COLLEGE OF DEFENCE MANAGEMENT

PROJECT MANAGEMENT

HDMC 20

SUBJECT PRIMER

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COLLEGE OF DEFENCE MANAGEMENT

SUBJECT PRIMER: PROJECT MANAGEMENT

1. **Introduction**. The primary goal of management is to achieve desired outcomes through efficient and effective processes. Attaining these objectives requires careful planning and systematic execution. Project Management, therefore, involves the application of knowledge, skills, tools, and techniques within the project environment. It integrates various disciplines such as Strategic Management, Resource Management, Organizational Behaviour, Systems Analysis, and Time Management to align outcomes with the organization's strategic vision. The journey of Project Management at CDM begins with understanding Project Formulation, followed by Project Scheduling while considering the triple constraints of time, cost, and scope. It delves into Network Analysis for resource optimization and emphasizes Monitoring and Control to measure progress, utilizing Earned Value Management techniques for accurate project assessment. Additionally, identifying inherent risks, monitoring, controlling, and mitigating them are crucial for project success. The syllabus also encompasses Critical Chain Project Management (CCPM) and explores emerging trends using alternative methodologies for project delivery. As military leaders, enhancing our skill set in this discipline is essential, and the IPMA's Individual Competence Baseline (ICB version 4) offers the means and opportunities for achieving this.

2. **Aim**. The aim of project management is to provide adequate inputs to effectively plan and monitor execution of large and medium size operational and administrative projects, using PM techniques.

3. **Objectives**. PM curriculum in CDM aims to enable participants to: -

   (a) Be an effective member of a PM team or lead / head a PM team.

   (b) Develop and effectively use networks in scheduling, monitoring and controlling of projects and plans.

   (c) Exploit PM software, quantitative methods (QM) package and apply simulation techniques in PM.

4. This primer aims at introducing the PM syllabi as it shall be covered for HDMC-20. The subsequent paragraphs would be introducing the topics including certain suggestive links for further reading/ enable better understanding.

5. **Essentials of Project Management**. If an idea is the genesis of a product, then projects are the prime movers to implement and realise goals. Like any other organization, nations exist, strive and grow by setting goals to achieve better standards

in future. The development and economic growth of any nation, particularly the developing ones depend upon successful implementation of new projects. Projects have been part of human scenes since civilization started. A project is generally a non-repetitive task, which is an entity by itself. Project management is an all-embracing term, covering management of every detail of the project promise instruction to its final completion. There are 3 main stages in the life cycle of a project namely; Project Formulation, Project Execution and Project Evaluation.

Reading References
https://www.apm.org.uk/resources/what-is-project-management/
https://www.pmi.org/about/learn-about-pmi/what-is-project-management

6. **Project Formulation**. Project formulation is the process of presenting a project idea in a form in which it can be subjected to comparative appraisal. Project formulation encompasses the concept definition, project planning and organization phases of the project life cycle. The formulation stage of complex and large projects has three distinct activities to be completed: -

(a) Preliminary project formulation.

(b) Feasibility study and report.

(c) Detailed project report (DPR).

Reading/ Video References
https://www.slideshare.net/marsmfyam/project-planning-and-feasibility-study
https://www.youtube.com/watch?v=HyM6d1ZXxXs

7. **Project Planning**. Project planning is an important part of the project formulation stage. It plays a vital role in successful implementation of a project. It includes stating the project objectives, finding tasks necessary to reach the objectives, making cost estimates and preparing schedules and budgets. It also involves assigning overall segments of the plant to individuals with a minimum of overlap problems. Once a clear objective has been set, the development of a project plan follows from answering a logical sequence of questions as outlined below: -

(a) What is to be accomplished?

(b) Who is responsible for what?

(c) What resources are required?

(d) What must be done when?

(e) How will resources be allocated?

Reading/ Video References
https://www.youtube.com/watch?v=Do8iykQKMfU (Project Planning Process: 5 Steps To Project Management Planning)
https://www.youtube.com/watch?v=FklYonNknRs (Work Breakdown Structure by Andy Kaufman)

8. **Project Organisation**. Organisations can be defined as groups of people who must coordinate their actions in order to meet organizational objectives. The coordination function requires strong communication and clear understanding of the relationships and interdependencies among people. Therefore, when an enterprise public or private launches a project, one of the foremost aspects to be addressed is the organizational structure for managing the project. The choice of appropriate organization arrangements for the project depends upon organizational and project factors and their inter relationships.

Reading/ Video References
https://www.youtube.com/watch?v=0vPCN6X3FUI (Project Management Organizational Structure | AIMS UK)

9. **Detailed Project Report (DPR)**. Once the project has been approved in principle, a detailed project report is prepared which is essentially a project plan in an executable format. It is an elaborate and systematic adoption of the feasibility report, which was prepared with the purpose of taking a decision regarding go ahead of the project. The DPR is essentially a tool for implementation. The preparation of DPR involves in-depth planning and detailed examination of all aspects of the project. Preparation of DPR is invariably the task of competent and professional consultants or collaborators in close coordination with the project management team. Development of the DPR is key to the successful completion of the project. A project being non-repetitive and an entity by itself, careful preparation of DPR will ensure that the projects are completed in time, thus providing tremendous pay off value in terms of its objectives.

Reading/ Video References
https://especia.co.in/post/what-is-dpr/
https://mohua.gov.in/upload/uploadfiles/files/MRTS_DPR_I_guidelines_final.pdf

10. **Project Scheduling using Networks**. Project scheduling is part of project management which relates to the use of schedules to plan and subsequently report progress within the project environment. It aims at finishing the activities in correct order and on time, within budget, meeting quality goals and receipt of information and direction. Networks are essentially a technique used to manage planning and control of projects. Networking is particularly useful where many interrelated tasks are to be carried out any of which may occur simultaneously. In general, the network analysis can be applied advantageously to those projects involving specific start times and end

times. Although planning networks take many forms, there are two following basic types that are in common use: -

(a) **Activity on Arrow (AOA)**. Also known as the Arrow Diagramming Method (ADM) network, in this method, each activity is represented by a solid arrow signifying a specific consumption of time and resources, but not drawn to any scale. At each end of the arrow lies an event, represented by a circle with a number inside. Thus, every activity begins and ends with an event.

(b) **Activity on Node (AON)**. Also known as Precedence Diagramming Method (PDM), Precedence Network, or Activity in Box (AIB) network, in this method, activities are depicted as rectangular nodes with arrows representing the interrelationships between the activities. This is in contrast to AOA networks where activities are represented by arrows.

11. **Network Analysis**. The purpose of network analysis is to determine the project duration and the available time cushion for each activity. Additionally, the analysis identifies critical path activities. Then non-critical activities are analyzed to provide the manager with information on their flexibility in terms of starting times and durations. This indicates the extent to which scheduling and resource allocation can be adjusted without impacting the overall project completion time. Time analysis serves as the foundation for management decisions regarding resource scheduling, monitoring, and controlling of a project.

Reading/ Video References
https://www.izenbridge.com/blog/what-is-float-calculate-total-free-float/
https://www.youtube.com/watch?v=vV3YUaUg5i8 (What is Critical Path in Project Management)

12. **Time Estimation**. One of the most important and essential resources consumed by any activity in its execution is time. Although techniques are available to reduce the duration of activities within a project, they can be costly and often subject to a higher level of uncertainty. Estimating the time required for an activity is crucial for subsequent network analysis. It allows us to draw conclusions regarding project duration and the level of monitoring required for activity progress. Some project activities may be based on past experiences, enabling the association of a reasonable deterministic duration. However, there may be situations where no previous experience exists, making it infeasible to provide a single time estimate. In such cases, probabilistic time estimation for activity duration must be adopted. It should be remembered that an estimate, regardless of qualifications or supporting experience, is simply a rough or approximate forecast of the future. It will seldom be entirely accurate and should never be considered immutable.

Reading/ Video References
https://www.youtube.com/watch?v=6B7Qtc3rrQ4 (Three Point Estimation Technique)

13. **Resource Scheduling: Levelling and Smoothing**. Scheduling is described as the programme of timing of activities comprising the project and their assembly to give the overall completion. This determines the order in which the activities are to be executed and places the entire program on a calendar. In some project situations, resources can be acquired or released in practically any desired amount, if one is willing to pay the expenses involved in changing resource levels. It is usually prudent, however, to maintain relatively stable employment levels and to utilise resources at a more constant rate. There are primarily two resource optimization techniques that are employed as enumerated below: -

(a) **Resource Smoothing**. This technique is used to maintain the utilization of project resources within specified limits while keeping the project duration unchanged. In other words, resources are planned to be utilized at constant rates within the project's duration constraints.

(b) **Resource Levelling**. This technique is employed when the project cannot be completed as originally scheduled due to resource constraints. Resource utilization is adjusted to remain within available limits. However, this may result in a change in project duration.

Reading/ Video References
https://www.youtube.com/watch?v=JlUXah6fsLI (Resource Allocation & Levelling - Project Management)

14. **Crashing of Networks**. Timely completion of the project is of paramount importance for any project manager. Network analysis establishes the projected duration for project completion, which may not always be optimal in terms of total cost or acceptable due to urgency by management. Moreover, project duration may be extended due to execution delays, necessitating actions to reduce time. It may be feasible to reduce the duration of certain activities by incurring additional direct costs, such as increasing resources or employing more efficient resources, which often entails higher costs but reduces indirect costs with shorter durations. Hence, during schedule revision, every potential opportunity should be considered to achieve maximum benefits at minimal incremental cost while incurring minimal additional risk. This process of time compression by adding resources with an incremental increase in cost is termed crashing. Crashing involves analyzing cost and schedule trade-offs to determine the most efficient method of compression. However, crashing does not always provide a viable alternative and often results in increased costs.

Reading/ Video References
https://www.youtube.com/watch?v=nGs6Kj46ofE

15. **Earned Value Management System**. The hallmark of a successful project is completion on time and within budget. The project budget must be reasonable,

attainable, and based on contractually negotiated costs and statements of work. Management must compare the time, cost, and performance schedule of the program to the budgeted time, cost, and performance, not independently but in an integrated manner. Hence, an effective control system is necessary to monitor schedule and performance as well as cost for setting budgets, measuring expenditures against budgets, and identifying variances to take corrective action when required. Cost/Schedule Control System Criteria (C/SCSC), referred to as Earned Value (EV), is one of the most powerful and productive concepts for managing complex projects in private, commercial, or government environments. Earned Value Management System (EVMS) is a highly effective and commonly used project performance management measurement tool that integrates cost and schedule performance into one report.

Reading/ Video References
https://www.youtube.com/watch?v=sAZZ5av9kk0

16. **Project Risk Management**. Project risk is an uncertain event or condition which if it occurs has a positive or negative affect on one or more project objectives such as scope, schedule, cost and quality including customer satisfaction. A risk may have one or more causes and may have one or more impacts. Project risk management seeks to manage and control the risk of project success to an acceptable level. Project risk management seeks to control risk beyond the scope of the project plan and beyond the circle of control of project manager. Project risk management is part of the project planning process, because the project manager must decide on a course of action to include in the project plan based on the relative risk. All risks are not equal in their impact on a project. The risks are prioritised by assigning risk priority numbers (RPN) to them. There are three factors that contribute to the RPN; the probability that the risk may occur, severity of the effect to the project should it occur, and thirdly a question of whether it can be detected before it hits the project. Based upon the RPN, various mitigation or risk reduction measures are employed.

Reading/ Video References
https://www.coursera.org/articles/how-to-manage-project-risk

17. **Critical Chain Project Management**. Critical chain project management (CCPM) is a method of planning and managing projects that emphasizes the resources (people, equipment, physical space) required to execute project tasks. It was developed by Eliyahu M. Goldratt. It differs from more traditional methods that derive from critical path and PERT algorithms, which emphasize task order and rigid scheduling. A critical chain project network strives to keep resources levelled, and requires that they be flexible in start times. In a project plan, the critical chain is the sequence of both precedence- and resource-dependent tasks that prevents a project from being completed in a shorter time, given finite resources. If resources are always available in unlimited quantities, then a project's critical chain is identical to its critical path method. CCPM planning aggregates the large amounts of safety time added to

tasks within a project into the buffers—to protect due-date performance and avoid wasting this safety time. Critical chain project management uses buffer management instead of earned value management to assess the performance of a project.

Reading/ Video References
https://www.youtube.com/watch?v=zLIdQLkWKjM

18. **Individual Competence Baseline (ICB) Version 4.0**. Under the International Project Management Association (IPMA) concept of PM, the Individual Competence Baseline (ICB) concept is the global standard for individual competence in project, program and portfolio management. The ICB supports the development of individual competence through the presentation of a complete inventory of competence elements across project, programs and portfolios. The goals with ICB are to enrich and improve the individual's competence in project, portfolio and program management and to provide an inventory of competencies that, if fully realised, represent complete mastery of these management domains. The ICB competence standard is intended to support the growth of individuals and also of organisations as they grapple with increasingly competitive project environments. It does not describe the processes or steps involved in project, program or portfolio management.

Reading/ Video References
https://www.youtube.com/watch?v=fjh_QY2IKwA
https://products.ipma.world/wp-content/uploads/2016/03/IPMA_ICB_4_0_WEB.pdf

19. **Microsoft Project 2019**. Microsoft Project is a project management software product, developed and sold by Microsoft. It is designed to assist a project manager in developing a schedule, assigning resources to tasks, tracking progress, managing the budget, and analysing workloads. Microsoft Project was the company's third Microsoft Windows-based application. Within a few years after its launch, it became the dominant PC-based project management software. It is part of the Microsoft Office family but has never been included in any of the Office suites. It is available currently in four editions, Standard, Professional, Server and Online. The software shall be covered in hand holding mode by providing handouts towards creating a project by using a military example for easy assimilation. '*Microsoft Project 2019 - Step by Step'* book guide is a free pdf download and can be used for development of core concepts.

Reading/ Video References
https://pdfcoffee.com/microsoft-project-2019-step-by-step-cindy-lewis-pdf-free.html

In addition, YouTube Channels - Edureka and Simplilearn Project Management videos are recommended for exploring the finer nuances of the subject.