiation Phase (Company's Internal Project Management Plan process)

Contract Negotiation Phase Conducting negotiations until a final decision, comprehensively documenting and communicating the results		Milestone PM070: Project Won / Lost
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework	• Nominate PM and CPM for the execution phase of the project • Prepare, hand over bid to customer, update as required	• Customer contract

Contract Negotiation Phase Conducting negotiations until a final decision, comprehensively documenting and communicating the results	Milestone PM070: Project Won / Lost	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Milestone fulfillment and decision documentation expectations	• Prepare and execute contract negotiation • Validate draft contract against LoA mandate • Finalize and sign contract • Provide order confirmation to customer • Collect bid lessons learned and provide them to the organization • Archive bid documentation • Perform and document milestone: Project won/lost	• Communication Matrix • Change log / register • Claim log / register • Lessons learned • Milestone documentation

The bidding team handover the won project to the Project manager and the execution team. Before that, the formal Project handover phase is carried out as described below:

Table. 8: Solution Projects, Project Handover Phase (Company's Internal Project Management Plan process)

Project Handover Phase Finalizing the sales phase, ensuring a structured handover of all relevant information to the execution team	Milestone PM080: End of Handover	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Lessons learned from previous projects • Customer contract	• Screen previous lessons learned and implement if applicable • Perform win/loss analysis	

Project Handover Phase	Milestone PM080: End of Handover
Finalizing the sales phase, ensuring a structured handover of all relevant information to the execution team	

Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs
• Bid team reward recognition	• Perform team appraisals for the bid phase • Hand over bid documentation to project manager of the execution phase	
• Letter of Empowerment for the PM and CPM as well as official appointment of other project team members	• Capture the baselines for the project in terms of requirements, schedule, calculation • Prepare a list of internal and external documents to be prepared during the project • Transfer offer calculation into Order Entry calculation	• Project Baseline • Document list • Contracts between the teams
• Compliance in the project execution process • Official release of sales team/Bid Manager	• Declare LoA Conformity	• Documentation of compliance relevance
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: end of the handover	• Milestone documentation

5.3.2 Solution Project Execution Phase:

The successfully booked project is taken over by the project manager of the execution phase and demonstrates the leadership example to execute the project as agreed during the pre-development phase with the customer. Following Fig. 20 illustrates the execution processes carried out thought out the execution phase.
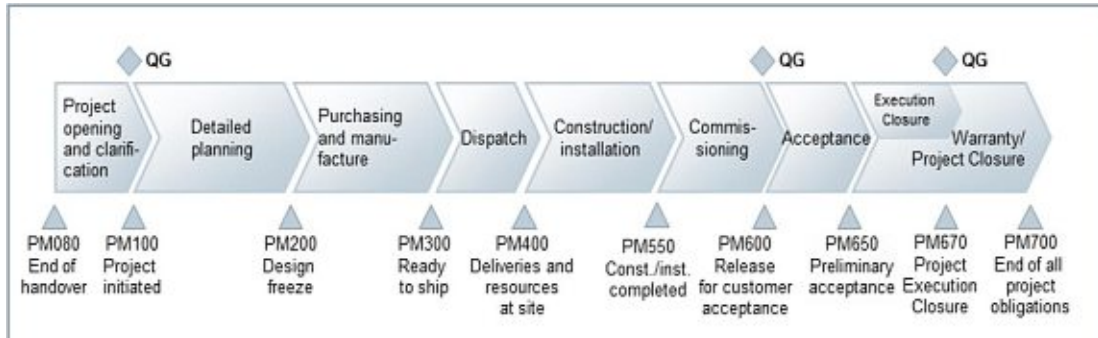
Fig 20: Execution phase of Solution & service Projects in Categories A, B & C (Company's Internal solution project execution phase

Table. 9: Solution Projects, Project Opening & Clarification Phase (Company's Internal Project Management Plan process)

Project Opening & Clarification Phase	Quality Gate PM100: Project Initiated	
Content clarified within the project boundaries and project execution initiated		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Role descriptions • Project organization chart • Resource calendar • Standard WBS • Claim strategy from the organization	• Setup project infrastructure and team • Book order entry into the ERP application, set up the WBS • Create and sign project target agreement • Create the EHS plan • Update change order and claim strategies in the contract management plan Handover bid documentation to project	• Order Entry calculation • Project Target Agreement • Procurement plan • Quality plan • EHS plan

56

Project Opening & Clarification Phase	Quality Gate PM100: Project Initiated	
Content clarified within the project boundaries and project execution initiated		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Compliance in the project execution process • Customer Contract	manager of the execution phase • Perform joint compliance risk analysis and measures Capture the • Prepare billing schedule information into the project time schedule • Analyze contract technically, commercially, legally & clarify open points • Plan activities to secure and obtain necessary permits and licenses • Initiate team building activities	• Compliance risks and mitigations
• Non-conformance management procedure • Quality Gate fulfillment and decision documentation expectations	• Start documenting non-conformance • Perform and document quality gate project initiated	• Non-conformance log • Q-gate fulfillment & decision documentation

Table. 10: Solution Projects, Project Detailed Planning Phase (Company's Internal Project Management Plan process)

Detailed Planning Phase Detailed implementation plan for the final design/solution as agreed with the customer		Milestone PM200: Design Freeze
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Lessons learned from previous projects • Historical Values • Existing contracts with suppliers (standards)	• Create engineering documentation for technical realization • Perform site inspection / analyze the installation environment • Prepare construction, installation, commissioning manuals • Screen previous lessons learned and implement • Update project security requirements • Update project management plan including project-specific outputs: ○ EHS Plan ○ Detailed supply chain /logistic concept ○ Project time schedule ○ Procurement plan ○ Quality Plan • Infrastructure concept • Plan mobilization • Release engineering design • Prepare and release to supply chain • Perform and document milestone: design freeze	• Engineering documentation • Results from site inspection/analysis of installation environment • Documentation for construction and installation • Documentation for commissioning • Project-specific Product & solution security • Project Management Plan • Test Plan • Design freeze agreement

Detailed Planning Phase	Milestone PM200: Design Freeze
Detailed implementation plan for the final design/solution as agreed with the customer	

Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs
• Milestone fulfillment and decision documentation expectation		• Supplier offer • Milestone documentation

Table. 11: Solution Projects, Purchasing and Manufacture Phase (Company's Internal Project Management Plan process)

Purchasing and Manufacture Phase	Milestone PM300: Ready to ship
Preconditions for the first deliveries to the defined locations are fulfilled	

Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs

• Process Framework	• Update Project management plan including the project-specific outputs:
	  o Supply chain / logistic concept
	  o List of suppliers
	  o Procurement plan
	• Place purchase orders for deliverables and supporting services
	• Verify quality and completeness of deliveries
	• Ensure site preconditions for receipt of goods
		• Project management plan
		
		• Supplier contracts
		
		• Products released for dispatch (within FAT)
		
		• Shipment documentation
		• Site procedures

Purchasing and Manufacture Phase	Milestone PM300: Ready to ship	
Preconditions for the first deliveries to the defined locations are fulfilled		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Milestone fulfillment and decision documentation expectation	• Prepare dispatch and release shipment documentation • Perform and document milestone: ready to ship •	• Milestone documentation

Table. 12: Solution Projects, Dispatch Phase (Company's Internal Project Management Plan process)

Dispatch Phase	Milestone PM400: Deliveries and resources at the site	
Site readiness declared; receipt of deliveries confirmed		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Resource Calendar	• Start resources mobilization • Verify the fulfillment of deliverables/obligations by customers and partners • Prepare infrastructure at the site • Receive and verify deliveries at site • Implement Project Security concept • Complete documentation for construction and installation	• Verify products/deliveries at site • Documentation for construction and installation

Dispatch Phase	Milestone PM400: Deliveries and resources at the site
Site readiness declared; receipt of deliveries confirmed	
Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: deliveries and resources at the site	• Milestone documentation

Table. 13: Solution Projects, Construction / Installation Phase (Company's Internal Project Management Plan process)

Construction / Installation Phase	Milestone PM550: Construction/Installation completed
Construction and installation of the solution internally verified against the agreed scope	
Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs
• Process Framework	• Perform construction and installation	• Redline documentation of construction and installation
	• Redline construction and installation documentation	
	• Prepare commissioning phase customers and partners	• Documentation for commissioning
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: deliveries and resources at the site	• Milestone documentation

Table. 14: Solution Projects, Commissioning Phase (Company's Internal Project Management Plan process)

Commissioning Phase Solution validation concluded, ready for customer acceptance		Quality gate PM600: Release for customer acceptance	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**	
• Process Framework • Customer Contract • Compliance in the project execution process • Quality Gate fulfillment and decision documentation expectations	• Commission Plant / solution • Conduct internal tests • Compile ''as-built'' customer documentation • Verify fulfillment of all contractual requirements • perform joint compliance analysis focused on customer acceptance and final check that all identified compliance mitigation measures are implemented • Perform and document quality gate: release for customer acceptance	• Documentation of tests records • ''as-built'' customer documentation • List of Open points • Concluded compliance risks and mitigations, documented in the register • Q-gate fulfillment & decision documentation	

Table. 15: Solution Projects, Acceptance Phase (Company's Internal Project Management Plan process)

Acceptance Phase Customer handover achieved and risk transferred		Milestone PM650: Preliminary acceptance	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**	
• Process Framework	• Conduct customer acceptance tests	• List of open points	

Acceptance Phase Customer handover achieved and risk transferred		Milestone PM650: Preliminary acceptance
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: preliminary acceptance	• Provisional Acceptance Certificate • Milestone documentation

Table. 16: Solution Projects, Execution Closure Phase (Company's Internal Project Management Plan process)

Execution Closure Phase Concluding project closure of the execution project including experience transfer to the organization		Quality Gate PM670: Project execution closure
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework	• Work off open points • Ensure correct posting and accounting of surplus material • Clarify open claims with contract partners • Create and hand over final customer documentation • Demobilize site • Perform Permanent Establishment (PE) closing or handover • Send the final invoice	• Documentation of site closure • Documentation for closing PE

Execution Closure Phase Concluding project closure of the execution project including experience transfer to the organization		Quality Gate PM670: Project execution closure	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**	
	• Ensure that the payment of the final invoice is received • Obtain customer satisfaction feedback • Evaluate the fulfillment of project targets and trigger reward recognition • Archive the documentation from project execution customer acceptance tests	• Project team reward recognition • Project closure report	

• Nomination of the responsible person for warranty/service	• Update Project management plan including the project-specific outputs:
	  ○ Final project execution calculation
	  ○ Lessons learned Perform, document milestone: preliminary acceptance
		• Project Management Plan Update	

• Quality Gate fulfillment and decision documentation expectation	• Perform and document quality gate: Project execution closure	• Q-Gate fulfillment & decision documentation	

Table. 17: Solution Projects, Warranty / Project Closure Phase (Company's Internal Project Management Plan process)

Warranty / Project Closure Phase	Milestone PM700: End of all project
Warranty concluded and final acceptance certificate received with the release of all project obligations and handing over to after-sales	obligations

Mandatory Inputs	Relevant Activities Within Project lifecycle	Mandatory outputs
• Process Framework	• Perform the warranty activities	
	• Document the end of warranty according to the contractual requirements	• Final Acceptance Certificate
	• Dissolve provisions	
	• Ensure that the bonds are returned	
	• Finalize the project calculation, including non-conformance costs	
	• Archive all the documentation created during the project	• Final project calculation
	• Initiate end of delegations	
	• Finalize project closure	
• Official release of the responsible warranty/service team		
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: end of all project obligations	• Milestone documentation

5.4 Small Projects:

Fig. 21 below illustrates the project lifecycle of typical small-scale projects, which are less complicated in execution and less in terms of overall volume compared to that of the Solution and service projects in an organization

Fig. 21: Small Project category S model (Company's Internal Small Project Model)

The small project model follows the same kind of lifecycle from the initiation till the end of the projects. However, there are some dissimilarities and less complexity in some of the execution phases, as described in this segment below.

Table. 18: Small Projects, Bid Preparation/Project Definition Phase (Company's Internal Project Management Plan process)

Bid Preparation/Project Definition Phase Submission of a successful bid, with the approved risk profile		Milestone PM040: Bid Approval
Mandatory Inputs	**Relevant Activities** **Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Standard contract terms and conditions followed in an organization • Lessons learned from previous projects	• Document, evaluate, substantiate lead • Evaluate customer's business situation & competitive environment • Initiate bid • Document deviations from standard contracts and procedures •	• Requirement collection (including break down and structure) • Project overview • Project WBS • List of deviations from standard contracts and procedures

66

Bid Preparation/Project Definition Phase Submission of a successful bid, with the approved risk profile	Milestone PM040: Bid Approval	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Tax advice and applicable contract setups • Milestone fulfillment and decision documentation expectations	• Check security requirements • Drive Permanent Establishment decision (PE) • Perform and document milestone: bid approval	• Approved contract setup • Milestone documentation

Table. 19: Small Projects, Project Opening and Clarification Phase (Company's Internal Project Management Plan process)

Project Opening and Clarification phase Content clarified within the project boundaries and project execution initiated	Milestone PM100: Project Initiated	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework • Official appointment of PM, CPM, and rest of project team for the execution phase	• Set up project infrastructure and team • Book order entry into the ERP application and set up WBS • Create and sign project target agreement • Perform joint compliance risk analysis and define	• Order Entry calculation • Project Target agreement

Project Opening and Clarification phase	Milestone PM100: Project Initiated	
Content clarified within the project boundaries and project execution initiated		
Mandatory Inputs	**Relevant Activities** **Within Project lifecycle**	**Mandatory outputs**
• Compliance in the project execution process • Milestone fulfillment and decision documentation expectation	compliance mitigation measures • Prepare first ongoing calculation • Drive Permanent Establishment decision (PE) • Perform and document milestone: bid approval	• Compliance risks and mitigations • Ongoing calculation • Documentation for permanent establishment registration • Milestone documentation

Table. 20: Small Projects, Project Execution Phase (Company's Internal Project Management Plan process)

Project Execution Phase	Milestone PM600: Release for customer acceptance	
Solution validation concluded, ready for customer acceptance		
Mandatory Inputs	**Relevant Activities** **Within Project lifecycle**	**Mandatory outputs**
• Process Framework	• Detailed planning • Purchasing & manufacture • Implement security requirements • Dispatch • Construction / installation	

Project Execution Phase Solution validation concluded, ready for customer acceptance		Milestone PM600: Release for customer acceptance	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**	
• Compliance in the project execution process • Customer Contract • Milestone fulfillment and decision documentation expectation	• Commissioning • Conduct internal tests for the plant/solution • Perform joint compliance risk analysis and define compliance mitigation measures • Verify fulfillment of all contractual requirements • Perform and document milestone: release for customer acceptance	• Test records • ''As-built'' customer documentation • Concluded compliance risks and mitigations, • List of open points • Milestone documentation	

Table. 21: Small Projects, Acceptance and Execution Closure Phase (Company's Internal Project Management Plan process)

Acceptance and Execution Closure Phase Customer handover achieved, and project closure of the execution project concluded		Milestone PM670: Project Execution Closure	
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**	
• Process Framework • Nomination of the responsible warranty/ service personnel	• Create final customer documentation • Perform Detailed acceptance planning • Close list of open points • Perform lesson learned	• Acceptance certificate	

69

Acceptance and Execution Closure Phase		Milestone PM670: Project Execution Closure
Customer handover achieved, and project closure of the execution project concluded		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Release of the PM, CPM, and rest of the project team	• Perform Permanent Establishment (PE) closing or Handover	• • • Documentation for closing PEList of open points
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: Project execution closure	• Milestone documentation

Table. 22: Small Projects, Warranty / Project Closure Phase (Company's Internal Project Management Plan process)

Warranty / Project Closure Phase		Milestone PM700: End of all project obligations
Warranty concluded and final acceptance certificate received with the release of all project obligations and handing over to after-sales		
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Process Framework	• Perform and close warranty activities. • Finalize the project calculation, including non-conformance data • Archive project data	• Final Acceptance certificate • Final Project Calculation
• Release of the warranty/service personnel		

Warranty / Project Closure Phase Warranty concluded and final acceptance certificate received with the release of all project obligations and handing over to after-sales		Milestone PM700: End of all project obligations
Mandatory Inputs	**Relevant Activities Within Project lifecycle**	**Mandatory outputs**
• Milestone fulfillment and decision documentation expectation	• Perform and document milestone: Project execution closure	• Milestone documentation

(Internal Project development processes, Updated version V6.0.13, November 2020)

6 Conclusion

The research determines and proves an ideal example of how the globally recognized multinational companies develop and execute the projects under different market and business circumstances, and still they conclude the projects successfully.

This dissertation will be the reference for the Small and medium enterprises (SMEs) to develop and execute the projects despite not possessing the specific and dedicated project environment. The CEO or functional manager can act as a project manager and employ the strategies best suits the company's core business values.

The methodology demonstrated in this study shows the extensive data for taking into consideration organizational environment (organizational features, culture, and types of business) and project environment, including the individual events during the project. The implementation of the PMO in an organization influences the overall project management maturity; it actually adds value in the expected value to increase profits through improved project execution and delivery, strengthening competitive advantage in the market and finding new business opportunities, it develops the competencies of the people of the organization and even within the cross-functional and cross-border projects.

The ways of PMO implementation, responsibilities of PMO, and value creation process of PMO were discussed regarding the types of projects, decision-making authority, organizational chart, and the project development process determine the new horizon for SMEs to understand the need of employing PMO and project management strategies into their business strategy. The Project management and PMO provide vital support in the decision making to choose the right project for the SME owner or managers. The implementation of the project culture and the PMO can remove the management obstacles and barriers that hinder the growth of the organization, which ultimately provides potential benefits.

The project-specific strategies defined in this study demonstrate the purpose of addressing specific needs of an organization, clear definition of the requirement, roles and responsibilities of the teams and people, Limits of authority, decisive leadership. Competent personnel such as RBM in the project management and the team of PMO provides such supports to the senior management and has the ability to demonstrate values to the benefits of the organization. The business and project types discussed within this study are the proven methods to win and conclude the projects within the

budget, schedule, and quality. However, the strategies for the projects may differ from organization to organization.

REFERENCES:

BOOKS:

BOLLES, Dennis. Building Project Management Centers of Excellence. New York, Amacon Books, 2002

Cleland, D. and Gareis, R., 2006. Global project management handbook. New York: McGraw-Hill.

Dai, C. X. Y., and Wells, W. G. (2004) An exploration of project management office features and their relationship to project performance. International Journal of Project Management, Vol. 22 (7), 523–532

Hill, G., 2008. *The complete project management office handbook, second edition*. Boca Raton, Fla.: Auerbach Publications.

KENDALL, Gerald & ROLLINS, Steve, "How to get value out of the PMO" McGraw Hill, NY, USA, 2002

Kerzner, H. and Pinto, J., 2007. Kerzner's Project Management Logic Puzzles. *IEEE Transactions on Engineering Management*, 54(2), pp.391-391.

Laufer, A., & Hoffman, E. J. (2000). Project Management Success Stories. New York: John Wiley & Son.

LETAVEC, Craig J. The Program Management Office. Establishing, Managing, and growing the value of the PMO. Fort Louderdale, USA, J. Ross Publishing, 2006

MORRIS, Peter. JAMIESON, Ashley. Translating Corporate Strategy into Project Strategy.Project Management Institute, Pennsylvania, PA, USA, 2004

Pinto, J. K., & Rouhiainen, P. J. (Eds.). (2001). Project Critical Success Factor. In Building Customer-Based Project Organisations. Retrieved June 20, 2005, from http://pmi.books24x7.com/toc.asp?bookid=3777

RAD, Parviz F. LEVIN, Ginger. The advanced Project Management Office. CRC Press. Boca Raton – USA, 2003

JOURNAL ARTICLES:

Andersen, B., Henriksen, B., and Aarseth, W. (2007) Benchmarking of project management office establishment: extracting best practices. Journal of Management in Engineering, Vol. 23 (2), 97-104.

AUBRY, M .; Hobbs, B .; Thuillier, D. Organisational project management: An historical approach to the study of PMOs- International Journal of Project management, vol.26, p. 38-43, 2008a

Audretsch, D. B., Y. M. Prince, et al. (1998). Do Small Firms Compete with Large Firms? Tinbergen Institute of Rotterdam, Centre for Economic Policy Research (CEPR), and Georgia State University.

Cooke-Davies, T., 2002. The "real" success factors on projects. *International Journal of Project Management*, 20(3), pp.185-190.

Cooke-Davies, T. J., Crawford, L. H., and Lechler, T. G. (2009) Project management systems: moving project management from an operational to a strategic discipline. Project Management Journal, Vol. 40 (1), 110–123.

CRAWFORD, J. K. The Strategic Project Office. Boca Raton, USA, CRC Press. 2002

Englund, R., Graham, R. and Dinsmore, P., 2003. *Creating the project office*. San Francisco: Jossey-Bass

Gareis, R., 2005. Happy projects!.

Grundy, T., 2000. Strategic project management and strategic behaviour. *International Journal of Project Management*, 18(2), pp.93-103.

Hurt, M., and Thomas, J. L. (2009) Building value through sustainable project management offices. Project Management Journal, Vol. 40 (1), 55–72

Ledwith, A. (2004). Management of New Product Development in Small Irish Electronics Firms, University of Brighton.

McAdam, R., R. S. Reid, et al. (2005). Innovation and Organisational Size in Irish SMEs: An empirical study. Department of Economics & Enterprise, Glasgow Caledonian University.

Mir, F. and Pinnington, A., 2014. Exploring the value of project management: Linking Project Management Performance and Project Success. *International Journal of Project Management*, 32(2), pp.202-217.

Mullaly, M., and Thomas, J. L. (2009) Exploring the dynamics of value and fit: insights from project management. Project Management Journal, Vol. 40 (1), 124-135

Pellegrinelli, S., and Garagna, L. (2009) Towards a conceptualization of PMOs as agents and subjects of change and renewal. International Journal of Project Management, Vol. 27 (7), 649–656.

PRADO, DS Project Management in Organizations. BH-MG, Brazil: Ed ManagementDevelopment, 2000

VALLE, José Santos' Angelo. "Communications and Information Technology - CIT - as a competitive weapon in Project Management''. Proceeding of the 28th PMI – ProjectManagement Institute – Global Congress, Seminars & Symposium. Chicago, USA, 1997

WEBSITES:

Apm.org.uk. 2021. *What is project management?*. [online] Available at: <https://www.apm.org.uk/resources/what-is-project-management/> [Accessed 9 March 2021].

Binfire. 2021. *Hybrid project management manifesto*. [online] Available at: <https://www.binfire.com/hybrid-project-management-manifesto/> [Accessed 10 March 2021].

EDUCBA. 2021. *Waterfall Model | Different Phases With Advantages & Disadvantages*. [online] Available at: <https://www.educba.com/waterfall-model/> [Accessed 10 March 2021].

Open Library. 2021. *A guide to the project management body of knowledge (PMBOK guide) (2008 edition) | Open Library*. [online] Available at: <https://openlibrary.org/books/OL25202748M/A_guide_to_the_project_mana gement_body_of_knowledge_(PMBOK_guide)> [Accessed 9 March 2021].

Tutorialspoint.com. 2021. *SDLC - Agile Model -*. [online] Available at: <https://www.tutorialspoint.com/sdlc/sdlc_agile_model.htm> [Accessed 10 March 2021].

Silva, M. and Bouter, R., 2015. [online] Pmworldlibrary.net. Available at: <https://pmworldlibrary.net/wp-content/uploads/2015/09/pmwj38-Sep2015-Silva-Bouter-valule-of-a-pmo-advisory.pdf> [Accessed 10 March 2021].

LIST OF FIGURES:

Figure:1, Project Management Processes

Figure:2, Relationship between cost predictability and time predictability

Figure:3, The significance of project management & operation management

Figure:4, The corporate context for project success

Figure:5, Model of relevant factors to implement PMO

Figure:6, Five-stage PMO Competency continuum model

Figure:7, The PMO value creation process

Figure:8, PMO Value Continuum

Figure:9, The Waterfall model

Figure:10, Agile Iteration Approach

Figure:11, Hybrid Project Management flow schematic

Figure:12, Interaction between organization and project environment

Figure:13, Business Strategy implementation cycle

Figure:14, Portfolio Management Process

Figure:15, Portfolio Management relation to the project business

Figure:16, People and Competency Management Process Model

Figure:17, NCM Model

Figure:18, Specific milestone model for defined business types

Table: 21, Small Projects, Acceptance and Execution Closure Phase

Table: 22, Small Projects, Warranty / Project Closure Phase

LIST OF ABBREVIATION

ACP: Asset Classification and Protection

BD: Business Development

BU: Business Unit

CEO: Chief Executive Officer

CIP: Continuous Improvement Process

CPM: Commercial Project Manager

CRM: Customer Relationship Management

ENG: Engineering

IPMA: International Project Management Association

KPI: Key Performance Indicator

MNC: Multinational Company

NCM: New Collaboration Model

P&L: Profit & Loss

PATAC: Process Adjustment Tax Advice and Compliance

PM: Project Management

PMBOK: Project Management Body of Knowledge

PME: Project Management Excellence

PMI: Project Management Institute

PMO: Project Management Office

PPMA: Project Portfolio Management Analysis

PSS: Product and Solution Security

RBM: Responsible Business Manager

ROI: Return on Investment

RU: Regional Unit

SCM: Supply Chain Management

SME: Small & Medium Enterprises

SWP: Strategic Workforce Planning

UI: User Interface

WBS: Work Breakdown Structure

WPC: World Project Controller