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# Recommendation to Improve Project Management Practices of the Case Company

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“وَقُلْ رَبِّ زِدْنِي عِلْمًا”

“Oh, Allah benefit us from what you taught us, and teach us what will benefit us, and grant us more of your knowledge. Oh, Allah open upon me your doors of wisdom and spread your mercy upon me and secure me straight understanding, for you almighty we have no knowledge except what you taught us and for you are the knowing and wise ”.

Twenty-two years passed by since I goodbye The Hashemite University and started my professional career journey in the field of Electrical Engineering, I been blessed to work in different countries with different cultures, languages and heritage, among different companies for each gifted me access to different experiences, exposures and knowledge. And here I am again knocking Metropolia University doors seeking the long-desired knowledge and accepting the challenge and all gifts that comes along with it.

Here I want to take the opportunity to thank Case Company Management for their great help in facilitating the access to company organizational assets and personnel that made this work possible. special thanks for my mentors in \*case company Kaj Bjorkqvist and Mikko Parikka. I would like to thank Global Account team and Region Europe team for their great help providing interesting rich inputs and contributions. I would like to thank all stakeholders, interviewees, workshop participants who constructively contributed in this work.

Warm thanks to my Thesis Instructor Dr. Thomas Rohweder for guidance and pointing me in the right direction. And M.A. Sonja Holappa for supervising my professional language. Thanks for the Wonderful Dr. Juha Haimala, and Special thanks to Dr. James Collins for his constructive inputs that contributed through my study program. Warm thanks to Dr. Jarmo Toivanen for mind opening knowledge and experiences. And here I want to thank Metropolia University staff and employees in industrial management study program. I also want to thank my fellow students for their valuable contributions, discussions and successful group assignments.

To My late father, your face was always there with me. To my Beloved mother thank you for always believing in me and strengthening my will with your warm assuring words. To my life companion Amina thank you for being there for me. This Lovely journey was everything but easy but it was totally worth the effort. And yet I am wondering what is next?

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<p>The objective of the study is to recommend improvements for project management practices of the case company. The case company has increased interest and focus on project management in its plant engineering projects. Since adequate project management practices implementation contribute directly in project success. the project management guidelines are established in the company system but yet it needs further detailing and more attention to be paid during project implementations.</p> <p>The research approach chosen for this study is design research, the study consists of four stages. The first stage carries out current state analysis where company organizational assets has been exploited, company stakeholders has been accessed to offer detailed description of company current project delivery and project management practices. Further it helped identifying strengths and weaknesses for current implementations. The second stage utilized academic and professional literature to come up with idea's to be utilized developing improvements to highlighted weakness found in first stage and form conceptual framework. Third stage was conducted utilizing the finding from the current state analysis and conceptual framework and by engaging company key stakeholders to co-create a draft for initial recommendations for improving current project management practices. the fourth and final stage was collecting feedbacks from initial recommendations and validating them with company key stakeholders to condensate final recommendations for improving project management practices.</p> <p>Several strengths and weaknesses were identified through the study. The study shortlisted most relevant weaknesses related to integrated change control implementations and the quality issues associated with it. in order to improve project management practices special attention was given to integrated change control, by redefining the framework of change control, improved processes implementations on organizational and personal levels. Implement iterative improvement on integrated change control processes to ultimately optimize the processes and integrate it with company ERP system.</p> <p>The outcome of the study, final recommendations provide a set of recommendations that resembles an action plan to improve project management practices through elevating and optimizing integrated change control processes. adequate implementation of enhanced integrated change control positively contributes with enhanced project governance and optimized financial performance for the projects, which will jointly benefit company and customers alike.</p>	
Keywords	Project management practices, Integrated change control. Organizational change control, individual change control. A3 Method. Continuous Improvement.

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## 1 Introduction

The purpose of any company is to conduct business to generate revenues and achieve profits. While commercial aspects can vary from company to company depending on its purpose and strategy, companies conduct projects to serve their own purpose and strategy. Projects are endeavors where time, scope, budget are the main constraints, where main constraints need to be considered to call a project success.

Project management is a set of process where the iron triangle of constraints (Time, Scope, Budget) is being regulated, controlled, compensated to achieve the project purpose and make sure the results are aligned with company quality levels, strategy and the revenues the project promised. project management is active during the project's lifecycle starting by initiation, planning, execution and ending with project closure. project managers are the glue that hold everything together.

Its common example that no body plans to fail, but they fail to plan, according to PMI (Project management Institute 2020) study 50 % of projects are susceptible to failure if they don't follow project management practices, processes, and guidelines properly. poorly managed projects are highly likely to derailed and fail which will cause financial losses through customer claims and negatively affecting company reputation. The purpose of this study to define and review possible improvements and recommendations for project management processes and practices in the case company.

### 1.1 Business Context

The company in this thesis is an engineering and consultancy company that provides its customers with engineering and design services. deliveries ranging from concepts, basic and detailed engineering design, documentation and digital solutions. Professional consultancy services in the field of industrial plants. furthermore, it develops power plants and battery farms engineering services, it also provides engineering services to oil and gas sector, refineries and oil and gas storage solutions, Moreover the company expertise reach on plant engineering and the processes ranging from food and beverage, wood and paper, mining industry. moreover, the case company has good references on product engineering and covers various forms of machinery and equipment as well as expertise in building design services and transportation solutions. The case company also offers digital solutions in regard of document control and technical documentation services as well as project management services.

The case company was founded in 1984, with more than 35 years of experience under its belt, home for more than 1000 specialist from 30 nationalities, references include more than 10 000 achieved projects globally in more than 100 countries. the company branches in 7 countries which are Finland, Sweden, Norway, France, Germany, India and Saudi Arabia.

As the company is engaged with many different and often complex projects, with different customers and different nature of projects. Further, special care and further consideration need to be given to project management practices and methods as it is in the heart of the company business. Failure to adhere to successful project management practices and methods will have serious consequences on project performance and consequently financial losses as well as market share loss due reputation degradation.

## 1.2 Business Challenge, Objective and Outcome

The case company has changed in a way its targeting new customer base and expanding its market share. This expansion process dictated the company to make organizational changes, and face new customers' demands with brand new scopes, and interests. This expansion and interaction with new customers have caused challenges to existing project management practices and guidelines, a key idea to success is engaging customers, keep them informed and interested.

The challenges reside in new workflows as dictated by new customers and processes, challenges with project governance, challenges in collaboration between project teams participants from different engineering disciplines, and the need for supporting platforms to achieve project performance and generate a cohesive view for project teams' members.

The objective of this study is to propose Recommendations to Improve Project Management Practices and processes of the Case Company, as the outcome we hope to deliver validated recommendations for improved project management practices and processes for the case company in this thesis.

### 1.3 Thesis Outline

The study includes 7 sections. Section one provides the introduction where \*case company is described and explained. Furthermore, introduction identifies business challenge and the expected outcome of the study. Section 2 describes the research design, data collection plan and study plan. Section 3 describes current state analysis and identifies the strengths and weaknesses. Section 4 describes the conceptual framework and analyzes findings through relevant literature, section 5 and 6 describes the initial recommendations for improvements and validates the recommendations through feedback and criticism respectively, section 7 state the conclusions and reflections on the study.

This study does not include implementations or process developments as it is only limited to \*current state analysis and recommendations to improve \*case company project management processes and practices. The next section describes the research approach, research design and data acquisition plan.

## 2 Method and Material

This section describes the needed research approach and the research design which explains different stages and the logic of this study. Furthermore it describes data collection and analysis methods.

### 2.1 Research Approach

According to Saunders et al. (2016) all business and management research has different purposes and contexts. One research approach could be labeled as basic, fundamental and pure research which undertakes the theoretical understanding process of business or management and their respective outcomes. This fundamental or pure research is often conducted dominantly by traditional universities and educational institutions and it revolves around academic agenda. The target audience for such research is academic scholars and academic communities. The real-life practical applications and their implications are merely studied if at all in fundamental pure research.

According to Saunders et al. (2016) basic, fundamental, pure research often aims to expand knowledge of process and management. The results in general principle relates processes and its relationship to outcomes. The consequence findings as a result are significant to society in broad lines. While basic fundamental has relatively flexible times scales.

According to Saunders et al. (2016) on the other end of \*spectrum is another research approach that could be labeled as applied research, applied research often addresses a specific set of issues that has importance to specific entities. The results of the research are relevant to target audience "managers" and they represent often a set of measures and action plans that is understood by managers and doable actions to be taken consequently.

The purpose of research approach is to find solutions to specific problems, and develop new knowledge areas about the issue of the problem and findings resulted have practical value to managers and entities or organizations. This type of research is conducted by variety of personnel in the body of the organizations and education institutions with limited time schedule.

According to Kothari (2004) applied research aims at finding solutions to immediate problems facing organizations in the field of business and industry. According to Kananen (2013) design research offers functional and practical solutions to organizational problems, as it is a combination of research and development in organizations in order to solve the problems and enhance operations. as design research targets one's organization processes, products and services.

This study will be conducted according to design research approach. And it will utilize qualitative methods. The reason behind this decision this study will take specific case company which has organizational issues and challenges that need to be addressed, explained and understood in a way to come up with possible solutions, action plans and development proposals, it also aims at producing new knowledge areas around the case company issues and challenges utilizing professional relevant literature.

In this study qualitative data collection approach is followed as this study will not include implementation or evaluation of the outcome recommendations effect on project management practices for the case company.

## 2.2 Research Design

This study includes four stages to elaborate and address issues and problems as stated in \*previous chapter. Figure 1 illustrates the stages in which this study will be conducted. First stage is \*current state analysis was gathering and collection of all existing information. Then analyze and perform process mapping to understand how projects are chartered, initiated, planned, executed and closed. Further to that how stakeholders are identified, and how risks are identified and documented. Moreover, how to implement change control mechanisms, elaborate on validation and quality, understand configuration control. further we will understand the project handover and closure processes, documenting lessons learned and archiving project documentation. this study will inspect the mechanisms and measures of customer satisfaction and the feedbacks received from customers and reflect them on future projects. in this stage this study will utilize case company assets, project management processes, project delivery documentation, project plans. Furthermore, this study will utilize interviews with project management Heads, project managers and project team members. The communications, observations, interviews and workshops will be either by emails, phone calls, Microsoft teams one on one meetings or with a group of stakeholders.

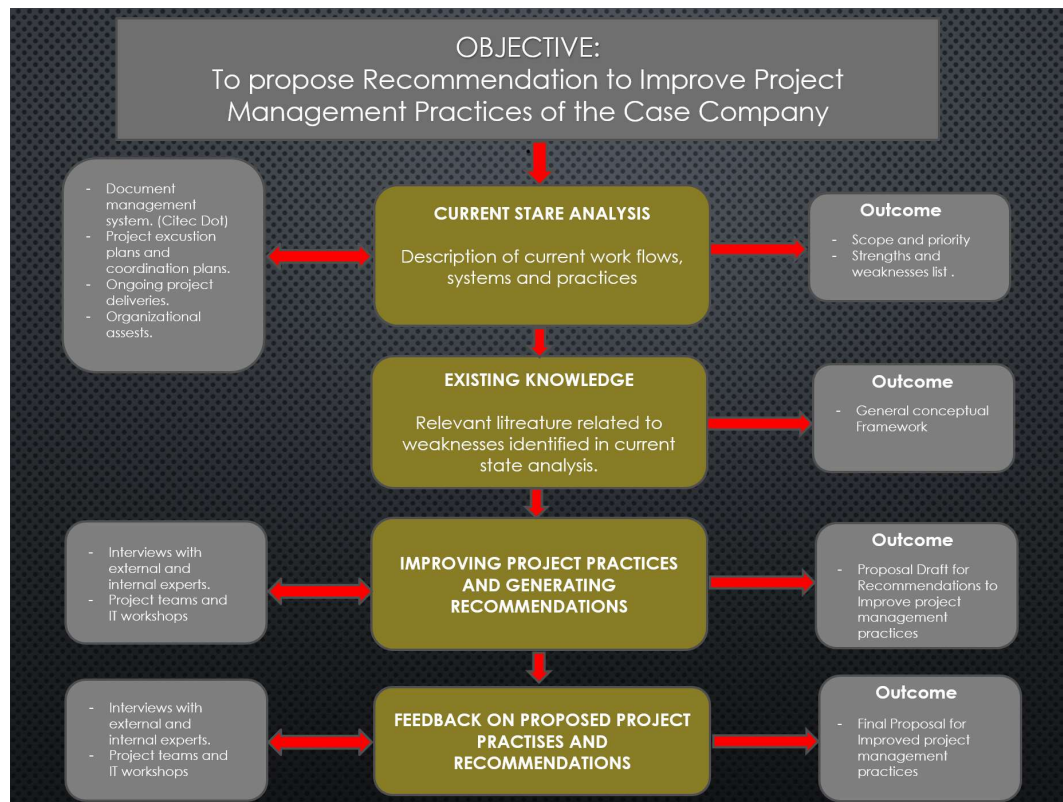


Figure 1 Research design of this study

During \*current state analysis with the help of tools previously mentioned, a set of strengths and weaknesses will be identified. The second stage of this study will be about target weaknesses which will be shortlisted for further consideration. Moreover \*shortlisted weaknesses will be addressed to come up with conceptual framework which will Utilize professional and academic relative literature to highlight the ideas on which this study will exploit to address the shortlisted weaknesses.

In the Third stage, with the help of various stakeholders and collaboration tools to discuss, initial proposed solutions will be created and co-created, mitigations, practices to improve \*case company project management practices. Finally, in the fourth stage this study took initial proposals and solutions and validated them by scrutiny, testing and criticism to come up with the outcome which are the recommendations to improve project management practices. This process involved various stakeholders explained earlier to the finalize the list of recommendations to Improve Project Management Practices of the Case Company.

### 2.3 Data Collection and Analysis

This study sourced data from various sources, starting My organizational assets, project delivery processes, gate model processes, project management guidelines, resource and change management. On the other hand, this study utilized interviews and workshops with various stakeholders relevant to the study. In this study data were collected in 3 rounds, an illustration of data collection is explained in three tables indicated below. Table 1 reveals Data 1 collection for the current state analysis.

Table 1. Data 1 Collection and internal documents

No.	Source / Informant	Data type	Topic / description	Date / Length	Documented
<b>Data 1, for the Current state analysis</b>					
1	Delivery Process	Document (Intranet)	Project's delivery process,	Accessed Jan, 2021 13 pages	Intranet web page
2	Internal Ordering	Document (Intranet)	Ordering processes for projects	Accessed Jan, 2021 25 pages	Regions/GA and EDC - Internal ordering
3	Resource Allocation and load estimating	Document (Intranet)	Resource scheduling and planning	Accessed Jan, 2021 9 pages	Resource allocation and load estimating
4	Project classification	Document (Intranet)	Classification to projects by size	Accessed Jan, 2021 4 pages	Project classification, K000093
5	Delivery Type Guideline	Document (Intranet)	Explains various project delivery types	Accessed Jan, 2021 10 pages	Delivery type, Guideline K000556
6	Delivery process, Description	Document (Intranet)	Project delivery process description	Accessed Jan, 2021 5 pages	Delivery process, Description QEHS000021
7	Project Management, Guideline	Document (Intranet)	Guidelines for project managers	Accessed Jan, 2021 120 pages	Project Management, Guideline K000543
8	Project management director	One on one interview	Project management delivery	25 Dec 2020	Microsoft Teams Recording
9	Project management Head, region Europe	One on one interview	Project management delivery	25 Dec 2020	Microsoft Teams Recording
10	Project management Head, Global Account	One on one interview	Project management delivery	4 Jan 2021	Microsoft Teams Recording
11	Project management Head, Germany	One on one interview	Project management delivery	4 Jan 2021	Microsoft Teams Recording
12	Project manager	One on one interview	Current Projects processes and challenges	4 Jan 2021	Microsoft Teams Recording
13	Project manager	One on one interview	Current Projects processes and challenges	4 Jan 2021	Microsoft Teams Recording
14	Project manager	One on one interview	Current Projects processes and challenges	4 Jan 2021	Microsoft Teams Recording
15	Chief design Engineers -	Workshop	Current Projects processes and challenges	4 Jan 2021	Microsoft Teams Recording
16	Chief design Engineers -	workshop	Current Projects processes and challenges	4 Jan 2021	Microsoft Teams Recording

As illustrated in Table 1, the data collection was conducted to gain a knowledge and basis to establish the understanding of the current state of project management of the case company. The data collected was organization internal documentation in the area of project management, interviews and workshops was help to have the clarity on the Subject. Table 2 follows to detail Data 2 collection which will assist and facilitate drafting initial recommendations to improve project management practices for the case company.

Table 2. Data 2 Collection.

	Source / Informant	Data type	Topic / description	Date / Length	Documented
<b>No.</b>	<b>Data 2, Initial Recommendations co-creation</b>				
1	Project management director	One on one interview	Co-creation of improved integrated change control framework.	12 Mar 2021	Microsoft Teams Recording
2	Project management Head, region Europe	One on one interview	Co-creation of improved integrated change control framework.	15 Mar 2021	Microsoft Teams Recording
3	Project management Head, Global Account	One on one interview	Co-creation of improved integrated change control framework.	16 Mar 2021	Microsoft Teams Recording
4	Project Managers	workshop	Co-creation of improved integrated change control framework.	21 Mar 2021	Microsoft Teams Recording
5	Project Managers	workshop	Co-creation of improved integrated change control framework.	22 Mar 2021	Microsoft Teams Recording

The second round of data collection Data 2 was collected through one-on-one interviews and workshops with various key stakeholders to facilitate co-creation of the initial recommendations to improve project management practices through improving and enhancing integrated change control framework and processes. As illustrated in table 2 the interviews and workshops were conducted utilizing Microsoft teams due to mandatory safety measures of ongoing COVID-19 pandemic.

Table 3 illustrates Data 3 was the final data set in the data collection which comprises of feedbacks from key stakeholders on initial drafted recommendations to improve project management practices

Table 3. Data 3 Collection.

	Source / Informant	Data type	Topic / description	Date / Length	Documented
<b>No.</b>	<b>Data 2, Initial Recommendations co-creation</b>				
<b>1</b>	Project management director	Email Correspondence	Co-creation of improved integrated change control framework.	12 Mar 2021	Field Notes Microsoft Teams
<b>2</b>	Project management Head, region Europe	Email Correspondence	Co-creation of improved integrated change control framework.	15 Mar 2021	Field Notes Microsoft Teams
<b>3</b>	Project management Head, Global Account	Email Correspondence	Co-creation of improved integrated change control framework.	16 Mar 2021	Field Notes Microsoft Teams

The final data collected Data 3 was collected through email correspondences and Microsoft Teams conversations. feed backs gathered and contributed into forming final recommendations for project management practices improvement.

The next section of this study presents the findings of data 1 collection which contains current state analysis of the case company project delivery and project management practices.

### 3 Current State Analysis

This section describes the current state of project deliveries processes and project management processes in the case company. This section will handle the shortlisted and categorized strengths and weaknesses as a result of inspecting organizational assets and as a result of conducted interviews with various stakeholders. Furthermore it establishes the collection of data to conceptualize the current state analysis as discussed in \*previous section.

In this section this study will provide an overview of current state analysis (CSA), it establishes the project delivery understanding by elaborating on project delivery stages starting with sales phase to and processes between company regions / Global Account GA. Then we will elaborate on project classification by determining the type of delivery and the tools to classify projects. After this section will explain project phases and general project phases and project setup and general responsibilities. Moreover, this section will elaborate on gate-controlled planning process, Work sharing and package management, Document Management and internal checking and approval as well as Project accounting.

#### 3.1 Overview of the Current State Analysis Stage

The data collection started by gathering documents from \*Case company intranet and internal documentation through company electronic documentation system. Gathered documents describes the project delivery process and project management processes, the documents included handbooks, guidelines, descriptions, diagrams, tools and software's. Many relevant stakeholders have been identified in connection with case study scope and in alignment with data collection steps elaborated in previous sections, stakeholders.

The documentation gathered has extensive explanations and elaborations on delivery management and project management processes. The document gathered were reviewed and inspected, digested and understood to sufficient extent. Then stakeholders' interviews were utilized to have \*\*clearer view on concepts and ideas. Furthermore, meetings and interviews and various workshops were conducted, with project management heads, project managers, chief design engineers, design engineers and other project teams were utilized to have perfect understanding on underlying processes and

procedures of project delivery and project management. Appendix 1 will shortlist the questions asked during team's interviews for processes clarity.

The Next stage after the study of documents and feedback from interviews and workshops a series of themed interviews has been conducted with selected key stakeholders of project delivery and management, interviews were conducted of personnel located in Finland (Espoo, Vaasa), Germany Office, France Office and India Offices (Mumbai). Interviews conducted on audio utilizing Microsoft Teams. The interviewees were asked to project their own thoughts and experiences and personal position on the processes which belong to current state, observations and opinions were logged into field notes log sheets during the meetings and interviews or after discussions. The questions asked during the interviews are shown in appendix 2.

During the interviews it was clear that similar redundant themed responses were observed. The responses identifying similar opinions and positions were categorized. Each category was describing \*\*specific aspect of current project delivery and project management processes. Reflecting on the field notes were analyzed and shortlisted to come up with strengths and weaknesses categorized in similar themed categories.

### **3.2 Description and Analysis of the Existing Process**

The description of \*current state was interpreted in company organizational assets clearly, where delivery processes were describing the project lifecycle from sales opportunity to projects closure and documenting lessons learned and observing customer satisfaction after delivery finishes and of course all the stages happening between. The Following Sections will explain the delivery and project management processes in a more detailed manner.

### 3.2.1 Regions and Global Account

The Regions or Global Account have the total responsibility (Project Owner) of the work order. The Regions and Global Account are accountable for the Customer Business Development, Satisfaction, Profitability, Project Sales Offering, Project Management, Special Engineering Partners.

The Region Project Management department is responsible for managing the sold services. Core project team resources are nominated from own Region/Global account and requested from Engineering Delivery Centre (EDC) or other Regions as required. In projects where special competence is needed and not available in EDC, it's to be arranged by the Region/Global account as illustrated in figure 2.

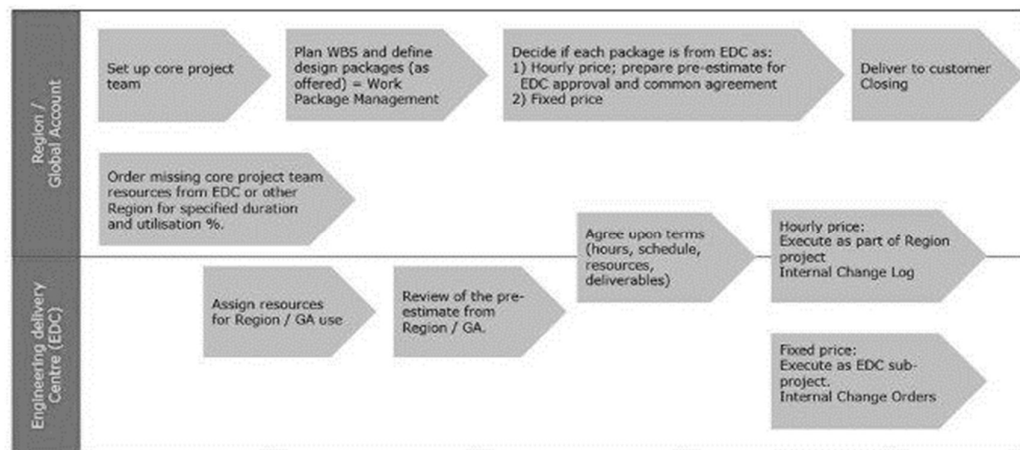


Figure 2 Projecting and internal ordering (Case Company Intranet 2020)

During Offering costs are jointly estimated, approved by both parties and \*result stored in Case Company Offer Machine Software as illustrated in figure 3.

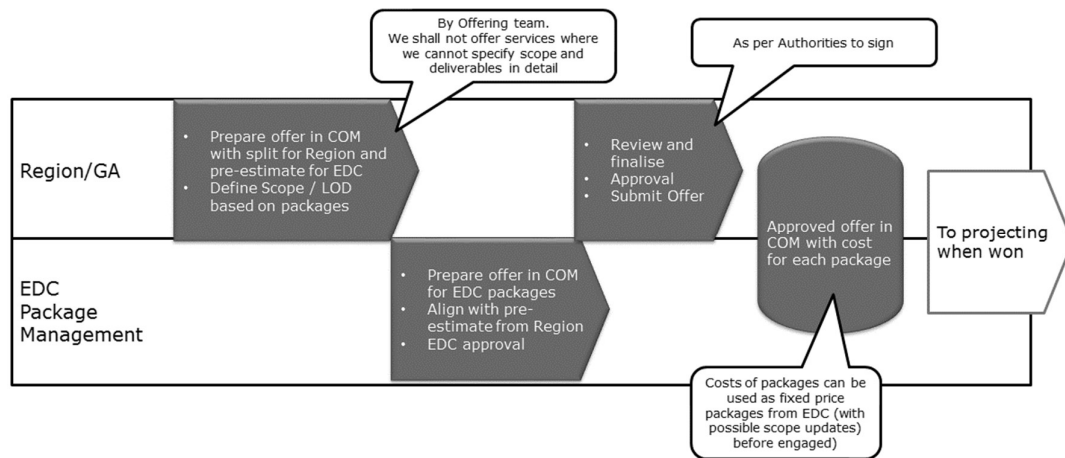


Figure 3 Region/GA plans and manages resource requests from EDC. (Case Company Intranet 2020)

Resource allocation and workload estimating and Long-term planning is managed from the early sales to the end of project with gradually increasing details and certainty. Up-to-date and reliable work load estimates are vital to efficiently manage:

- 1) resource availability for high quality performance sold tasks and
- 2) high invoicing level for organizational profit.
- 3) financial estimates for oncoming months

Long term planning is done on role / cost category level (Country/discipline/role level).

Resource plans are typically recorded on few temporary work breakdown structures (WBS) lines before final WBS structure is developed.

Resources are assigned to project tasks typically on one or two phases:

Phase 1 Project core team planning is managed and recorded by Sale or Project Manager, usually during late sales before submitting Offer. Project core team plans are agreed with Resourcing Line Manager from Region or EDC before assignment Project core team to included team to perform Extended Basic Engineering - i.e., also required members from EDC. For small projects all resources can be treated as Project Core team and directly assigned to planned tasks by project manager PM.

Phase 2 Short-term planning: Team members are assigned to tasks by Resourcing Line Manager typically 1-2 months before resources are needed.

Reliable view to Planned Hours is a must; \*Case Company uses Planned Hours as the load view to secure availability of needed resources as well as profitable business. If the

case load view is inaccurate, consequently \*project ends up to wrong or missing actions and low profit.

For Key Customers \*Case Company is committed to provide complete services - no matter how much work load varies. Under this varying load \*case company does not have \*luxury to have all the needed competences and resources in-house during low load period. \*Case company must be flexible and capable to utilize external resources to balance the workload fluctuations as well as to find needed competences for every project.

For project success it is mandatory to secure that competent resources are available on time. \*Case company always tries to find the needed resources via Resource Allocation process from Case company Global resources. In case the needed resources are not available then there will be extended search for externals.

The Case company has three basic ways to extend project capacity and/or competences beyond resources/competences available at global company level.

1. Book external persons to become part of Project Core Team which is Managed by PM. For resources needed in the core team to be close to the customer or with special understanding of customers technology, products or processes
2. Purchase a design package' from an external company which is Managed by project manager (PM) / chief design engineer (CDE), Design Packages' quoted during Offering and contracted after project contract. Use the Purchasing process.
3. Load balance by Engineering Delivery center which is Managed by EDC, in case resources/competences needed are extension to the case company own competences or experts for specific detail design. It is also Based on Load Estimates (offered projects) from Sales to early balance resources pool up or down as per estimated need.

### **3.2.2 Type of Delivery**

Any upcoming contract / order are analyzed to determine type of category (project or professional service) is applicable, ensuring services provided are professionally approached utilizing proper activities for delivering exceptional results as illustrated in figure 4.

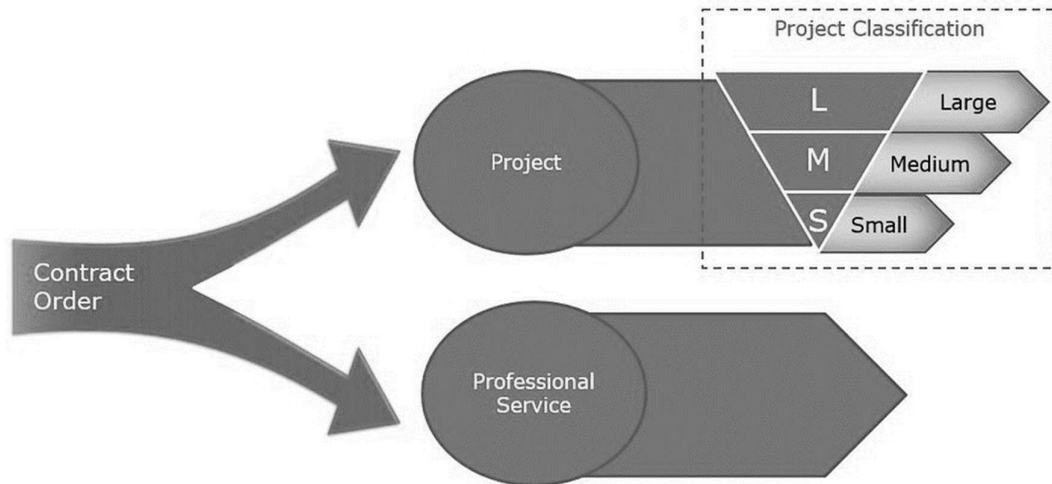


Figure 4 Type of service and project classification. (Case Company Intranet 2020)

\*Case company employs a classification tool to classify projects size and risk level involved, the classification Tool is considering the contract Price and the way of invoicing, the scope clarity, project time schedule, the project cost, disciplines involved. Furthermore, it considers competence areas, project organization, customer classification, technology involved, liability and strategic significance. The classification tool will classify project into (S, Small), (M, Medium), (L, Large) according to size. And further it will project risk Levels into Low, Moderate, and High.

Professional service is a work package not fulfilling the qualifications of a project. Professional service can be a work task to provide a service where \*customer has the main project planning and management responsibility, typically when resources are working in customer facilities or construction sites under supervision of the customer. This type of work can also be minor work tasks, consultancy services and work assignments generated via established systems or processes (tickets, requests, etc.).

### 3.2.3 Work processes

Case Company operate effectively by identifying and managing many linked activities. These activities are using resources, which are managed in order to be able to transform the flow of inputs into outputs. These activities can be considered as a process or processes. Often the output from one process directly forms the input to the next and so forth PMbok (2013).

Delivery categorized as Professional Service are managed as regular work tasks, project management methodologies as described for projects can be applied if seen beneficial.

According to PMbok (2013) Project management is the application of knowledge, skills, tools, and techniques to project activities to meet contract requirements. Project management is performed using the processes such as initiating, planning, executing, monitoring and controlling as well as project closing, as illustrated in Figure 5

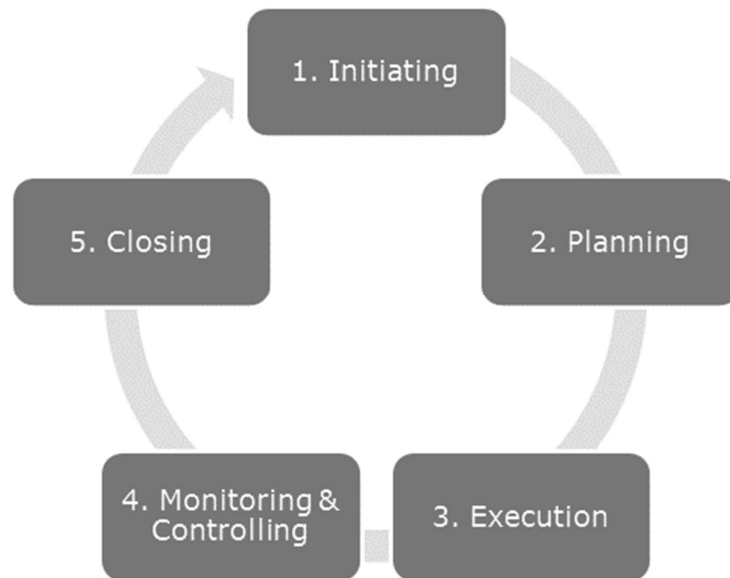


Figure 5. Project Phases (Case Company Intranet 2020)

To Elaborate Further on the project phases in the case company each phase will be explained as follows:

- **Project Initiation** The project management works starts with the initiation phase and consists of those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase. The initial scope is defined and initial financial resources are committed. Stakeholders who will interact with the project are to be identified, PMbok (2013).
- **Project Planning** The project planning phase consists of those processes performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives. The complex nature of project management may require the use of repeated feedback loops

for additional analysis. The key benefit is to delineate the strategy and tactics as well as the course of action or path to successfully complete the project or phase., PMbok (2013).

- **Project Execution** The project execution phase consists of those processes performed to complete the project execution plan to satisfy the project specifications. This involves coordinating people and resources, managing stakeholder expectations as well as integrating and performing the activities of the project in accordance with the project execution plan, PMbok (2013).
- **Project Monitoring and Control** Internal monitoring and control provides a timeline of the project status progress and the final report serves as a summary of how the project succeeded in achieving the goal. Progress measurement shall be conducted on a weekly basis if not otherwise agreed. The internal reporting serves also as base for the customer reporting and is an important way of communicating the project status to stakeholders all that have an interest in the progress and status of the project, PMbok (2013).
- **Project Closing** phase consists of those processes performed to conclude all activities across all project management process groups to formally complete the project, phase or contractual obligations. The process group when completed, verifies that the defined processes are completed within all of the process groups to close the project or a project phase, as appropriate and formally establishes that the project or project phase is complete, PMbok (2013).

### 3.2.4 Project Delivery

Project setup and general responsibilities, responsibilities in the case company can be observed in Figure 6. The appointed project core team members in the Region or Global Account are responsible for the project management processes. Moreover, it is responsible for being the customer interface, planning and managing project Time schedule, preparing costs and controlling them. It is also in charge of requirements management and technical solutions creation, interdisciplinary coordination, change management and work package sharing. On the other hand, Engineering Delivery Center EDC is responsible for Work Package execution. On time delivery technical expertise and man power is the responsibility of EDC.

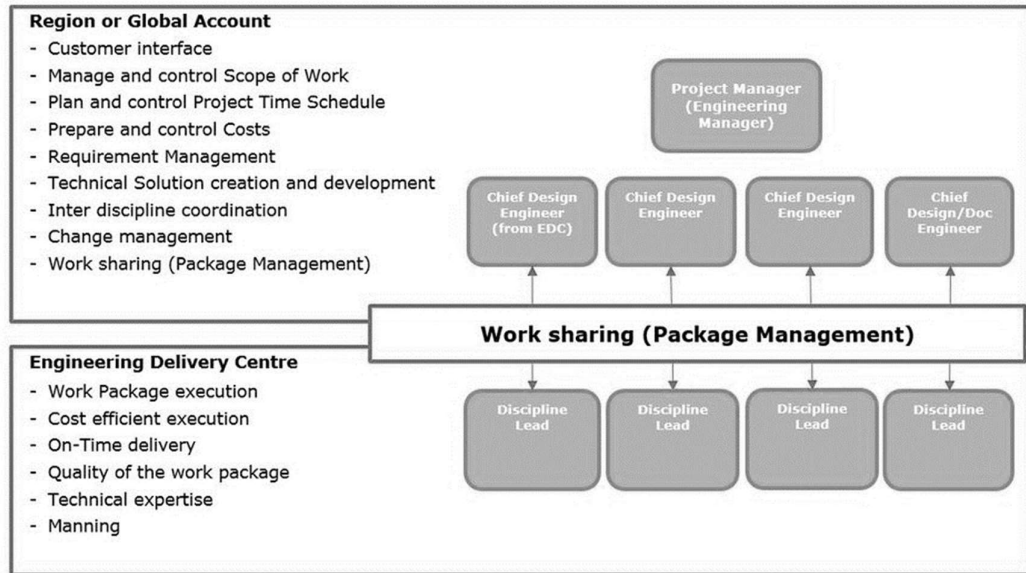


Figure 6 Project Setup and General Responsibility (Case Company Intranet 2020)

Delivery Projects Milestones can be observed in Figure 7. After sales handover of the project, project lifecycle starts by chartering, naming the Project manager and Core team, then planning phase start by kick-off meeting, project execution and quality plans are set, Internal kickoff of engineering delivery center team Occurs after. Through the execution phase reviews, checks and performance reporting along with customer deliverables are performed as projects heading toward project closure.

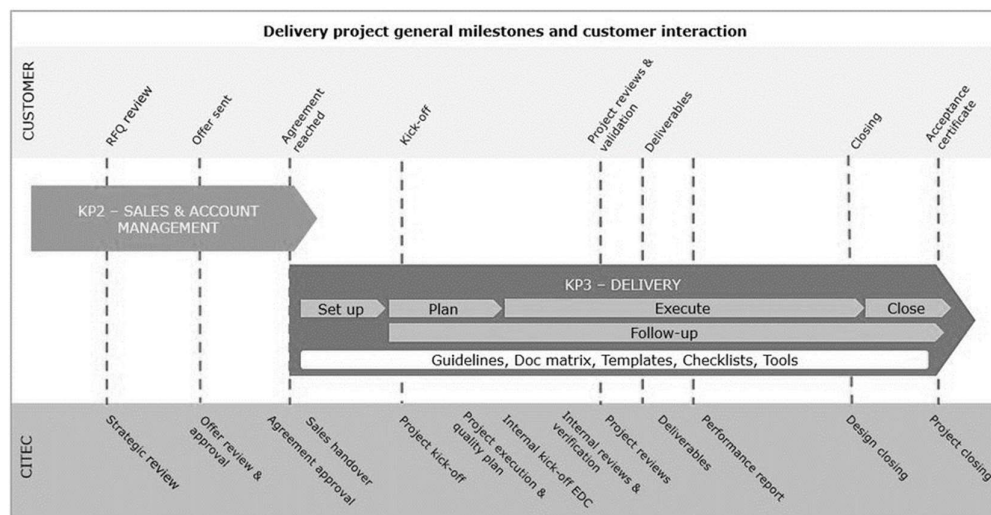


Figure 7 Delivery project general milestones and customer interaction (Case Company Intranet 2020)

### 3.2.5 Gate Controlled Planning Process

\*Case Company Gate Model process is developed for execution of plant engineering projects. Gate Controlled Planning Process phases consists of preparing seven (7) gates, each gate is controlled by project specified targets. The project phases are to be aligned with the project key milestones. For key customers is the gate model to be harmonized and aligned to match the process models of the customers.

\*Objectives for the Gate Model includes Actual planning status reflected in real time mode throughout all planning phases at any time. Additionally, it is utilized for Multidiscipline clash free and high-quality plant model prepared in real time concurrently by all disciplines involved. Furthermore, it establishes \*Progress controlled engineering process. Figure 8 explains \*Gate controlled planning process/ Case Company Gate Model.

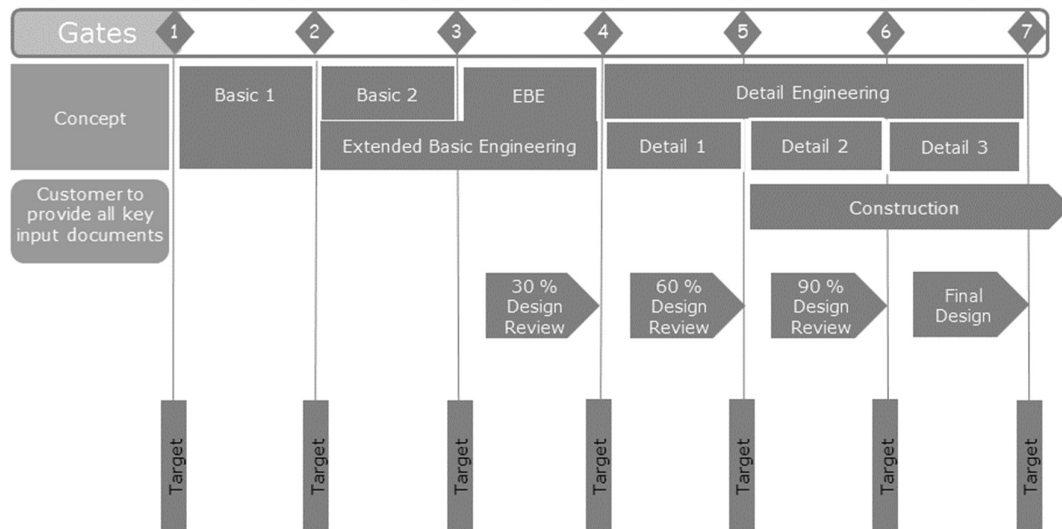


Figure 8 Gate controlled planning process/ Case Company Gate Model (Case Company Intranet 2020)

The phases are designed to collect specific information to help move the project to the next stage or decision point. Each phase is defined by the processes and activities. Processes are completed in parallel (concurrent engineering). The project passes through a gate where a decision is made whether or not to continue. These gates serve as quality control checkpoints to ensure quality of execution and achieve customer approval (model freeze) of the plant model.

The Gate Controlled Planning Process consists of following phases, Basic 1 phase which sets Plant functionality and layout is defined, The Definition of functional requirements and initial design input are set. Basic 1 is a Key input data required to start Extended Basic Engineering. Basic 2- determines and defines Equipment requirement. In Extended Basic Engineering Plant concept model defined and 30% plant model achieved and approved by customer. The Extended Basic Engineering phase is to be prepared by dedicated plant design task force team consisting of piping layout & design and civil / structural discipline. Jointly & concurrently executed by CDE's from Region / GA and EDC. The task force must be in close cooperation with \*customer. In Detail 1- 60% plant model progress achieved and approved by \*customer. Furthermore, in Detail 2 phase 90% plant model achieved and approved by \*customer. And finally Detail 3- Design completed, Final engineering documentation and Final 3D plant model is delivered.

### **3.2.6 Work sharing, package management**

The appointed project core team in the Region or Global Account is responsible for defining the work sharing (work package, horizontal or vertical work split). To collect requirements defined requirements will be the base for work break down structures (WBS), cost, schedule, quality planning and work sharing. The defined works must be scheduled, cost estimated, monitored and controlled during the project execution. Engineering Delivery Centre is responsible for nominating the discipline leads and manning of the ordered works tasks and packages. At least the following is to be clearly defined and agreed between the Region / AG and EDC before start of work. First Requirements need to be clear, Scope and deliverables as well as Time schedule (input & output) and finally Budget (cost and /or hours).

### **3.2.7 Document management and workflows**

All documentation and produced project deliverables are to be stored in respective project folder in Case Company Document Management System (DMS), in addition to that DMS also provides all project delivery document related templates.

Deliverables or submittal work packages are to be checked by different person with extended knowledge of the content and approved by the persons nominated in the Project Execution and Quality Plan or according to Case Company Quality Management System. If separate approval procedures have been stated in the contract or with the

customer, it's to be followed. It is highly recommended for Project Teams to use check lists for securing the quality and content of the deliverables. Engineering Delivery Centre (EDC) has separate check lists developed for each discipline. It is the Chief Design Engineer's responsibility to supervise that check lists are used and the Project Manager / Leader is accountable to follow-up of the usage for respective project.

### **3.2.8 Project accounting**

Project accounting is utilizing the data from the Case Company ERP system. Meaning that the project resourcing, hours logging, logged hours approval and rejection, as well as project reporting must be managed regularly in Case Company ERP System. Project accounting is managed in \*Case Company Finance system, which is the responsibility of the Finance department.

### **3.3 Summary of the Findings**

The current state analysis findings are considered to be in two categories: strengths and weaknesses. This study has further categorized weaknesses into similarly themed weaknesses. Total 8 strengths have been identified, as for weaknesses 18 weaknesses has been identified.

#### **Strengths**

1. Established Project management system, established project management documentation and guidelines.
2. KP3 Gate model has been established and applied, projects have 7 Gates with each gate has its inputs and outputs and requirements.
3. Project's classification tool, classes granted based on workload, disciplines participating, budget and cost.
4. Very good knowledge of key customers way of working and organizational culture.
5. Knowledge of key customer times schedules by utilizing previous projects knowledge.
6. Good technical knowledge of key customers deliverables.
7. Good technical team competencies.
8. Good knowledge about key customer products.

## **Weaknesses**

The below weaknesses were categorized in same themed groups which contain resemblance between each other.

### **Sales Support Related Weaknesses**

- 1- Support for Project sales teams' activities are not built on established analyzed data, as projects hourly estimation based on experience and personal views
- 2- Previous projects data is not analyzed to establish database for Hour estimation for projects Sales Teams.

### **Strategy Related Weaknesses**

- 3- Project managers and team members are often not aligned with company strategy.
- 4- Team members roles and responsibilities are not acknowledged and communicated clearly.

### **Projects Related Weaknesses**

- 5- Internal and External Communications between project manager, team members and customer teams are not clear enough.
- 6- Challenges in Risk identification, monitoring, and readiness for risk mitigation. Most relevant to risks from delayed inputs from customers.
- 7- Change management challenges, where capturing, documenting, communicating challenges and proving them and tracking them process are not implemented strictly enough.
- 8- Quality implementation challenges, guidelines documents and checklists are in place but teams are not always aware of them.
- 9- Lessons Learned, documentation, handling, archiving need to be conducted in more systematic and more strictly, make lessons learned easy to access and easy to search.

### **KPI's Related Weaknesses**

- 10- Project managers use Earned value KPI's which only monitor schedule and budget, another set of KPI's are not implemented to measure overall project performance.

- 11- Previous Projects files and data are currently not utilized despite it is good source of data and solutions to potential problems in current projects and extract KPI's for benchmarking.

#### **Tools Related Weaknesses**

- 12- Shortage in project management tools where project managers run reports and monitor projects in scattered excel sheets.
- 13- For case company to stay competitive an efficient way of working should be maintained, competitors have relatively higher hours price, but they do same tasks with less hours than we do due to outdated Tools.

#### **Resource Related Weaknesses**

- 14- Resource scheduling challenges, more efficient resourcing and scheduling policies are not in place.
- 15- Challenges in recognizing competencies and recruiting, mentoring and integrating them into the company body.
- 16- No Bonus system for employees is implemented to reinforce their loyalty and boost their productivity.

#### **Customer Satisfaction Related Weaknesses**

- 17- Resource and Customer satisfaction is not measured properly.
- 18- No Action planning based on customer satisfaction; no deep analysis is taking place in that regard.

### **3.4 Key Findings to Elaborate**

This study will be focusing on \*following shortlisted Project related challenges:

- Change management and Control.
- Quality implementation challenges.

The justification for that is the Project change management and control failures have a strong impact on projects profitability, as failing to capture, communicate and approve changes with customers will cause financial losses. Quality implementation has strong correlation with customers satisfaction and trust as well as it impacts on company image and reputation which affects sales projects and consequently profitability.

In the following section. This study will further review shortlisted challenges and search through relative academic and professional literature for improvement ideas and concepts to be elaborated later in proposing solutions for \*shortlisted challenges.

## **4 Improvement Ideas from Relevant Academic and Professional literature**

Section 4 employs relevant existing knowledge whether academic or professional sources to conclude and generate stream of ideas, frameworks, concepts, methods. The shortlisted ideas will contribute into building conceptual framework addressing the weakness points this study address to elaborate in previous section. The previous section outlined 18 weaknesses in 7 categories, this study will address two relevant weakness related to change control and quality implementations.

This section describes major key findings from literature review in 3 subsections. Among each subsection there is definitions and elaborations on each idea, framework, concept, method and its relevance to the case company challenges in this study. The last subsection summarizes the key findings and it visually illustrates the conceptual framework.

The literature describes the frameworks that define change management in duality between project-based change management and the organizational change management. This study tries to bring together those concepts and frameworks. The following subsections defines the project and organizational change scope and how literature ideas contribute in setting change targets, prioritizing change targets, test current process maturity levels and propose the integration between project and organizational change. Furthermore, this study elaborates on implementation concepts and tools.

### **4.1 Change Management Models**

#### **4.1.1 Integrated change Control.**

According to PMI PMBOK (2013) performing integrated change control is the process in which all Customers change requests for being captured, documented, reviewed and approved. Change requests could be related to project deliverables, organizational process assets, projects documents and project management plan. The integrated change control documents and reviews all change requests or modifications to projects documents, deliverables, project schedule, scope, cost baselines or the project management plan and it approves or rejects the changes. The key benefit with integrated change control it allows for documented changes in the project to be reviewed in systematic

integrated fashion which will reduce project risk by eliminating the execution of changes without consideration to the projects plan and objectives .

Figure 9 Illustrates integrated change control process inputs, tools and techniques and outputs.

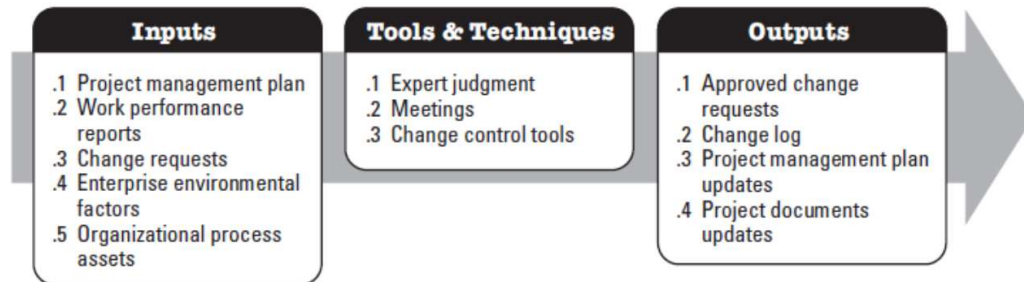


Figure 9 Perform Integrated Change Control: Inputs, Tools & Techniques, and Outputs (PMBOK 2013)

The integrated change control process is conducted starting from project inception through finalization and closure as its ultimately the responsibility of project manager. Project management plan, Project scope, schedule and cost along with project deliverables are maintained by careful and continuous change management. changes are either approved or rejected which will ensure that only agreed approved changes will be incorporated into project consequently revised project baseline to be developed, PMI PMBOK (2013).

Changes may be requested by any stakeholder related to the project, often change requests are initiated verbally, but yet they should be documented in written format and data entered in change management and configuration control system. Changes requested and documented should include estimates on time and cost impact. Every documented change request is processed by responsible individual often by project sponsor or project manager. Project management plan identifies the responsible person or when required change control board CCB. The CCB is formally chartered group of individuals handling the documented change requests as they review, evaluate, approve, delay or reject the changes. The CCB is also responsible for recording and communicating decisions to stakeholders, PMI PMBOK (2013).

Approved change requests often require revised cost estimates, activities sequences, changed delivery dates and additional resources, identify risks associated with change and plans to mitigate those risks. Changes may require adjustments to project management plans and/or project deliverables and project documents, PMI PMBOK (2013).

The change control level is closely related to the project nature, application area, project complexity level, project context and environment on which it performed, contract requirements. In some cases, project sponsor approval is required after CCB approval unless sponsor is part of CCB him/her self.

One important point to observe is that configuration control aims the focus on deliverables and processes configuration. While on the other hand change control is focused on the processes of identifying, documenting, approving or rejecting changes.

According to PMI PMBOK (2013). It is essential to include and integrate configuration management processes with integrated change control processes as described:

- Configuration Identification. Identification of configuration item to define and verify the basis of product configuration. Documents or products are labeled, changes are managed and accountability is defined.
- Configuration Status accounting. This includes recorded reports as when the data about configuration is to be provided, this includes listening of approved configuration identification, the status of proposed changes implementation to the document or product configuration.
- Configuration verification and audit. This process is vital to make sure that all changes corresponding to document or product has been implemented correctly as also functional requirements defined in configuration documentation.

Figure 10 illustrates Perform integrated change control Flow diagram and describes the inputs and involved processes and outputs of integrated change control.

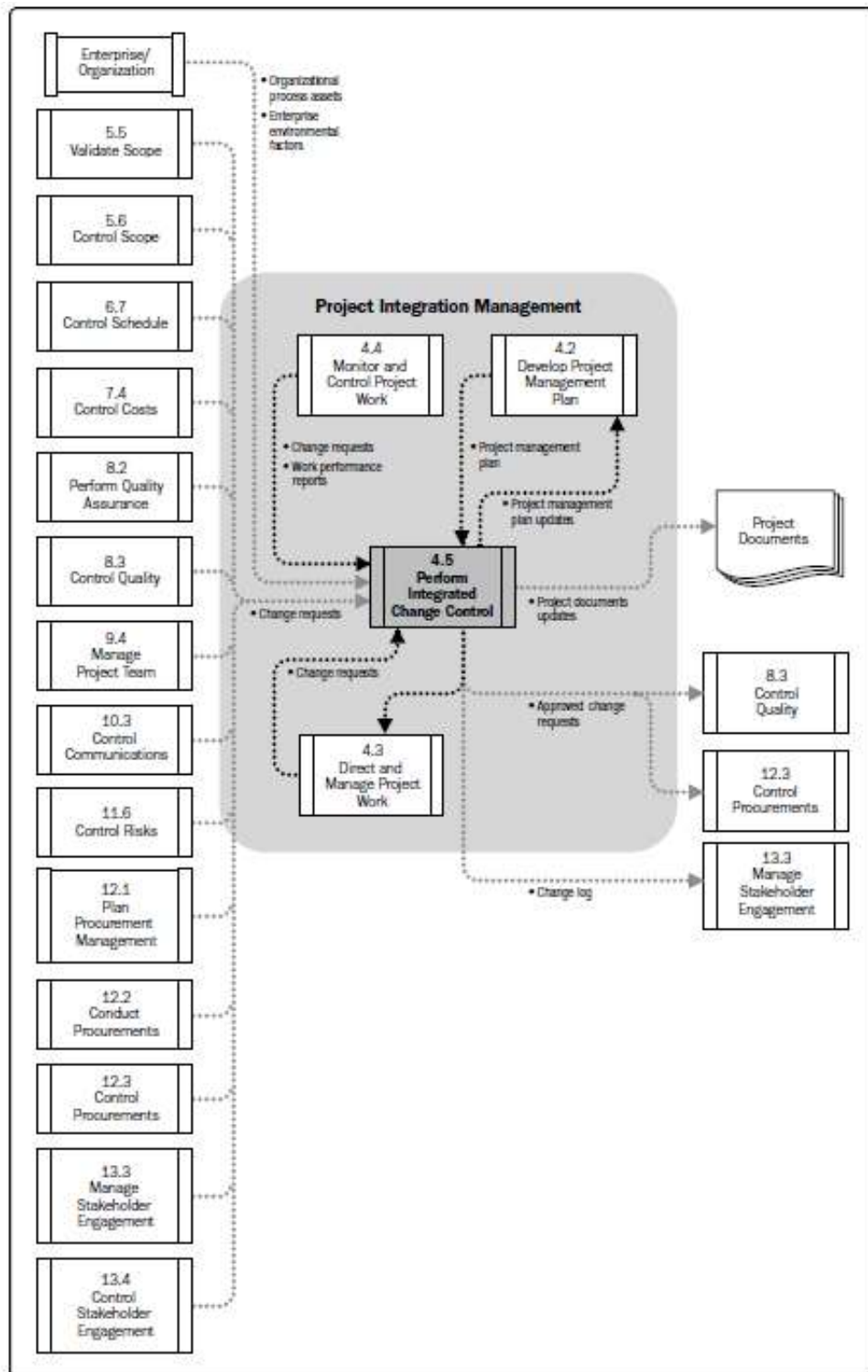


Figure 10. Perform integrated change control Flow diagram. (PMI PMBOK 2013)

Inputs for integrated change control contain the following points:

- Project management plan. Elements in project management plan to be used and not limited to scope management plan which have the procedures for changing the project scope. Project baseline can be used as it contains deliverable definition. And change management plan which provides the guidelines for managing change control process and defines change control board roles. Changes are documented and updated in project management plan as part of configuration management processes, PMI PMBOK (2013).
- Work performance reports in relevance to integrated change control which facilitates the control processes, these reports monitor schedule and cost data, earned value management and burn up or burn down charts, PMI PMBOK (2013).
- Change requests are a result of project monitoring and controlling processes during project execution and it's an output for those processes. Change requests maybe result of requested corrective action, preventive action or defect repairs. Moreover, corrective or preventive actions may not affect projects baselines but they affect the performance against mentioned baselines whether it is schedule, cost or scope baselines, PMI PMBOK (2013).
- Enterprise environmental factors which include environmental factors that can affect and influence integrated change control. It may contain project management information system. The project management information system may include software tool, configuration management systems, web interfaces or other online automated systems as well as data collection and distribution systems, PMI PMBOK (2013).
- Organizational process assets can influence the integrated change control as it includes the change control procedures, and step by step descriptions, policies and plans on how change to deliverables will be conveyed and how changes will be reviewed and approved and validated and implemented. Organizational assets include procedures for approving and issuing authorization for the changes, and how to collect measurement data on change implementation of deliverables. It also includes project specific documents such scope, cost and schedules baselines, project calendars, risk registers and plan risk mitigation plans, change logs.

Further, assets include organizational knowledge bases of organizational standards and policies, PMI PMBOK (2013).

According to PMI PMBOK (2013) integrated change control Tools and Techniques includes the following points:

- Expert judgement from project team experts and stakeholders be shared with change control board, this experienced judgement is applied to any managerial or technical details during change process. Sources for expert judgement could be consultants, customers or sponsors and / or any other stakeholders, professional and technical associations, industry groups, subject matter experts (SME's) and project management office (PMO).
- Meetings which are often referenced as change control meetings carried out by change control board to review change requests and approve or reject them or inflect any other decisions. During the meetings CCB review configuration management activities. CCB decisions are documented and communicated to project stakeholders for the purpose of information and follow up.
- Various organizational tools are utilized for change control and configuration control which considers environmental considerations and constraints.

Integrated change control outputs as expressed in PMI PMBOK (2013) include the following outputs:

- Approved change requests which have been reviewed and proceed by Project Manager, CCB or assigned team members, approved changes will be implemented through Manage Project Work processes. The disposition of all change requests which been approved of rejected will be listed in the project change log as a part of project documents.
- Change Log is a project document used to log all changes during project lifecycle. Further it documents the impact on schedule, time and cost and the risks identified as result of change or potential change which has been communicated to relevant stakeholders.
- Project management plan Updates. Which might include any subsidiary plans or baselines that subject to change process. It is worth mentioning baselines do not apply for past progress and it shall be considered from change point inward.

- Project Documents Updates as a result of the integrated change control processes and it includes all documents that have been subjected to the changes implementation.

#### 4.1.2 McKinsey 7S model

The McKinsey 7S Framework is a management model developed by well-known business consultants Robert H. Waterman, Jr. and Tom Peters in the 1980s. McKinsey 7S model helps to understand if the organization is structured in a way that allows it to reach its own objectives. McKinsey 7S Model is exploited to assist the organizations in organizational change, implementing strategy and understanding the weaknesses of an organization, Bishwajit Baishya 2015.

Bishwajit Baishya (2015) explains that McKinsey 7S Framework is a powerful tool, but yet changing organizations and organizational culture isn't an easy task but that shouldn't deter a person from striving for a change. the McKinsey 7S listed in the Framework The 7 key areas in which alignment and development is due. The 7 key areas are structure, strategy, systems, skills, style, staff .and shared values. The key areas are strongly related and connected, any change in any area will influence other areas in the structure.

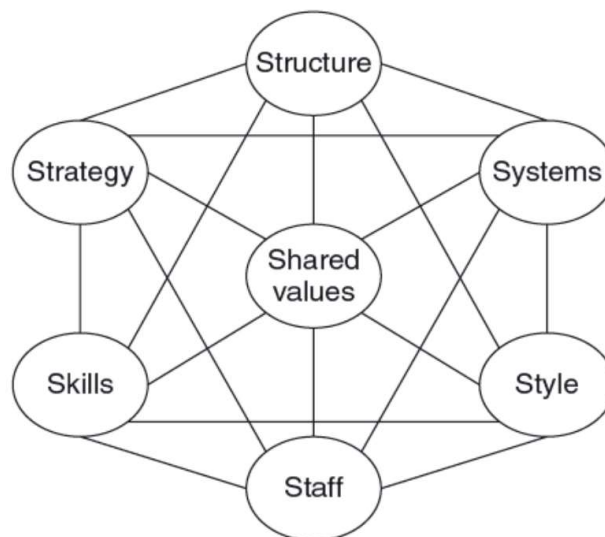


Figure 11. McKinsey 7S model (extracted from Waterman, Peters, and Phillips, 1980).

Figure 11 illustrates McKinsey 7S Framework structure. It's vital to observe there is no hierarchy in the model which illustrates all key areas are equally important and deeply interconnected. The 7S's were categorized into two categories, Hard S's and Soft S's. The Hard S's include Strategy, Structure and Systems, which are relatively easy to management to influence and change but on the other hand soft S's which includes Skills, Staff and Style are more challenging to change. The Shared value is positioned in the center of the structure to indicate shared value is central in the organization and other key areas.

According to Channon and Caldart (2014) Strategy is the means the organization is utilizing to achieve its goals. As it's the set of actions and measures the firm plans as a response to changed environment. That specific set of actions should leverage the firm to defend or improve their complete position and contribute in delivering better quality to customers.

According to Channon and Caldart (2014) Structure to some extent is how the company is structuring its assets, buildings, equipment resources and even money. The challenge that resides with structure is the company ability to shift its structure elements in harmony with other key areas to achieve the evolution of the corporation. The shift of structures could be based on functional considerations, client based or geographical basis. Design and distribution parameters refer to formalization behaviors in certain unit, the degree of decentralization and the degree of vertical and horizontal coordination.

According to Channon and Caldart (2014) Systems does mean the regulations and procedures in both formal and informal that allows for organization to function. Understanding the organization function is key element and how it interacts not only on formal level but informal fashion as well. Bishwajit Baishya (2015) explains Systems are often referred as infrastructure as it includes subsystems relating to production, planning and control, cost accounting procedures, capital budgeting and performance evaluation.

Bishwajit Baishya (2015) Elaborates the Next S is called Style, style means is the lever to bring about the organizational changes. As it expressed in the pattern of actions in

which top management (CEO) conduct over a period of time. Channon and Caldart (2014) states the pattern will support the organization to boost performance and deliver value to company customers. It also indicates if the CEO is participating in micromanagement or just detached from operations and only supervise urgent affairs. is CEO market oriented, and the CEO handles risks.

Bishwajit Baishya (2015) explains Staffing as the processes of selection, placement, training and development of deserved qualified personnel. Channon and Caldart 2014 considers people as the pool of resources that should receive massive care and nourishment, it has to be developed and guarded and allocated. The key role of top management to locate and attract young talented executives carefully crafting their abilities and prepare them to give their contribution to the company.

Skills according to Channon and Caldart (2014) is the tool which companies use to evaluate in realistic terms their capabilities in terms of success factors that describes the business. one issue to highlight the necessity of marrying old skills with the new skills to conceptualize a draft of updated skills as a result of change.

Shared value or Super Ordinate Goal to Bishwajit Baishya (2015) is the set of values and aspirations that goes beyond the explicit formal statement of corporate objectives or the main set of ideas on which the main values are built upon. Channon and Caldart (2014) claims discarding the shared values will condemn change projects to fail to embrace the radical changes required to achieve dramatic stretch targets.

#### **4.1.3 ADKAR Model for individual change management.**

The ADKAR Model states the vital building bricks for individual change and it was developed based on analyzing 900 organizations and entities over a period of 10 years and introduced by Jeffrey M. Hiatt.

According to Hiatt (2006) when groups of individuals go through change processes it is not the organization these people belong that changes but rather the behavior of individuals changes. The change is collective behavior that produces different outcomes to the

organization. For instance, it's not the organizations undergoing the change to its structure but rather a shift in accountabilities and responsibilities. New behaviors result in different outcomes in business perspective. " organizations don't change, people within organizations change" Hiatt (2006).

Hiatt (2006) argues that understanding how to achieve change at individuals' level is vital to achieve changes and achieving goals in organizational scale. Which is often called individual change management. Organizational and individual change management should go hand in hand for achieving successful change projects.

Hiatt (2006) claims The ADKAR Abbreviation resembles the following:

**A:** Awareness of the need to change

**D:** desire to support and participate in the change

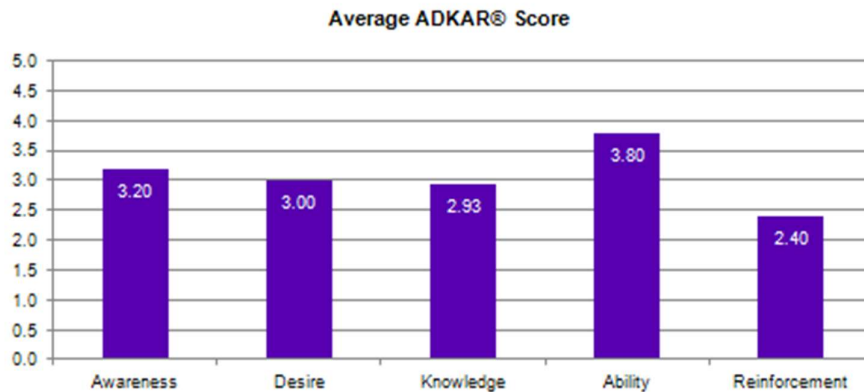
**K:** knowledge how to change

**A:** Ability to implement change

**R:** Reinforcement to sustain change.

The elements summarize the very basic concepts in which individuals need to initiate and sustain change. The elements must be kept in order as they dependent and the success of them is guaranteed when performed in consecutive order. For example, you cannot create desire for change unless the person is aware of the change urgency. Further you cannot force individuals to gain knowledge if there is no desire, no ability to implement challenge is established without gaining knowledge to carry the change and finally you cannot reinforce implementation without establishing the ability of change itself.

ADKAR model Aim to establish Score chart in which guide managers on each individual score in each of the five key elements. Each element score is measured out of 5 where Scoring 3 is called barrier point. Figure 12 explains ADKAR Score chart.



. Figure 12. ADKAR Score chart (Prosci 2012)

According to Hiatt 2006 ADKAR model for individual change management can be applied along with organizational change management frameworks for more effective and deliberate change. As organizational change projects will not be successful without measuring success on individual level.

Hiatt 2006 continues and explains that successful change is not by completing activities but the measurement of outcomes of awareness, desire, knowledge, ability and reinforcement. As this also applies to structured approaches for other managing changes processes from John Kotter, Daryl Connor, Jeanenne LaMarsh and Prosci. Finally, the ADKAR model is that link between individual performance organizational change management and the results of the business.

#### **4.1.4 Malcolm Baldrige criteria for performance excellence**

The Malcolm Baldrige Criteria for Performance Excellence (CPE) is a frame work directed to organizations to empower their competitive edge through enabling same organization to deliver ever improving value to customers. CPE is also handling organizations self-assessments. It's a standard that is being revised and updated annually depending on collective winsome of examiners, award winners and other practitioners.

According to Ford and Evans (2000) Malcolm Baldrige CPE consists of hierarchal formation for elements, areas to address. the addressed areas are Leadership, Strategic Planning, customer and market focus, process management and business results, information and analysis. Figure 13 illustrates Baldrige Award criteria framework.

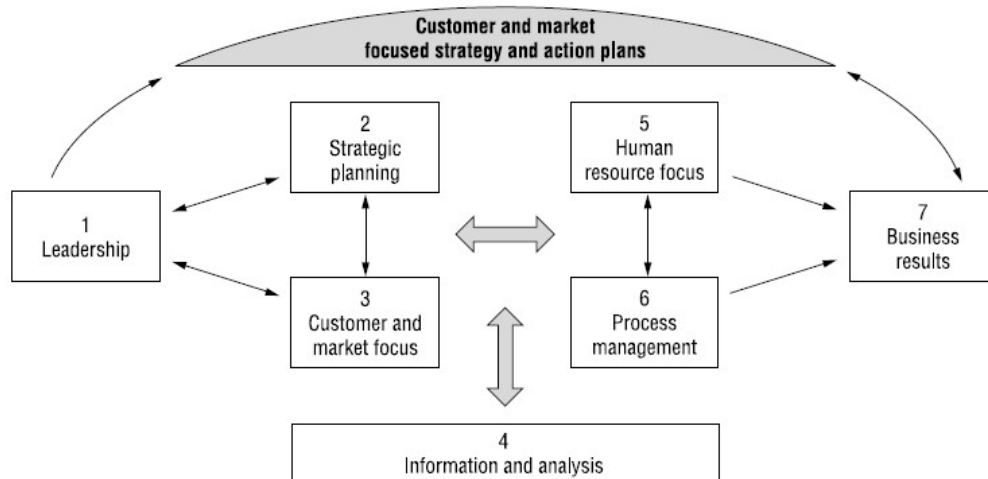


Figure 13. Baldrige Award criteria framework. (Ford and Evans 2000)

Ford and Evans (2000) highlight the hierarchal areas and elaborate as follows:

- Leadership category addresses fundamental questions focused on how senior management manage and how they govern organization and make societal contributions. In other words, setting and deploy mission and vision to organization and its partners as well as workforce and other stakeholders.
- Strategy category handles questions about how an organization develops and implement organizational strategy. Strategy should be aligned with key customer requirements and needs. Complacent with customer need for present and future is the key issue. Implementing strategy done by collecting and analyzing data and performance records. based on data collection and analysis action plans is developed and reviewed for implementation.
- Customers this category the set of questions addressed focused on how the organizations listens and interact and learn from customers. How relationships are

established with customers and how an organization determines customer engagement and satisfaction. Using the set of questions in this category company listens to current former and potential customer as well as competitors to obtain an index of customer preferences for services or product, as it helps organizations to change their structures to support customers engagement and requirements. Having this information will enable change in parallel with customer satisfaction and engagement.

- Process management questions in focuses on how organizations design and manage and improve key products and work processes and how organizations effectively manage operations. In more frank approach how organization design and manage and improve daily work activities.
- Human resources are all work force available in the organization whether its paid employees, contact employees or, interns and volunteers. This criterion asks questions about how an organization builds and effective and supportive work environment and how they engage the workforce for retention and enhanced performance. Engaging workforce will enable management and workforce to have clear understanding of customer need and emotionally and intellectually committed to accomplish organization mission and vision.
- Business results addresses the questions on how the organization is Monitoring performance of key indicators which is directly related to key approaches of an organization. organizations secure the data and information necessary to evaluate and drive performance improvement.
- Information and analysis which is the foundation of the model. It addresses the questions on how organization measures and conduct analysis collected data. And how organization manages and stores its data.

Ford and Evans 2000 claims Leadership, Strategy and customer is often called Leadership Triad its worth mentioning excellent leaders will be distinguished in understanding the triad and guiding organization toward success. Further human resources, process management and business results often called results triad.

## 4.2 Scoping Change Management processes

### 4.2.1 Eisenhower Matrix

The Eisenhower Matrix or Eisenhower Decision Matrix, is named after Dwight David Eisenhower, Eisenhower is the 34th President of the United States. According to Homère and others (2019) the Eisenhower matrix categorizes tasks as urgent and important and the combination in between urgent and important. in a principle the urgent tasks are not important, and the important tasks are never urgent. From then, the Eisenhower Method emerged, classifying and planning the tasks relatively to their Urgency and their Importance in four descending priorities as follows, Figure 14 illustrates Matrix:

- Important and Urgent tasks which should be handled with extreme immediacy, crisis level priority and to be done as soon as possible.
- Important but not urgent tasks associated with long term targets to achieve. its important tasks but don't have concrete deadline yet, these types of tasks are to be scheduled in a timely matter and done later.
- Not important but urgent tasks these tasks can be delegated and transferred to other professionals in the team. As they should be straight forward tasks.
- Not important and not urgent either tasks are looked as a waste of time and should be discarded and eliminated.

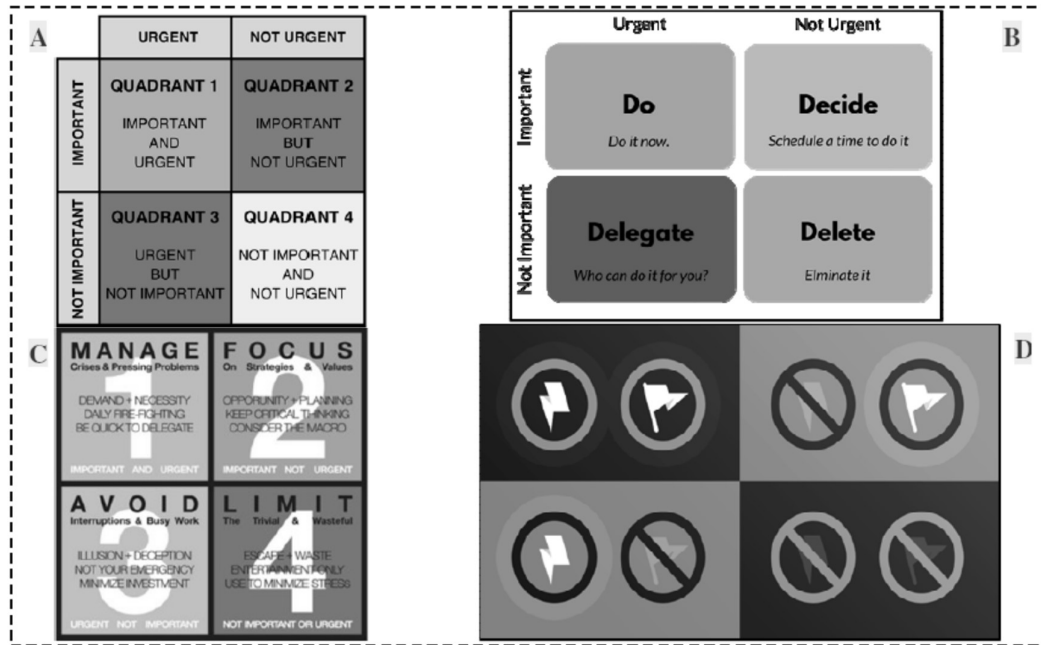


Figure 14 Eisenhower Matrix (Homère and others 2019)

#### 4.2.2 Balanced Scorecard for performance measurement

Norton and Kaplan introduced the Balanced Scorecard in a 1992 Harvard Business Review article. It is essentially a method to measure performance of companies where intangible assets play central role in delivering value to customers. It also measures performance from financial and non-financial point view. Performance measurement is key performance improvement. Figure 15 illustrates Balanced Scorecard.

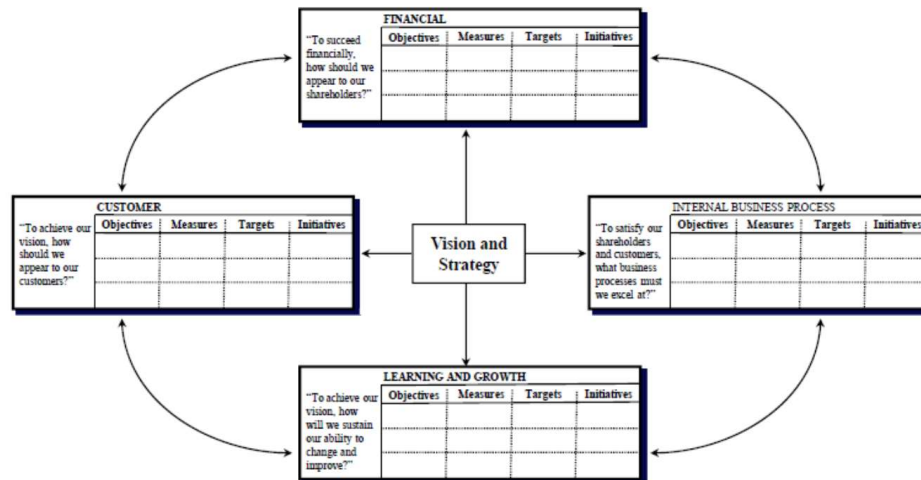


Figure 15. Balanced Scorecard for performance measurement (Robert S. Kaplan 2010)

The balanced score board takes top-down approach as it starts with mission and vision of the business, identifies key performance indicators KPI's in four areas which are financial area, customer area, learning and growth, and internal business process, Robert S. Kaplan (2010).

To elaborate more on KPI's on different areas, once financial perspective is concerned return on investment ROI or return on capital employed ROCE can be used to observe and measure performance. customers area could bring another set of KPI's which could be the level of order returns, level of customer satisfaction and service rating. Internal business processes area can bring product lead time and costs of production as an indicator. learning and growth area KPI's could be employee's retention, and the flow of new innovations and idea's related to business line.

According to Robert S. Kaplan (2010) Balanced Scorecard for performance measurement gives broader view on business performance, and it links in long term business performance to mission and vision. It also invokes all stake holders' efforts in the process and not exclusively financial personnel. It offers high felicity as KPI's used are chosen according to company preference and need.

### 4.2.3 Process Maturity Framework

According to Paulk and others (1993) process maturity framework describes that continuous improvement comes from small evolutionary steps rather than revolutionary innovations. the model describes 5 maturity levels for the evolution steps. these maturity levels define processes against ordinal scale to contribute in processes capability and help organizations prioritize improvement efforts. Figure 16 illustrates process maturity framework.

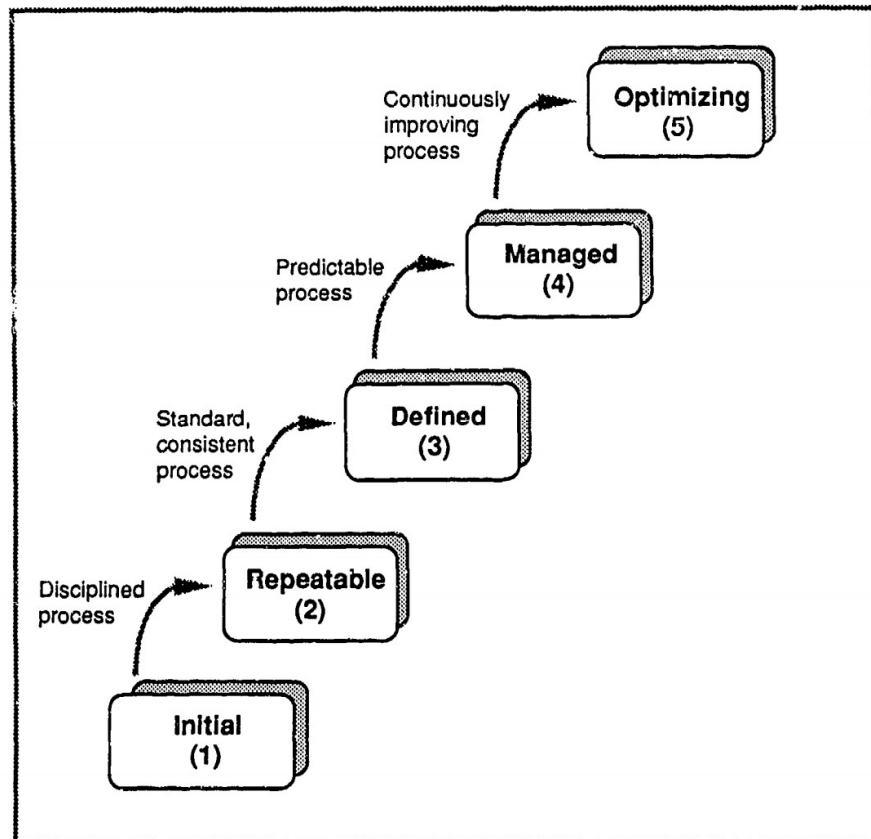


Figure 16 process maturity framework (Paulk and others 1993)

Paulk and others (1993) elaborate on the characterization of the highlighted five maturity levels for processes:

- 1- Initial in this level processes are characterized and not adequately governed and often chaotic, few processes are defined and success depends on individual efforts.

- 2- Repeatable level processes are described in basic terms to track cost, schedule and functionality the process is set on place to be repeated successfully for similar projects.
- 3- Defined Level dictates the processes and activities are standardized, documented. all organization use same approved tailored processes for projects.
- 4- Managed level states the processes are quantitatively understood and controlled and the process and product quality data are collected.
- 5- Optimized level describes that the process has gone through iterative improvement cycles and feedbacks on improvements collected and adjustments has done by piloting these improvements to products.

#### **4.2.4 The integration of project management and organizational change management**

Hornstein (2014) describes the necessity of training for new project managers for integration between project management and organizational change management, or organizational management has an impact on project implementations success and failure. Hornstein (2014) advises project management certifying agencies such PMI and IPMA to supplement their education plans with organizational change management to their certification programs.

### **4.3 Change Management Implementation Tools**

#### **4.3.1 Effective communication**

According to PMI PMBOK (2013), the success of project management is strongly correlated to effective utilization of organizational communication style. Organizational communication capabilities have great impact on how projects are conducted, executed and closed. As a result, project managers in distant locations around the globe are able to more effectively communicate with all relevant stakeholders within the organizational structure to facilitate decision making. Stakeholders and project team members can also use electronic communications (including skype, Microsoft teams, e-mail, texting, and

other technologies) to communicate with the project manager formally or informally, PMI PMBOK (2013).

### 4.3.2 PDCA Cycle

According to Moen and Norman (2002) The PDCA cycle had its origin with Dr. W. Edwards Deming's lecture in Japan in 1950. the four steps for problem solving includes the following, Figure 17 illustrates PDCA cycle:

- Plan: in this step Assessment of the current state and Investigating for improvements. If a problem exists, examination should be carried out in detail. Development of possible solutions and means of execution. In this phase, the target is gathering as much information as possible to make informed decisions about how to proceed. Moen and Norman (2002).
- Do: this step is about tying out the plans, making sure everyone involved understands the changes. This implementation phase is key to have accurate results. Moen and Norman (2002).
- Study: this step is a follow up to see how effective the changes are. Spending some time comparing the new state to how things were previously, Moen and Norman (2002).
- Act: If the changes work, this step is about continuing using changes and make them the new standard. This will be the new point of reference for future PDCA efforts, Moen and Norman (2002).

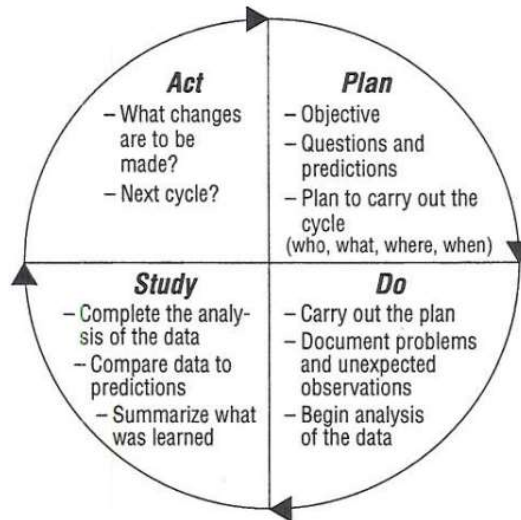


Figure 17 PDCA cycle (Moen and Norman 2002)

#### 4.3.3 A3 Method

Sobek and Jimmerson (2006) explains A3 as a problem-solving Tool for organizational process, this tool has been used by Toyota corporation. The core is to have continuous quality improvement to eliminate costs, waste and inefficiency for organizations processes, it's something Toyota has excelled in but not yet globally known on how to implement it.

According to Sobek and Jimmerson 2006 The A3 report is named after the size of the paper used to document it, it has series of guidelines which lead to successful problem solving in daily work life. The report shall include 8 stages, 4 stages on each side of the paper. it starts by the title describe the problem, a historical and organizational background of the problem, current state analysis, then identifying the root cause then proceeds to the target desired by proposing solutions and briefly mention the predicted performance if implemented. After that implementation plan to be proposed by action planning who is doing what and by when, then plan to follow up and measure performance for target realization and the results which is left blank as a start.

A3 report and powerful tool for organizational improvement and enhancement, it gives the organization the tools to improve performance by problem solving and implementing solutions. As in the context of health care system process development, the steps of A3 report could be outlined as below, Sobek and Jimmerson (2006).

- Identifying the problem by the people who is closest to the problem and in close contact with the faulty processes and can see clearly on smaller scope unlike management that is not really in close contact in small details while their vision might be distorted by too many possible mixtures of causes. The advantages of that change can happen in matter of days or weeks unlike big management changes that might require months and years.
- Current condition observation, as Toyota advise, go see for yourself” this dictate, observe, collect data, ask people.
- Root cause analysis to be observed by following the “5 Why’s” rule, this illustrates the root cause analysis is often not the direct and most trivial cause of the problem as it’s a series of less obvious causes contribute together to trigger the obvious cause.
- Envisioning the future state after releasing the possible solutions and how the solution will serve the problem resolution. Attention to be given in solving the problem with the process and not changing the normal pathways and connections of the process itself.
- Action planning, who is doing what and by when to implement the founded solutions, then measure the performance after implementation as have, we realized the improvement we aimed for, if not it means we clearly didn’t understand the situation enough, it’s about validation and accountability. It’s a great way of learning and exploring.

#### **4.4 Conceptual Framework of the Study**

The ideas included in the Conceptual Framework of this study have been found from relative professional and academic literature as thoroughly explained in previous sections. Figure 18 displays the key areas and themes which have been collected, combined and visualized to come up with this conceptual framework.

As indicated in Figure 18 \*conceptual framework is divided into three key areas, \*first area is about defining the integrated change control processes in projects that we target to implement in the case company. \*Definition of the change management frameworks to govern the change implementation in organizational level, hence McKinsey 7S Model is utilized. Parallely implementation and change governance on personal level in the

organization is described in ADKAR model. Malcolm Baldrige performance excellence criteria will define excellence in change process toward better integrated change control.

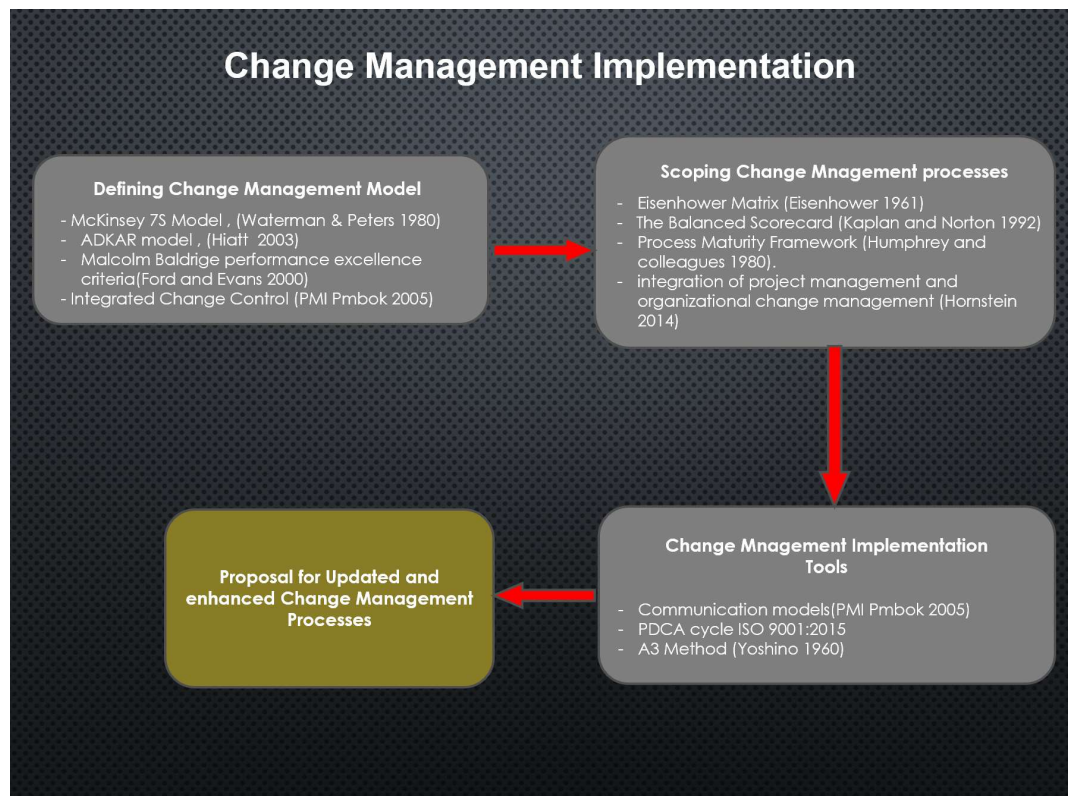


Figure 18. Conceptual Framework of this study

The second area is scoping the change management which will utilize set of tools to categorize the tasks needed to be done during the change and prioritizing them, it will also test the maturity of the current processes to shortlist the processes that need to be developed. Balanced score board will measure the change performance through selected financial and non-financial KPI's. And finally stressing the need that the efforts should be in one direction in implementing integrated change control along with organizational change. Further implementation tools have been discussed including communications, PDCA cycles and continuous implement through A3 Method.

Section five will exploit \*conceptual framework to create initial improvement recommendations, the conceptual framework is aiming to eliminate the highlighted weaknesses identified in \*current state analysis. process strengths will be recognized and integrated

as well as problems will be addressed and solved by seeking contributions from relevant key stakeholders.

## 5 Building Proposal of Improved Project Management Practices for the Case Company

This section combines the findings and ideas from \*current state analysis and conceptual framework stages to co-create initial recommendation for improved and enhanced project management practices. The process will be conducted by employing improved integrated change control and leading organizational change to achieve that. This section provides an overview of this stage, detailed elaborations, summaries and recommendations.

### 5.1 Overview of the Proposal Building Stage

The initial recommendations of improvements proposal were developed and co-created through two workshops and three stakeholder interviews. Workshops and interviews were started by introducing general information related to case company business challenge and the objective of this study and the expected outcome. Further current state analysis strengths and weaknesses were introduced and presented along with ideas from relevant professional and academic literature ending by the conceptual framework needed to create and co-create the initial recommendations for improvement.

The discussion then shifted toward the possible recommendations for project management practices improvement that are relevant to chosen weakness area. The interviewees were engaged during the session to brain storm, argument, discuss and assess the ideas for recommendations. Participants contributed actively in the discussion and showed enthusiasm to discuss their view on other members ideas addressing the shift toward more governed and stringent implementation of integrated change control.

Due current situation of Covid19 pandemic all interviews and workshops were remotely conducted through Microsoft teams, sessions were recorded under consent of participants. Arguments, debates and discussions during interviews and workshops were captured in field notes. The notes were edited and prepared directly after the interviews and workshops.

The key stakeholders selected for Data 2 collection were directly involved in project management. The stakeholders were project management heads, project managers and discipline lead who are heavily involved in project management processes in the case company. The approach was to have one on one interviews and workshops for limited number of attendees to have more effective dialogue and to avoid any technical or logistical challenges. The co-creation of improvements recommendations took two weeks to enable highly diverse stakeholders to participate.

The initial recommendations were listed compiled from field notes of all interviews and workshops. The initial recommendations were placed in a form of action plan to implement the desired integrated change control and organizational change associated with it. All action plan phases and elaborations are illustrated and presented in the following summaries.

## 5.2 Summary of initial Recommendations.

The initial recommendations were founded by employing current state analysis and with the aid of ideas from conceptual framework. The initial recommendations for improvement for project management practices are illustrated in table 4.

In this stage of forming initial recommendations to improve project management practices, the study have identified two key areas from current state analysis and eleven relevant ideas from conceptual framework. This knowledge from current state analysis and conceptual framework has paved the way to engage company team on which relevant stakeholders have contributed in drafting initial recommendations that comes in twelve recommendations in two categories. The theme of these recommendations resembles an action plan that need to be adopted by case company to ultimately improve project management practices by enhancing implementation of integrated change control within project environment, along with managing change in individual and organizational levels to ensure proper implementation of the enhanced practices.

Table 4 Summary of the initial recommendations for change management and quality implementation.

	<b>Key focus area from Current state analysis.</b>	<b>Relevant Elements of Conceptual framework</b>	<b>Initial recommendations</b>
1	Change management challenges, where capturing, documenting, communicating challenges and proving them and tracking them process are not implemented strictly enough.	<ul style="list-style-type: none"> <li>a) Integrated change Control.</li> <li>b) McKinsey 7S model.</li> <li>c) ADKAR Model for individual change management.</li> <li>d) Malcolm Baldrige criteria for performance excellence</li> <li>e) Eisenhower Matrix</li> <li>f) Balanced Scorecard for performance measurement</li> <li>g) Process Maturity Framework</li> <li>h) The integration of project management and organizational change management</li> <li>i) Effective communication</li> <li>j) PDCA Cycle</li> </ul>	<ul style="list-style-type: none"> <li>a) Create a team within the organization to manage the updating and implementation of enhanced integrated change control processes.</li> <li>b) Audit current integrated change control processes and custom build processes for different projects (fixed price or hourly based) and different customers (key customers and business partners or new customers).</li> <li>c) Check current processes and discuss with project managers and chief engineers about process maturity and improvements needed and processes effectiveness.</li> <li>d) Create awareness within the project managers and Chief engineers about the importance of change management. Create desire for change.</li> <li>e) Offer enhanced training for project managers and chief engineers for project integrated change control processes.</li> <li>f) Inviting teams for internal audit sessions to discuss adherence to the processes and explain variances if any .as stringent implementation for integrated change control is a must.</li> <li>g) Set for performance management KPIs for integrated change control and Familiarize chief engineers of adequate implementation of them.</li> <li>h) Implement change management tools in company ERP system. To have automated workflows.</li> </ul>

2	Quality implementation challenges, guidelines documents and checklists are in place but teams are not aware of them.	<ul style="list-style-type: none"> <li>a) Eisenhower Matrix</li> <li>b) Effective communication</li> <li>c) PDCA Cycle</li> <li>d) A3 Method</li> </ul>	<ul style="list-style-type: none"> <li>i) Implement stringent and more frequent projects audits.</li> <li>j) Implement and activate lessons learned, analyze the data and establish action planning based on lessons learned.</li> <li>k) Implement continuous improvements principles and tools. By checking processes to have more of a lean for increased effectiveness and cost management.</li> <li>l) Implantation of E3 Method. And integrate it with in company ERP system and create automated workflow for that purpose.</li> </ul>
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The relevant stakeholders highlighted the idea of forming a committee within the organization to conduct the necessary action to lead enhancements efforts. Stakeholders shed some light on auditing integrated change control processes the company has developed and the guidelines associated with it and check alignment and effectiveness and customization levels to go hand in hand with different project category and different customers. Furthermore stakeholders indicated the importance of measuring the process maturity and how processes are performing and develop the way to have more governess and optimization.

The stakeholders during the interviews highlighted the necessity for project managers and chief engineers to establish awareness of successful integrated change control implementation and to adhere to company guidelines and established processes. The stakeholders also highlighted the need for establishing training program for project managers and chief engineers to understand fully the scope of integrated change control and how to adhere to company guidelines surrounding that topic. These suggestions were utilizing the ADKAR model and McKinsey 7S model. Furthermore these suggestions established the excellence in implementation and integration of change management with organizational change management.

Other interviewees suggested that project managers and Chief Engineers should be invited to brainstorming sessions for checking the integrated change control processes for the purpose of auditing, highlighting the possible enhancements after measurement of processes maturity and effectiveness. Different Stakeholders highlighted the necessity of accountability reinforcement and having direct approach into accessing teams directly after auditing for integrated change control guidelines adherence.

Some interviewees stressed the importance of orienting chief engineers with earned value measurements as performance indicator. earned value measurement will offer more governance on deliverables undergoing changes some others highlighted the need to develop other KPI's to measure performance on multiple angles. Furthermore, interviewees indicated there are some problems related to tools. The tools currently needed are not sufficient. Interviewees explained that some tools need to be developed within company ERP system to create automated workflow for integrated change control.

Interviewees on the other hand stated that more stringent projects audit need to be conducted to check adherence to guidelines regarding integrated change control implementations. The necessity of analyzing the lessons learned and building the database associated with it, further action planning according to conclusions taken from action plans. Other stakeholders believe improvement process is not static and it should continuously evolve by continuous feedback and detecting weaknesses within the integrated change process, optimization efforts to cut corners when it's a waste of time and resources.

Stakeholders welcomed the suggestion of implementing A3 method as a tool of continuous improvement and further suggested to integrate it with the company ERP system and establish automated workflow for that purpose.

### 5.3 Description of the Recommendations Creation

The following subsections contain descriptions and elaborations on the co-created recommendations in more detailed Manner. The initial recommendations were compiled from Data 2.

### 5.3.1 Integrated change control recommendations

Creating team within the organization to study the current state of integrated change control using the tools described in conceptual framework. The team should check the findings with in its quest and prioritize them utilizing Eisenhower matrix to determine which aspects have the urgency. The team should determine priorities for establishing enhanced practices for integrated change control.

The team Should ensure enhanced integrated change control practices alignment with company strategy, employ tools described in conceptual framework to build skills and establish competency requirements with staffing and should look into company systems and establish plans to develop ERP systems to include automated workflows for integrated change control and continuous improvements.

The established team should lead the company shift toward optimized integrated change control. The team should control and monitor the change on individual level utilizing AD-KAR Framework which will give the committee the tools to create awareness. Further after creating the awareness, it should manage and control the desire to change among company core teams that is going in touch with the integrated change control process. The team should manage knowledge delivery to core teams and manage internal authorizations and clearances and resources to lead knowledge delivery. The team should be responsible to foster sustainability of the new integrated change control practices and continuously improve them.

The established team along with company experts should audit current integrated change control processes and investigate the level of applicability and effectiveness and suggest optimization along with company stakeholders in touch with the integrated change control processes. Furthermore, the team should look into company standard processes and find a way to customize the process according to the project environments (hourly based or fixed price) or if the project belongs to key customer or new customers. Figure 19 illustrates the integrated change control process map in the case company as it clearly resembles generic integrated change control process that needs more details and customization.

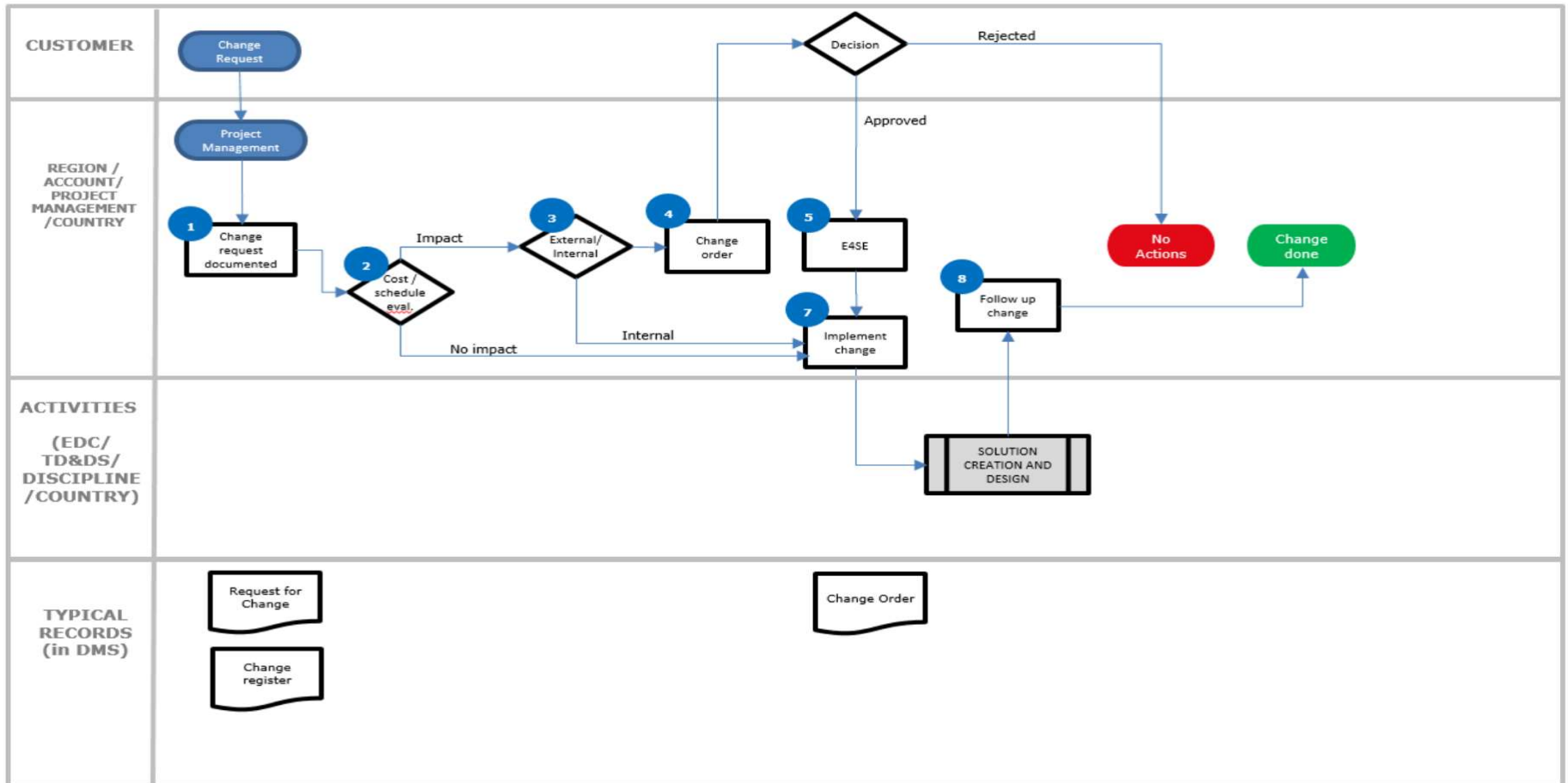


Figure 19 integrated change control process map in the case company (case company intranet 2020)

Further the team should be responsible jointly with company experts and core teams put to the test the current processes and updated processes maturity. The team should categorize the processes according the process maturity framework as stated in conceptual framework. Some of the processes should be described as initial which dictates it is not adequately governed and it is still chaotic in nature so special care should be given to this category to further define and organize these processes. Some other processes should be described as repeatable as its processes defined in basic terms and defined to track cost and schedule; these repeatable processes are repeated successfully in similar projects, further focus should be given to this category to transform them into more governed and controlled categories. The team should keep improving the processes categorized as defined and managed until ultimately it reaches the maturity level of optimized where processes undergone iterative improvement cycles and feedback of improvements collected and adjustments has been made.

Consequently, the team should create awareness within stakeholders who are in close contact with integrated change control. The team should shed some light on the current processes and how it impacts the financial performances of projects, and how it threatens company overall performance and market share and company reputation. The team should create and monitor desire with in core team for implementing improved integrated change control, offer knowledge which should be explained more in detail later. The team should utilize tools described in conceptual framework to implement the change and follow up on the change status to support sustainability and reinforcement of the change.

The team should prepare detailed training for enhanced and customized integrated change control. The training should be performed by team and experts to explain the integrated change control for different project setups and environments with different types of customers. The training should be in multiple sessions as needed, furthermore it should contain simulations and should contain short quizzes after each session. The training program should contain quality questionnaires to ensure proper and adequate knowledge transfer.

Recommendations include the created team to lead improved integrated change control individual audits which will constantly benchmark individual's performance and check for alignment with the improved practices. The team should collect individual's data and comments and conduct root cause analysis to identify any potential problems and address them into reports for potential improvement areas.

The team should also study and define a set of key performance indicators which should help measure the performance of improved integrated change control process. The team should utilize the concept of Balanced score card to develop the KPIs which should address not only the financial performance of the project like for example profit margin or only project key performance indicators as stated in earned value analysis. Earned value Analysis is only analyzing the project Earned value, and planned value and measure the variance between them as well as calculating cost and schedule indices. The team should develop further set of KPI's addressing customer satisfaction, service rating and level of non-conformities. Another set of KPI's that dresses internal processes and business efficiency, product lead time and units' costs is example of KPI's that is relevant in internal process category. Furthermore, when addressing KPI's related to organizational capacity, knowledge and innovation KPI's, employee's retention and flow of improvement ideas are relative KPI's in that perspective category.

The team along with company experts and external IT consultants should establish an IT platform and integrate it with company ERP system, the platform should initiate automated workflow for integrated change control. The work flow should start by initiation of change request, change requests can be external based on customer request or can be internal as defect repair, then an IT tool is documenting that change request into electronic change log. The request then forwarded to chief engineers to estimate impact on schedule and time and cost, the workflow is automatically gathering information from different chief engineers of different disciplines. After the impact is evaluated the change request is forwarded automatically to the project manager to process it by jointly agreeing the change with the customer if the change is based on customer request or internally agree with project team for defect repair. The project manager process is by accepting or rejecting, if acceptance occurs then project schedule, time, cost baselines are updated as well as project management plan. If rejection happens the change order will be only logged into change log. Moreover, the workflow should include integrated tools to report different KPI's and update chief engineers and project managers for monitoring and control purposes.

The team along with company experts and quality department personnel should call for more project level audits. The project level audits will inspect project performance in general and improved integrated change control performance in specific. The audits check team's adherence to the improved integrated change control processes. The audits check adequacy of change logs and work flows and gather notes and observations and improve accountability by implementing root cause of non-conformities to processes adherence. Another takes as a result on the audits on project level, personal assessment for project team which can lead into recognition or entitle them into more training.

### 5.3.2 Quality Improvement Initial Recommendations

Another established process in the case company is documenting lessons learned for projects from different setups and environments. On the other hand, no adequate lessons learned data analysis for insights about projects performance and what kind of deficiencies were faced and how was it is mitigated at time. Data Analysis shows how problems and deficiencies were be managed in better terms. In this context proposition of going into projects data and analyze data related to integrated change control, and screen any possible issues and address these issues in action plans to solve any potential deficiencies or difficulties.

The team should look into improved processes and gather feedbacks and make adjustments on iterations, these adjustments should also consider lean principles, while most of design deliverables are typically same in principle, lean logic should be adapted to implement to come up with more cost-effective work flow by inspecting waste activities and eliminate them and impalement optimizations on improved integrated change control processes.

One more task that should be led by the team is the implementation of the A3 method, even more the team should collaborate with company experts and IT consultants to integrated A3 method into company ERP. The integration should include integrating the A3 method work flows were project managers, Chief Engineers, and team members who are in touch with integrated change processes can report issues and problems, Following

A3 method they should initiate automated workflow, they should explain the problem thoroughly, suggest solutions in details. The work flow initiator should suggest the team responsible for solving the problem, it will be then automatically forwarded to quality department which will study further and check the criticality and redundancy of the issue and initiate work order to be carried out by responsible team for rectification.

Initial recommendations were co-created in previous sections with active contributions and collaborations from stakeholders. The recommendations are twelve in quantity and covered integrated change control improvement and quality issues. The next section will explain the validation of the co-created initial recommendations.

## 6 Validation of the Proposal

This section demonstrates the validation of co-created initial recommendations as described in the previous section. This section describes the validation process in general. Further, it displays the Final recommendations. This section provides a description of validation feedback. Finally, this section describes the adjustments and improvements made to initial recommendations.

### 6.1 Overview of the Validation Stage

The initial recommendations validations were carried out by presenting the initial recommendations to relative stakeholders, stakeholders selected are project management heads for region Europe and Global Account teams. The stakeholders have given their feedback, notes and constructive critique. The feedback is considered as a key input to evaluate if the recommendations have the potential for implementation in business perspective as well as in company specific environment. The aspects that stakeholders look into consider relevance, feasibility and effectiveness of recommended project management practices improvements.

The recommendation validation was executed in two interviews, the nature of interviews is one on one interviews. Both of the interviews were conducted using Microsoft team's software. The stakeholders selected were the head of project management of region Europe division and head of project management of global account division. The interviews were structured in a sequence: presetting the study theory, then study briefing followed by current state analysis and conceptual framework work overview. The final stage was presenting the initial recommendations which comes in two categories, first category was recommendations of improved integrated change control. The second category was quality implementation recommendations. The feedback and critiques were captured in field notes transcript directly after each meeting to form along with recorded interviews Data 3. Furthermore, the initial recommendation was adjusted and drafted in final form.

## 6.2 Summary of the Final Recommendations

Final Recommendations for Improved project management practices are presented in Table 5, the recommendations are categorized by same hierarchy as initial recommendations for this study.

Table 5 Summary of the Final recommendations for change management and quality implementation.

	<b>Key focus area from Current state analysis.</b>	<b>Final Recommendations</b>
1	Change management challenges, where capturing, documenting, communicating challenges and proving them and tracking them process are not implemented strictly enough.	<ul style="list-style-type: none"> <li>a) Core team (Project Managers and chief Engineers) and Quality team QEHS to jointly manage the updating and implementation of enhanced integrated change control processes.</li> <li>b) Audit current integrated change control processes and custom build processes for different projects. Ongoing work for WoW plans (Way of working) improvements is going on and customized processes suggestions will be implemented in 2021.</li> <li>c) Check current processes and discuss with project managers and chief engineers about process maturity and improvements needed and processes effectiveness. Company developing instructions for way of working and implementing gradual improvements.</li> <li>d) Implementation of tools to Create awareness within the project managers and Chief engineers about the importance of change management. Implementation of tools Create desire for change and monitor that aspect.</li> <li>e) Company has ongoing training for project management practices, but special care to be given to focus on enhanced training for project managers and chief engineers for project integrated change control processes.</li> <li>f) Inviting teams for internal audit sessions to discuss adherence to the processes and explain variances if any .as stringent implementation for integrated change control is a must. Further feedbacks from teams to be instigated during the process to improve the WoW process.</li> <li>g) Set for performance management KPIs for integrated change control and Familiarize chief engineers of adequate implementation of them. KPIs shall measure performance in comprehensive aspects of integrated change control.</li> <li>h) Implement change management tools in company ERP system. To have automated workflows. Proposal for automated workflows need to be developed.</li> </ul>

2	Quality implementation challenges, guidelines documents and checklists are in place but teams are not aware of them.	<ul style="list-style-type: none"> <li>i) Implement stringent and more frequent projects audits. <b>Case company shall improve the total audited projects and (frequency, how to conduct, in which project phases etc.).</b></li> <li>j) Implement and activate lessons learned, analyze the data and establish action planning based on lessons learned. <b>The case company is addressing that and working on it, quality team is handling that issue.</b></li> <li>k) Implement continuous improvements principles and tools. by checking processes to have more of a lean for increased effectiveness and cost management.</li> <li>l) Implantation of E3 Method. And integrate it with in company ERP system and create automated workflow for that purpose. <b>Tool development possibilities and needed issues / points to be checked in the future with IM/IT.</b></li> </ul>
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As illustrated in table 2 recommendations were changed in a minor way when comparing the final with initial recommendations. The initial recommendations can be found in section 5.2, changes made to conclude the final recommendations are described in section 6.4.

### 6.3 Received Feedback from Initial Integrated change control recommendations

Feedback from initial recommendations taken from senior management was positive and further comments stated and acknowledged and taken into account to establish the final recommendations. Further the recommendations covered in totality the weaknesses identified, the study importance and relevance were recognized.

*The study is good job and well done, recommendations will be looked into for further consideration (Head of project management)*

The senior management feedback on initial recommendation draft is indicated in the following paragraphs.

*a) Create a team within the organization to manage the updating and implementation of enhanced integrated change control processes.*

Senior management commented that the suggested Team shall be appointed within case company core team of project managers and experts along with QEHS quality department members. The team shall conduct the necessary action to lead enhancement efforts.

- b) Audit current integrated change control processes and custom build processes for different projects (fixed price or hourly based) and different customers (key customers and business partners or new customers).*

Senior management commented that there is ongoing work for WoW plans (Way of working), improvements are going on and customized processes suggestions to be implemented in 2021.

- c) Check current processes and discuss with project managers and chief engineers about process maturity and improvements needed and processes effectiveness.*

Senior management commented Company developing instructions for way of working and implementing gradual improvements. The integration of improvements to be in line with checking individual process maturity level according to process maturity framework.

- d) Create awareness within the project managers and Chief engineers about the importance of integrated change control. Create desire for change.*

Senior management indicated what could be done in to raise awareness. Awareness can be raised by creating events and webinars within the company highlighting the risk and the reward by adhering to adequate of integrated change control or neglecting proper implementation. Intranet and professional social hub can play good role in creating awareness. Organize educational sessions to familiarize stakeholders with the risk and reward of integrated change control implementations. A good idea also could be organizing pilot project to give an example of adherence to proper implementations.

- e) Offer enhanced training for project managers and chief engineers for project integrated change control processes.*

Senior management indicated that there is scheduled project management training in place and Targeting 100 participants. Senior management indicated that special care needs to be taken while transferring knowledge of enhanced integrated change control.

- f) Inviting teams for internal audit sessions to discuss adherence to the processes and explain variances if any as stringent implementation for integrated change control is a must.*

Senior management highlighted “This is taken into account in the internal audits. We have made and will make audits for different projects and different “project” teams have been / will be involved in these audit sessions. One of the key issues is always to check the current instructions and wow and to discuss about those and are these applicable for that project or service and do we need any updates or changes for the instructions or wow” QEHS Head manager.

- g) Set for performance management KPIs for integrated change control and Familiarize chief engineers of adequate implementation of them.*

Senior management requested to “ include proposal for valid KPI’s related to integrated change control and how the KPI’s could be measured and managed” (head of project Management). To address this comment a Set of KPI’s addressing customer satisfaction, service rating and level of non-conformities. Another set of KPI’s that addresses internal processes and business efficiency, product lead time and units’ costs is example of KPI’s that is relevant in internal process category. Furthermore, when addressing KPI’s related to organizational capacity, knowledge and innovation KPI’s, employee’s retention and flow of improvement ideas is relative KPI’s in that perspective category

- h) Implement change management tools in company ERP system. To have automated workflows.*

Senior management acknowledged the need for establishing Improvements for implementing integrated change control, as stated by Head of project management “ to include

proposal of tools and workflows regarding change management “. The work flow will start by initiation of change request, change requests can be external based on customer request or can be internal as defect repair, then an IT tool is documenting that change request into electronic change log. The request then forwarded to chief engineers to estimate impact on schedule and time and cost, the workflow is automatically gathering information from different chief engineers of different disciplines. After the impact is evaluated the change request is forwarded automatically to the project manager to process it by jointly agreeing the change with the customer if the change is based on customer request or internally agree with project team for defect repair. The project manager process is by accepting or rejecting, if acceptance occurs then project schedule, time, cost baselines are updated as well as project management plan. If rejection happens the change order will be only logged into change log. Moreover the work-flow shall include integrated tools to report different KPI's and update chief engineers and project managers for monitoring and control purposes

#### 6.4 Received Feedbacks from Initial Quality Improvement Initial Recommendations

The senior management feedback on initial recommendation draft is indicated in the following paragraphs.

*i) Implement stringent and more frequent projects audits.*

The senior management scheduled plan for the internal audits wov 2021. The internal audits (wov and questions) have improved a lot during 2019 - 2020, For 2021 the case company have increased the total amount of audits with improved plan and way of working (frequency, how to conduct, in which project phases etc.).

*j) Implement and activate lessons learned, analyze the data and establish action planning based on lessons learned.*

Senior management acknowledged and recognized. The management will consider this solution for further development by QEHS team.

- k) Implement continuous improvements principles and tools. By checking processes to have more of a lean for increased effectiveness and cost management.

Senior management acknowledged and recognized the proposal, core team along with QEHS team members to propose integrated change control enhancements, by streamlining the processes and accurately map the process and apply optimizations that will result in more lean processes for key customers. The optimizations could be more toward agile process for other customers that their projects need custom design. Optimizations applied to the process will reflect in more efficient integrated change control processes, less lead times and more cost optimizations which consequently will reflect on projects financial performance.

- l) Implantation of E3 Method. And integrate it with in company ERP system and create automated workflow for that purpose.

Senior management acknowledged further development A3 method need to be conducted to be fitted with company projects and process requirement. Joint effort between core / quality Team along with IT team and external consultants to work on software integration within company ERP system to establish automated workflow for the purpose of continuous development gathered from team members and coordinate action plans to cover and address development areas.

## 6.5 Final Proposal

Eleven out of our twelve initial proposals have been updated according to feedbacks received, some proposals were severely changed and some received minor comments. Data 3 forms the basis on which these updates been derived for validation. The changes are illustrated in Table 6.

Table 5 Summary of the Final recommendations for change management and quality implementation.

	<b>Key focus area from Current state analysis.</b>	<b>Initial recommendations</b>	<b>Final Recommendation</b>
1	Change management challenges, where capturing, documenting, communicating challenges and proving them and tracking them process are not implemented strictly enough.	<ul style="list-style-type: none"> <li>a) Create a team within the organization to manage the updating and implementation of enhanced integrated change control processes.</li> <li>b) Audit current integrated change control processes and custom build processes for different projects (fixed price or hourly based) and different customers (key customers and business partners or new customers).</li> <li>c) Check current processes and discuss with project managers and chief engineers about process maturity and improvements needed and processes effectiveness.</li> <li>d) Create awareness within the project managers and Chief engineers about the importance of change management. Create desire for change.</li> <li>e) Offer enhanced training for project managers and chief engineers for project integrated change control processes.</li> <li>f) Inviting teams for internal audit sessions to discuss adherence to the processes and explain variances if any .as stringent implementation for integrated change control is a must.</li> </ul>	<ul style="list-style-type: none"> <li>a) <b>Core team (Project Managers and chief Engineers) and Quality team QEHS to jointly manage the updating and implementation of enhanced integrated change control processes.</b></li> <li>b) Audit current integrated change control processes and custom build processes for different projects. <b>Ongoing work for WoW plans (Way of working) improvements is going on and customized processes suggestions will be implemented in 2021.</b></li> <li>c) Check current processes and discuss with project managers and chief engineers about process maturity and improvements needed and processes effectiveness. <b>Company developing instructions for way of working and implementing gradual improvements.</b></li> <li>d) <b>Implementation of tools to</b> Create awareness within the project managers and Chief engineers about the importance of change management. <b>Implementation of tools</b> Create desire for change and monitor that aspect.</li> <li>e) <b>Company has ongoing training for project management practices, but special care to be given to focus on enhanced</b></li> </ul>

		<p>g) Set for performance management KPIs for integrated change control and Familiarize chief engineers of adequate implementation of them.</p> <p>h) Implement change management tools in company ERP system. To have automated workflows.</p>	<p>training for project managers and chief engineers for project integrated change control processes.</p> <p>f) Inviting teams for internal audit sessions to discuss adherence to the processes and explain variances if any .as stringent implementation for integrated change control is a must. <b>Further feedbacks from teams to be instigated during the process to improve the WoW process.</b></p> <p>g) Set for performance management KPIs for integrated change control and Familiarize chief engineers of adequate implementation of them. <b>KPIs shall measure performance in comprehensive aspects of integrated change control.</b></p> <p>h) Implement change management tools in company ERP system. To have automated workflows. <b>Proposal for automated workflows need to be developed.</b></p>
2	<p>Quality implementation challenges, guidelines documents and checklists are in place but teams are not aware of them.</p>	<p>i) Implement stringent and more frequent projects audits.</p> <p>j) Implement and activate lessons learned, analyze the data and establish action planning based on lessons learned.</p> <p>k) Implement continuous improvements principles and tools. By checking processes to have more of a lean for increased effectiveness and cost management.</p> <p>l) Implantation of E3 Method. And integrate it with in company ERP</p>	<p>i) Implement stringent and more frequent projects audits. <b>Case company shall improve the total audited projects and (frequency, how to conduct, in which project phases etc.).</b></p> <p>j) Implement and activate lessons learned, analyze the data and establish action planning based on lessons learned. <b>The case company is addressing that and working on it, quality team is handling that issue.</b></p> <p>k) Implement continuous improvements principles</p>

		system and create automated workflow for that purpose.	and tools. by checking processes to have more of a lean for increased effectiveness and cost management.  l) Implantation of E3 Method. And integrate it with in company ERP system and create automated workflow for that purpose. <b>Tool development possibilities and needed issues / points to be checked in the future with IM/IT.</b>
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Table 9 highlights and visualize the changes associated with validation. The recommendations have been changed to give more clarity on responsible team, the validation feedback also give some depth on the tools and new perspectives of implementations.

The validation feedback gave additional suggestions and further details. Some feedback acknowledges and recognize the initial recommendations. Other feedback acquires and address new questions to explore new knowledge. The feedback received suggest more elaborations on applied portion of the suggestion as integration or some suggestions with company IT and ERP system should have the priority.

The validation process of initial recommendations has been successfully implemented, the validation and feedback sessions contributed positively in reshaping and refining the initial recommendations and putting them from feasibility perspective. The next final section puts all ideas together and summarizes the study. The next section includes executive summary, implementation recommendations, self-evaluation and final closing words.

## 7 Conclusions

The 7<sup>th</sup> and final section contains the executive summary, recommendations for the next steps of implementation in company environment, self-evaluation and reflections of the study and its results, and finally closing words.

### 7.1 Executive Summary

The objective of this study was to recommend improvements for project management practices for the case company. The outcome of this study is recommendations for improved project management practices through improving integrated change control processes and have improved quality implementation. The case company has recognized the challenge in projects governess and performance and took into consideration the task for project management improvement as a target.

Research design was selected as research approach, where qualitative data gathering methods have been utilized. The study comprised of four stages. The first stage was understanding and mapping current company practices and determining strengths and weaknesses. The second stage was reviewing relative literature both professional and academic to address the findings in current state analysis to come up with conceptual framework that contains key ideas that could help in forming recommendations. The third Stage was through collective ideas from first and second stages and by engaging stakeholders in the company to co-create initial recommendations for improving project management practices in the case company. The fourth and final stage was collaborative effort for case company senior management to offer feedback of drafted initial recommendations which offered refinement, reshaping and enhancement to come up with final recommendations in which case company will improve project management practices.

The current state analysis was conducted through one-on-one interviews with company leaseholders along with workshops. The finding was established by locating 8 key strengths of case company current state as well as eighteen weaknesses in six categories. The first category talked about sales support related weaknesses while project managers contribution during sales phase is not anchored to data and more to experienced

hunch. The second category addresses strategy issues while portion of core team (project managers and chief engineers are not aware of company strategy and lack of alignment. The third category handles project environment related weaknesses addressing communication challenges, risk handling, integrated change control challenges, quality implementation short coming, challenges of utilizing lessons learned data from projects. The fourth category addresses the KPI's used and how different KPI's need to be used to measure project performance in more cohesive way. The fifth category addressed tools related weaknesses where company needs more efficient tools to conduct project work and stay competitive in the market. The sixth category elaborated on customer satisfaction related issues where there are challenges in tool employed to measure customer satisfaction and closely relate results with action planning to address customer satisfaction results and further development.

This study elaborated on project related weaknesses and it aims to enhance project management practices through implementation of enhanced integrated change control and address quality issues related to that. The relative literature around the subject was reviewed. The ideas utilized which has formed conceptual framework comprises of three stages. The first stage was utilizing literature ideas to define the integrated change control in ideal implementation, then define the change that need to be done in organizational level by employing variety of change framework like for example McKinsey 7S. then define the change framework on personal level. The second stage is utilizing tools to scope the change in project management practices by targeting integrated change control. Tools utilized includes Eisenhower Matrix, Balanced Scorecard for performance measurement and Process Maturity Framework. The third stage utilized ideas for implementations such effective communication, PDCA cycle and implementation of A3 method as a tool for continuous improvement.

The initial recommendations of improvements proposal were developed and co-created through two workshops and three stakeholder interviews. Workshops and interviews were started by introducing general information related to case company business challenge and the objective of this study and the expected outcome. Further current state analysis strengths and weaknesses were introduced and presented along with ideas from relevant professional and academic literature ending by the conceptual framework needed to create and co-create the initial recommendations for improvement.

Twelve recommendations were co-created around the improvement of project management practices in case company through implementation of enhanced and improved integrated change control and associated quality implementations. The recommendations established the need to create a task force or a team in which the core responsibility to improve integrated change control. The team should start by auditing current integrated change control, then check each individual process and categorize them according to maturity level and check improvements to reach optimized processes. After establishing improved integrated change control, the nominated task force should create awareness and desire for core teams through various tools in the organization body of change necessity to implement improved integrated change control process. The task force to offer enhanced training around integrated change control framework and measure adherence to the enhanced framework through applying different KPI's. The task force along experts and IT consultants and third-party IT companies need to integrate automated workflows in case company ERP system for enhanced integrated change control framework. Task force along with quality team need to further investigate lessons learned for enriching case company experience and offer policies to mitigate any future risks. Task force along experts and IT consultants and third-party IT companies need to integrate automated workflows in case company ERP system for A3 method implementation for continuous improvement.

The final recommendations have gone through final round of validation effort thanks to senior management efforts in that regard. The senior management has advised, commented, enriched and evaluated ideas from feasibility of implementation perspective. The validation has given some further details and highlighted the need to cover knowledge areas around validated recommendations.

## 7.2 Recommendations toward Implementation

The implementation of this study outcome and the recommendations proposed in which it leads to improved project management practices should be applicable to the case company in the same order and hierarchy as proposed in the final recommendations. The final recommendations resemble an action plan in case implemented it will lead to better integrated change control mechanisms thus better project governess which will impact projects time, schedule and financial performance.

It is recommended to start by assigning the team as proposed, then have an inspecting look at the current integrated change control framework, study, improve customize and finetune processes. The optimized integrated change control framework should be the basis of the enhanced training. Further after accomplishing the training continuous work on performance measurement need to be maintained by applying the tools and KPI's proposed in the study. Jointly with above efforts from the assigned team along with IT consultants need to be done to integrated enhanced framework with case company IT system as well as ERP system. Moreover lessons learned and further data study and breakdown could offer valuable input for further process improvements. The final ring in the chain could be focusing on continuous improvements by the application of A3 method and integrate it with case company IT and ERP system.

### 7.3 Thesis Evaluation

Business challenge for the case company was Implementation challenges for project management practices, and project management practices themselves need further development. The objective of the study was to offer recommendations to improve project management practices for the case company. The study offered detailed recommendations which have been jointly created and validated by case company key stakeholders. From personal perspective the study adhered with its premise and delivered what is expected.

The scope of the study was limited to the case company current state analysis identified findings. The findings comprise of strengths and weaknesses as a result of case company stakeholder's facilitation through interviews and workshops. The study shortlisted eighteen weakness in six categories. The study elaborated on weakness related to project management due to strong relevance to the study title and scope. Nevertheless, the study did not include all 18 weakness though. On the other hand, the weaknesses identified were determined and developed by case company team, one possibility that some relevant weakness is still need to be found, addressed and to be elaborated. Furthermore the recommendations were co-created with as versatile as possible stakeholders but yet the recommendations are limited to the selected and engaged stakeholders which might have different elaborations from different stakeholder's perspectives.

The author of this study is involved in case company project management practices. The author was trying to be neutral observer through all the study lifecycle and tried to maintain neutrality and not be biased or influenced by own personal opinion.

The study evaluated in the following subsections based on creditability, logic and reliability. Furthermore, following elaborations will describe how these terminologies was defined and employed in the study research.

### 7.3.1 Reliability

According to Shenton (2004) reliability is producing similar findings which are consistent if same methods for analytical analysis and data collection methods are followed by other researchers in other time period. Further to keep results consistent and to eliminate any liability to participants, participants were engaged almost at the same time of the day for consistency. To improve the study reliability participants were selected mostly in one-on-one interviews mainly and fewer workshops which contained small sample of people that are not managerially related to eliminate any biased opinions that could be influenced or misshaped. The personal participant's liability was also avoided as much as possible by keeping interviews consistent, planned and conducted once or maximum twice every individual day. The work objectivity was maintained as carefully as possible by recording interviewee's opinions as objectively as possible.

### 7.3.2 Validity

According to Heale & Twycross (2015) "validity is defined as the extent to which a concept is accurately measured in a quantitative study", constructive validity was maintained by conducted design research approach. And it will utilize qualitative methods. The reason behind this decision this study will take specific case company which has organizational issues and challenges that need to be addressed, explained and understood in a way to come up with possible solutions, action plans and development proposals, it also aims at producing new knowledge areas around the case company issues and challenges utilizing professional relevant literature. And external validity was maintained by applying qualitative data collection approach.

### 7.3.3 Relevance

Relevance is defined in the Oxford dictionary as “a close connection with the subject you are discussing or the situation you are in”. The relevance of the study was achieved by addressing a real-life problem for the case company that is strongly related to company performance, profitability and growth. The study addresses plausible solutions aiming to solve the case company problem and improve case company competitiveness. The relevance is also obtained by accessing relevant company documentations and assets and engaging case company stakeholders and create and co-create the recommendations and further validate the recommendations aiming to address and solve the problem. The relevance was maintained through reviewing academic and professional literature to utilize relevant ideas to establish the key on which recommendations were derived and established. Validation of recommendations by company senior management contributed in maintaining study relevance. Based on previous elaborations the study is concluded to be relevant.

### 7.4 Closing Words

As we come to an end to this study project, in a business world full of competition, companies should continuously adapt and improvise and evolve with markets, demands, customer requirements. Companies should differentiate themselves among competitors to be able to be a leader by securing more market share. This study presents a road map toward implementing relevant and improved practices that could help the case company to leap forward to achieve its targets.

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### **Interview questions during the current state analysis**

1. Is there a need to map processes for change management?
2. What are existing change management processes?
3. how can we measure processes maturity? Can we categorize processes?
4. What are the ideas to improve Change management?
5. What are the priorities for suggested solutions?
6. How can we measure the performance? any KPI's?
7. How to transform change management on individual and organizational level.
8. How can we implement enhanced integrated change control (Tools)?
9. How can we implement quality in change management?