



Cooperative Education Report

A STUDY OF PROJECT MANAGEMENT OF ERAWAN PROJECT LOT1 AND LOT2
TO PRODUCE STEEL CORD OF TIRES

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Cooperative Title: A STUDY OF PROJECT MANAGEMENT OF ERAWAN PROJECT LOT1
AND LOT2 TO PRODUCE STEEL CORD OF TIRES

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ABSTRACT

This cooperative project aims to study project management at Michelin Siam RYG is in the process of implementing the ERAWAN project, which is a project that changes the capacity of the old product into a new product by dividing the project into lots 1–5 of the project so that it is easy to administer and can be adapted to the rapidly changing needs of the customer. The tool used in project management is the Industrial Project Approach (IPA), which involves applying different methodologies to the project. From the end of May to October, ERAWAN was while implementing ERAWAN Project Lot1 and ERAWAWAN Project Lot2. Both projects will be implemented in RCD1.

According to a Michelin Siam Co.,Ltd (RYG) project management research, more than 90% of Michelin's management chose the Waterfall Project Approach to design and execute the project. It split the task into phases, resulting in a total of five phases. During training and cooperative education period, ERAWAN Project Lot 1 was in phase X2 (Solution Development phase). In the BIB Ramp Up workshop, it discussed the issues all participants faced while completing adjustments and preparations for the installation of machinery. Moreover, as Erawan Project Lot1 was processing, Erawan Project Lot2 began

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the bidding process to identify contractors responsible for the project's deconstruction, building upgrades, and preparation of different utilities for newer machines.



Approved by

[Handwritten Signature]
19/11/2023

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CHAPTER 1 INTRODUCTION

The study of project management in Erawan Project Lot 1 and Erawan Project Lot 2 of Michelin Siam RYG in the factory area in RCD 1 contains relevant details, including background and significance, purpose, scope of study, methods of conducting research, and expected benefits, which can be described as follows:

1.1 Background and Significant

Currently, the overall image of the auto industry abroad, including Thailand, is on the rise. As a result, the auto rubber industry is on its rise, as the demand for car rubber in the market is greater. The company that manufactures automotive rubber is therefore required to increase production capacity to meet the needs of the customer. The start of the project will require project management. Project management is a project that will have a definite start and end date. And there is also a 'different' job characteristic, and by the way, the project has a special, temporary job character, so the project management consists of employees and people who often do not work together. Sometimes they come from individual departments, sometimes from individual organizations, and sometimes from country to country. Project management has a wide range of factors. For many project managers, the process of project management may seem difficult and complicated. Especially when we must manage multiple projects at once. Since we have limited resources and time, A good project management principle is to divide large projects into several small parts so that the project manager can allocate limited resources to all parts of the project. Project management differs, but in general it is a three-step procedure between quality, time, and cost. Project management is objective is to "manage risk" to increase the likelihood that a project will be successful (or satisfy a customer). Risks come with a variety of components. The more a project is of high value, the more variables there are, and the more "risk" implementation stages there are, the more likely it is that the project will fail. These variables can be found both within the project, such as personnel or resources, and outside the project, such as competitors, technology, or uncontrollable problems, like the weather. This is why a lot of project managers decide to divide big projects into smaller tasks to make the project easier to manage.

The company selected as a case study on project management is Michelin Company, which manufactures a variety of tires for vehicles, including aircraft tires, racing tires, and motorcycle tires. tires for motorcycles, bicycles, truck tires, as well as large tires used in mining, etc.

1.2 Company Background

Two brothers, Édouard and André Michelin, owned and operated a farm implement company in Clermont-Ferrand, France, in 1889. A biker who needed his pneumatic tire repaired showed up at the workplace one day. The tire had to be removed, repaired, and allowed to dry for more than three hours because it was stuck to the rim. The bicycle was tested in the production yard the following day by Édouard Michelin. The tire gave out after only a few hundred meters. Despite the setback, Édouard remained enthused about the pneumatic tire and he and his brother set about developing their own, non-glue rimless, version. The Michelin company was founded on May 28th, 1889.

1.2.1 Michelin Group

Michelin Group is a company world-class established in 1889 with its head office located at City of Clermont-Ferrand France and manufactures tires for distribution in more than 171 countries around the world by producing tires to meet the market needs and different local road conditions from 69 factories around the world. Michelin number over 114,000 different people. Dedicated to production The safest tire and suitable for the user's usage most consumed Therefore, Michelin is known as the Sustainable innovation and development for the flow of people and goods.

1.2.2 Michelin Siam Co., LTD

At Michelin, we take great pride in the challenging objectives and exacting standards we have set for our diversity and inclusion initiatives. The commitment and dedication of Michelin workers continue to be the driving force behind our efforts to improve daily for both our customers and the community. There are about 15,400 people working at Michelin East Asia & Oceania in 13 countries. Michelin (Thailand) was founded in 1987 and is run by Michelin Siam Company Limited and Michelin Research Asia (Thailand) Co., Ltd. Bangkok, Thailand is where we have our headquarters. With its headquarters in Bangkok and 6 plants throughout 5 provinces, Michelin Thailand employs about 8,700 people.

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- **Michelin Siam Co., Ltd (Phra Pradaeng)** located in Samut Prakan Province. Main production is car, motorcycle, and big bike tires.
- **Michelin Siam Co., Ltd (Laem Chabang)** located in Laem Chabang Industrial Estate, Chon buri Province. There are two factories, main production is Passenger Tires and rubber mold.
- **Michelin Siam Co., Ltd (Rayong)** located in BanKhai, Rayong Province. Produced steel cord for export to other factories.
- **Michelin Siam Co., Ltd (Nong Khae)** located in Hemaraj Saraburi Industrial Land, Saraburi Province. Main production is Truck tires and Bus tires, Aircraft and Retread Tires
- **Michelin Siam Co., Ltd (Hat Yai)** located in Southern Region Industrial Estate Songkhla Province. Produced the rubber compound for export to other factories.

1.2.3 Philosophy and Vision

MICHELIN, OPEN TO A WORLD OF DIVERSITY. The ideals of respect, excellence, and responsibility demonstrate Michelin's dedication to longevity. The company benefits from the diversity of brilliant workers, cultures, and work settings by developing a close relationship to the local markets. These factors foster the company's enthusiasm, performance, and originality.

“Wealth is Diversity” The variety of skills, nationalities, personalities, and ages is valued at Michelin as a source of innovation. As a result, the corporation employs a planned strategy against all types of discrimination throughout the world:

- Encouraging gender equality in work
- Improving the representation of women in the workforce, especially in management
- Encouraging local management to at least 80%
- Accepting an inclusive workplace Disabilities-related policy
- Creating customized career routes that foster intergenerational interaction and professional growth.

Michelin consistently emphasizes the necessity of promoting travel, technology hubs, and its factories around the world. It places a strong emphasis on producing balanced tires

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employing three key characteristics: long-lasting tires for all automobile kinds, safe tires, and fuel-efficiency. To assure functionality, every aspect of the tire will be carefully examined. Michelin aims to accomplish this.

Our task today is to innovate to create tomorrow's mobility, a fundamental change toward cleaner, more connected road mobility that uses energy and raw materials more effectively. This is necessary in a growing world with increasing environmental criteria. Tires from Michelin will be made from renewable, recycled bio sourced materials by the year 2050. Our strong R&D capabilities and creative partners make this feasible.

1.3 MICHELIN SIAM CO., LTD (RYG)

A factory in Thailand selected as a case study for cooperative education is the Michelin Siam RYG. Michelin Siam RYG manufactures rubber wire and exports it to a Michelin-affiliated factory to be used to manufacture tires for each type of vehicle. One of the key materials for rubber production is the "steel cord" for the radial rubber faces and for filling the rubber manufacturing industry.



Figure 1. 1 - Michelin Siam Co., Ltd (RYG)

1.3.1 Organizational Regulation

Safety Cardinal Rules

- 1) Training
 - a. Employees are trained to perform their job safely. They can only perform tasks for which they have been trained and validated.
 - b. Employees have the right and the duty not to perform tasks for which they have not been trained and validated.
 - c. Managers have an equal responsibility in ensure employees are not assigned to perform tasks for which they have not been trained and validated to perform safely.
- 2) Integrity of safety devices: No safety device can be disabled, bypass or made inefficient unless there are alternative methods or intervention method made by risk assessment and authorized by RGEP or MD.
- 3) Respect locks out/tag out work instruction: Interventions in abnormal working conditions (maintenance, repair, set up, cleaning, etc.) on a machine or equipment must be carried out by applying lock out/tag out procedures.
- 4) Circulation: Forklift, cyclist, and drivers of other vehicles comply with the traffic plan and traffic rules.
- 5) Specific interventions/work permit system: Interventions in confined space, working at height more than 1.2 m., working below working platform more than 1.2 m. area that does not designed as working area, and hot work must be carried out in compliance with procedures treating these subjects.
- 6) Personal Protection Equipment (PPE): All personnel inside the plant need to wear the required PPEs and comply with the defined Personal Protection Rules at the work post and in individual workshops.

1.3.2 RYG Organization

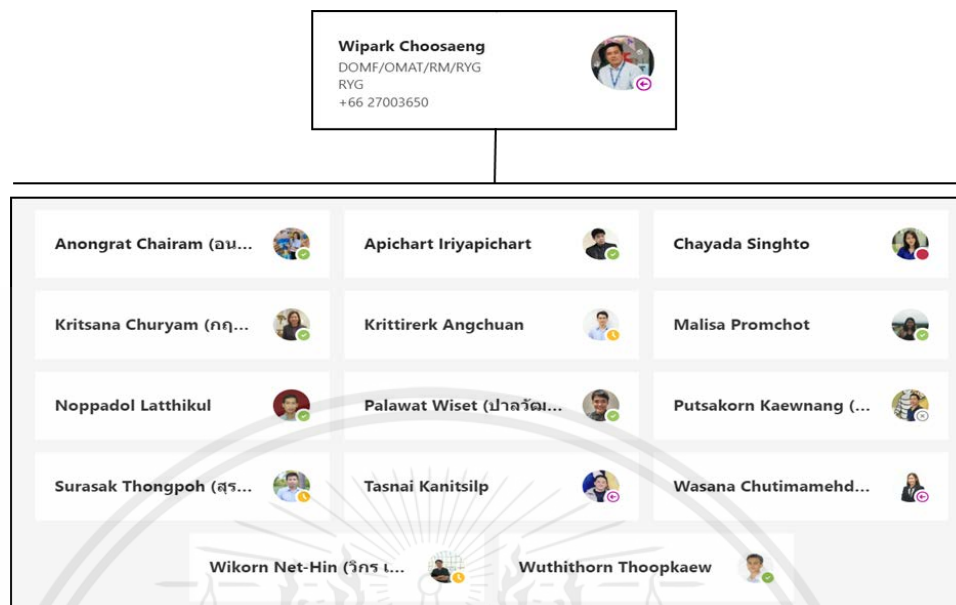


Figure 1. 2 - RYG Organization Chart

1.3.3 RYG - Project Team Organization

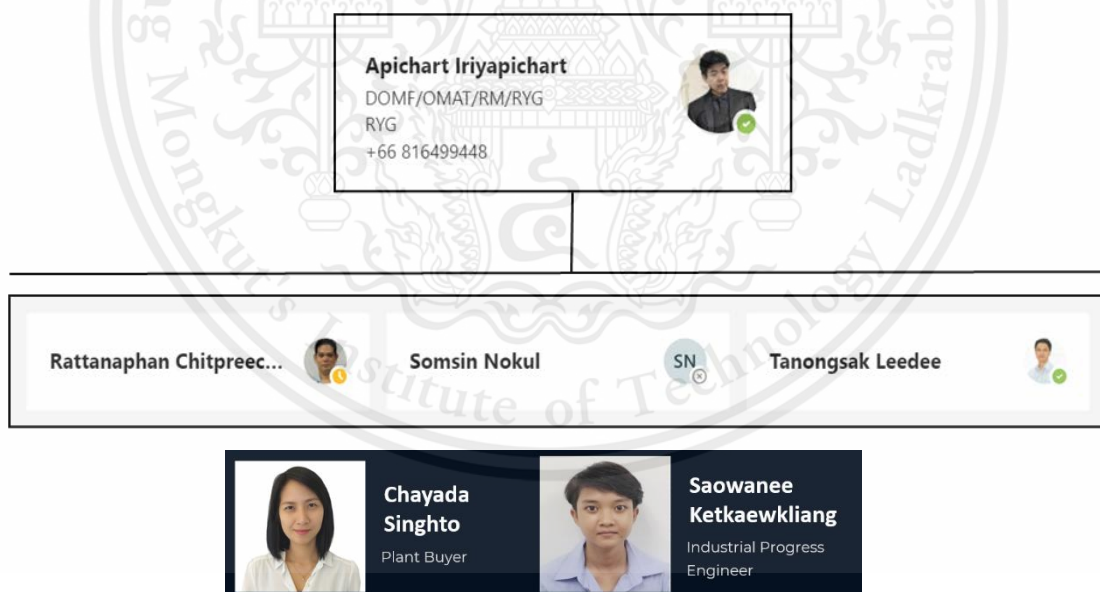


Figure 1. 3 - RYG - Project Team Organization

1.4 Project background and significant

If one day you are an entrepreneur or CEO in the company or you could be a manager. The main priority in an organization is management. One of the factory managements is management of resources, operators, budgets, as well as management of projects that take place inside the plant, as there is an important part involved is in the issue of budget. This project aims to leverage project management methodologies and best practice to guide the development the project management, ensuring it aligns with business objectives, remains within budget, adheres to a defined schedule, and ultimately delivers a high-quality product that will provide a competitive edge in the market.

Before studying project management, The author was interested in project management, which was during the same period that Michelin Siam Co., Ltd. (RYG) was running the Erawan Project. This is a project that was set up to produce a product on demand by increasing the capacity of a product in a machine of the same type.

Therefore, the project was assigned to be mentor's assistance to drive the project in the project management part that mentor's handle also assigned to study about project management approach that Michelin Company use in currently.

1.5 Project Objectives

To study the approach and process of project management. Including learning to communicate to control project execution in Erawan Project.

1.6 Materials

- 1) This research used project management theory
- 2) The principle of research is the 4 components of project management
- 3) Tools to use:
 - a. Microsoft Excel
 - b. Microsoft Word
 - c. Format Form
 - d. Outlook
 - e. Draftsight Mechanical
- 4) Knowledge and Activity
 - a. Communication Skill

- b. Management Skill
- c. Joined workshop
- d. Meeting

1.7 Project Scope

The uniqueness of this study will be a case study, a study of project management in the sequence of implementation of the Michelin Siam RYG project, beginning with an area study in the factory to study the layout of the machinery in various parts, and then beginning with concepts and theories related to project management and documentation, articles, and related research. Start bringing the information that has come in connection with the principles of functioning of the Michelin Siam RYG Project once accepted in the portion of the theory. Currently, Michelin Siam RYG has the Erawan project, through which students can study Erawan project Lot1 and Erawan project Lot2, both of which are sub-projects that are being carried out during the internship and cooperative education. The research area focuses on the management processes of project relocation, installation, demolition, building upgrades, and utilities for new machines. During the study of these two projects, each project starts at different times, with Erawan Lot1 starting before which, during the cooperative education, Erawan project Lot1 is in the start of production or ramp-up and during the Erawan project Lot2 in the bidding process to find a contractor to dismantle the machinery.

1.8 Methods of conducting research

1.8.1 Project Methodologies

- 1) The site visit in the factory area that has been studied in construction is in RCD1, RCD2, RCD3, and into the production process of the wire in each process.
- 2) Site Visit to view the area needed to run the ERAWAN PROJECT LOT1 and LOT 2 projects.
- 3) Study Industrial Project Approach documents first before studying the actual site.
- 4) Join the BIB Ramp Up Workshop: Site observation and identify actions.
- 5) Action implementation
- 6) Attend the meeting to see the progress of the work from various actions and study the problem systematically.

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- 7) Check the radius of the fire extinguisher before installing and deliver it to EP department to be validated.
- 8) Study Industrial Project Approach while studying each project implementation phase and monitoring results.
- 9) Summary of the project study Presenting the project to the company, professor, and the committee.
- 10) Make a complete report book.

1.8.2 Methods of conducting Project

The following Table 1 is Gantt chart, include the brief action plan and the actual action. First month, in May, The author have learned simple tasks, to understand the scope of work, and to adapt for working environment. Due to the project was begin in July so the Gantt chart started from July 2023 to October 2023. Therefore, the duration of an internship student and cooperative education from May to October 2023 is a total of six months, with the operational plan as shown in Table 1.1

Table 1.1 Cooperative education plan

Activities	Duration																											
	May				June				July				August				September				October							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1.) Observe the production process at the site			←--→	←--→																								
2.) Study the project implementation site			←--→	←--→																								
3.) Study the theories related to IPA			←--→	←--→																								
4.) Attend the BIB Ramp Up Workshop							←--→	←--→																				
5.) Attend meetings to review project progress											←--→	←--→																
6.) Write a scope of work of fire tank in ERAWAN PROJECT LOT 1 area																			←--→	←--→								
7.) Study IPA in parallel with project execution															←--→	←--→												

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Chapter 2 Concepts, Theories, and related Research

In chapter 2, will discuss concepts, theories, articles, and related research on project management as guidelines for the study of project management. ERAWAN PROJECT Lot1 and Lot 2

2.1 Related Theories

2.1.1 Definition of Project and Project Management

William Malsam gives the meaning of the project is A project is a set of tasks that must be completed within a defined timeline to accomplish a specific set of goals. These tasks are completed by a group of people known as the project team, which is led by a project manager, who oversees the planning, scheduling, tracking and successful completion of projects. Harold Kerzner gives the meaning of the project is A project can be any series of activities and tasks that: Have a specific objective to be completed within certain specifications, defined start and end dates, funding limits, consume human and nonhuman resources (ie., money, people, equipment), and are multifunctional (ie., cut across several functional lines). J. Rodney Turner gives the meaning of the project is A project is a temporary organization to which resources are assigned to do work to deliver beneficial changes. David I. Cleland gives the meaning of the project Projects are the building blocks in the design and execution of strategies for an organization. Projects provide an organizational focus for conceptualizing, designing, and creating new or improved products, services, and organizational processes. Joseph M. Juran (1904-2008) gives the meaning of the project A project is a problem scheduled for solution. All improvement takes place Project-by-Project and in no other way and follow the “Universal Sequence for Breakthrough.” Jane M. Wiggins gives the meaning of the project is Changes that matter, are not things that happen on a regular basis, objectives and clear beginnings and ends are identified, calling for investment decisions.

The term "project" refers to a specific action based on all of the notions gathered. A group or temporary team effort intended at reaching a goal within a specific budget entails a diverse variety of qualified persons from various job lines in various sections of the business. A procedure that must be carried out in a methodical manner. Activities have a

clearly defined starting and ending point. There are clear goals, accomplishments, and objectives for the intended objectives by using the available resources to maximize the benefits and value. The project therefore involves design or planning, period, budget, and allocation of resources. And most importantly, the project must be carried out qualitatively, reviewed, and evaluated according to its intended goals. The project management department is an important activity that involves everyone in the organization, from senior managers to operational staff. Kloppenburg describes it as applying knowledge, skills, tools, and techniques to implement a project to meet its needs, as well as work processes ranging from initiative, planning, operation, and closure, during which the process requires a balance of scope, quality, funding, and timetable in project execution. Project management, including administration for planning, archiving, task control, and visionary leadership, motivation, and public relations in the program, means that management uses the available resources appropriately to carry out the project to its intended objectives. Following that, Richardson stated that successful implementation required the use of tools, technical abilities, and project expertise, as well as organizational patterns and standards. Pico and J defined it as a fundamental principle of resource planning, assessment, and control in relation to project goals. The project team has to set a single target with limited time and budget available. The management characteristics are predetermined systems and processes that have been improved over time. Project management differs from production precisely where project management has the landscape and skills that are part of the project operator. The focus of a project manager is the operation of achieving all the objectives as well as delivering the product within the budget and the specified timeframe. Also, Vanhoucke has described project management as consisting of planning, organizational management, and resource management towards the achievement of project objectives and goals. The principles of project management that are critical to the purpose of the project are: project scope management, human resource management, and the role and responsibility determination of participants and beneficiaries.

From the above-mentioned definition, it can be concluded that plant management refers to the ordering of events and activities in the project's operation process, with individuals or stakeholders involved in determining the purpose of the project. The nature

of project management is flexible and adaptable to changing environments or circumstances. Project management is the application of knowledge, skills, tools, and project management techniques, such as project performance evaluation and control techniques, organizational structure, management, and resource management, as well as work processes that start from initiation, planning, operation, and closure to project activities that are tailored to specific purposes and to product delivery within a specified budget and time frame.

2.1.2 The importance of Project Management

Arintra Punyayuttakan The key characteristic of a project is that it has a definite duration and is unique. Since each project always has different factors, be it a product, a customer, a resource, a staff budget, there is no project that looks the same in all respects. With the specific characteristics of the project being made, it is not easy to predict or measure everything. The more uncertain it is in some kind of industry, the more difficult it is to manage a project successfully.

Most of the current projects are characterized by high uncertainty. The system requirements may be unclear, making it at great risk of failure. Failures involve money, time, and resources being lost. The need to have a lot of projects in an organization is thus increasing the risk to the entity if the organization does not have efficient project management processes and systems. From the failure statistics of IT projects in America, which were surveyed by Standish Group, it was found that in 2012, only 29%, or 1 in 3 projects, succeeded. Another 71%, or 2 in 3, were projects that failed. Or it took more time or resources than planned.

Efficient project management is therefore an important part of ensuring that a project succeeds within existing limits and achieves the objectives of the project set, to make the project a part of the organization's strategic plan and lead the organization to business success.

Dr. Pornchai Ongwongsakul A project is a policy that is defined within the organization to convert strategic intentions into tactics at the operational plan level, which must meet the requirements set for most of the agencies in which the project manager will face the following situations:

- 1) The complexity of administrative problems increased over time, and the complexity increased until a single agency was able to solve the problem.
- 2) Constant change and speed make routine responsiveness untimely, but the project can respond to this change.
- 3) Resources have a higher value. Resources are limited. They need to be used to maximize value. Delays increase the value of resources.
- 4) The need to use the technology. The technology is very rapidly obsolete. The supply of the technology must consider the cost. Before using the technology, all four of the above problems must be considered as a project. The problem can be solved with just one project, which is a modern concept.
- 5) Increased speed and accuracy in administration. The requirement is always very fast. Projects are necessary in situations such as this. An acute response will be a victory in the work and the survival of the enterprise. Because the project will help reduce the work process. Increase in technology. There are more people helping to work faster.
- 6) Quality development. People can develop self-quality. Only one level will reach a saturation point, so higher-quality development requires an additional project to learn.
- 7) Faced with risk and uncertainty. An industrial plant or service facility that needs to be operational 24 hours a day. When a breakdown occurs, routine work cannot be recovered. It requires another group of people to handle it. This is called a special operation set. Starting a new business is risky.
- 8) The new mechanisms of a very violent global competition The project will be a struggle to fight against. The New Mechanisms consist of things as follows:
 - a. New markets are derived from global money and capital markets. The value of money may be always rising or falling rapidly. Makes the negotiations in the markets more concentrated.
 - b. New tools, such as the Internet, cell phones, and mass media, have increased the learning of news and had an impact on people's lives.

- c. New actors are transnational organizations (the World Trade Organization, or WTO) and private development organizations or non-governance organizations that play a major role in determining the advantage or pace of competitive opportunities or as barriers to competition.
- d. The New Rules come along with the Agreement on Peace, a multilateral agreement in trade, administration, intellectual property, natural resources and the environment, and human rights. These agreements will have a role and influence over state policies.

To cope with these conditions, it is required to consider and perform project after project, project after project, and manage successfully. Strategic analysis is therefore critical.

2.1.3 Characteristics of Project and Project Management

The nature of the project must have a specific purpose. The purpose is a temporary operation with a duration of execution and an expiration period. It requires several types of resources. It should have a budget for sponsorship or involvement. In cases of uncertainty, the project is divided into six major categories:

- 1) According to the nature of the situation to be encountered, the project is divided into three categories:
 - a. Improvement Project is an improvement to solve problems in an organization.
 - b. An innovative project is a project that aims to introduce new ideas to the workings of an organization.
 - c. A research and development project is a pilot project to bring results to development in various fields.
- 2) Divided by project size, small projects include school projects, and large projects include national projects.
- 3) Divided by project duration, short-term projects are one year long and five years long.
- 4) Divide by original and new projects, including original or continuing projects and new ones.

- 5) Divided by administrative level, these include policy agency projects, middle and practical levels.
- 6) Plans are divided into projects by mission, such as educational quality development plans, cultural promotion plans, etc.

Pakorn Preeyakorn, 1999 Explain the difference between a project and a fixed task. Firstly, it is the characteristic of an individual job or a specific job. It is the output or service on which a project works. It differs in some respects from the outputs or services. Secondly, it is a temporary operation. Every project has a definite start and end date. Next **Chaiwath Jukthae, 2013** The description of the nature of the project administration is as follows:

- 1) The objectives or results of the project are clearly defined, usually in terms of cost, timing, and desired work.
- 2) It has its own unique character, which means it has to do something different from what it has ever done, and even if it's a project that's been done on a daily basis, it is still different.
- 3) It consists of temporary activities, with the start and end of the project. A committee or team has been set up to carry out the project to the desired objectives, and the project office has a location. When the project ends, the committee will disintegrate (or may be re-established to do another project) and shut down the project's workplace.
- 4) Cut across organizational lines, because the implementation of the project involves various departments or parts of the organization, requiring specialists from different departments such as production, finance, marketing, etc. In addition, those collaborators from different departments will be required to work together under the administration of the same project manager to make the project successful, which may lead to conflict issues that are specific to each project.

2.1.4 Goals of Project Management and Risk Management

The primary goal of project management is to generate results. The project is unique, unlike what the organization normally does. In this case, the objective of project administration is to bring together resources to achieve 'unprecedented results'. But the term result also includes a number of limiting factors, such as time, cost, and quality. We might say that the aim of project leadership is to manage 'risk' in order to maximize the

chances of success (or customer satisfaction) of the project. Risks include a variety of factors, ranging from factors within the project, such as employees or resources, to factors outside the project, such as competing companies, technology, or uncontrollable problems such as the sky. The more valuable a project is, the more variable it is and the more “risk” it takes to fail. This is why many project managers choose to break up large projects into smaller activities for ease of management.

2.1.5 Project Management Factors

The complexity of project management is even greater if the factors and resources are limited. The factors that help in project management include:

- 1) *Cost* – The first factor to look at is the cost and cost of the project. If the costs and costs exceeded what was specified. From a business point of view, then this project is an unsuccessful project because it could not be profitable.
- 2) *Time* – The second important factor that does not lose cost is time. All types of projects have schedules for delivery, and project tasks do not vary. In this section, project managers have to compare how much time and cost a project can have. The more complex a project has multiple steps; the more detailed project time management has to be on each step.
- 3) *Customers and stakeholders* – In many projects, there may be more than one 'client'. The IT software development project may have to look at both the needs of the client, the employer in the project, and the requirements of the software user. Meanwhile, the village construction project may also have to take a look at the need of the project owner who is the primary customer, as well as those of the 'customer' customer.
- 4) *Project staff* – In order for the project to be successful, project managers must also manage the human resources in the project. It may be to relocate resources to another task, to reduce human resources to save costs, or to find additional staff to keep the project running on schedule.
- 5) *Goal of project management* – The goal of the project depends on the needs of the client. It may be to build a software, build a house, or open up a new

market in a new area. A good project management needs to have a clear goal and a way to measure the results of each step.

- 6) *Resources* – In many cases, project managers need to manage resources other than human resources. In the case of construction projects, resources may refer to construction equipment, sandstone, which should be identified from the outset as part of cost planning and project planning.
- 7) *Price* – Some of the projects may be a 'hire' of another company, which means that for the project managers who are hired, the 'price of hiring' is a factor to consider. No contractor would want to work for a client for free. Therefore, if the price and cost are inappropriate, there's a lot of chances that the project will be rejected from the first stage, and the challenge of initially managing the project is a variety of factors.

From the above factors, we can see that the project manager needs to manage money and time, managing staff and customer expectations, which means a good project manager. Besides having skills in managing finance and resources, it also needs to have skills to reach people. The more knowledge-based projects, such as IT projects or construction projects, the more jobs a project manager has. Especially in the case of projects in large organizations where most project managers do not own a company, but need to manage individual departments.

2.1.6 Constraints of Project Management

- 1) **Quality:** Quality in project management is the degree to which a project and its deliverables meet the requirements and expectations of the customer or stakeholder.
- 2) **Time:** This should lay out clearly the overall timeframe of the entire project, including scheduling, deadlines, and milestones. Using a Gantt chart is effective for managing the time constraint. Time management is crucial in its relation to other constraints, as going over deadlines can mean more money and higher budgets.
- 3) **Cost:** The budget or the project cost should be done early on during project planning. Making a clear project budget is always related to other constraints,

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for example, the amount of time your team will require translates to paid wage-labor hours, or a higher budget means you can reach for more lofty goals.

- 4) **Scope:** The scope of the work refers to the deliverables of the project or the result of the work. The scope should be clearly defined before beginning work and closely monitored throughout the project. Scope creep, or the project getting bigger or changing without proper protocol, can throw the constraint triangle off balance.

2.1.7 Project Life cycle

The life cycle of the project consists of four major stages (SarishChotepanit, 2553, page 199 Reference: Remington, 2003)

- 1) Project design and analysis involve determining the objectives of the project, choosing the direction of project conduct, a cost study, a cost analysis, and determining project feasibility.
- 2) Project planning involves the definition of the area and administrative structure of the project, the planning of the provision and allocation of resources necessary for the project's implementation, project planning, and budgeting.
- 3) The project implementation process involves the implementation of the project as planned, follow-up and evaluation, as well as solving problems to keep the project running smoothly until the project results are in each phase.
- 4) Project completion and delivery involve performance testing and delivery to the owner or user.

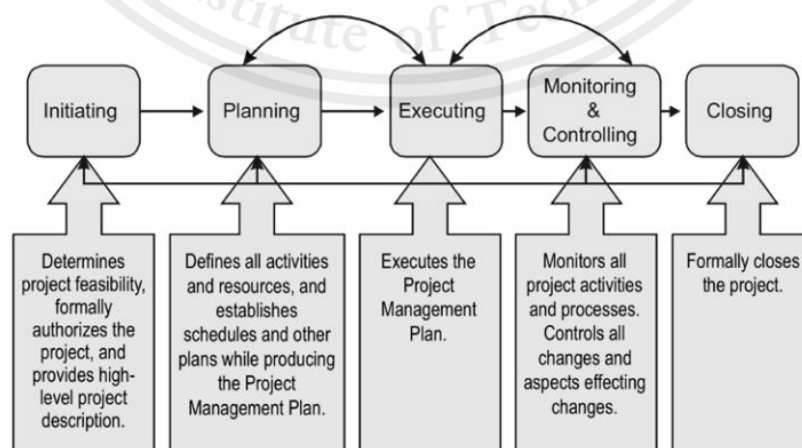


Figure 2. 1 Project Life Cycle

Traditionally (depending on what project management methodology is being used), project management includes a number of elements: four to five project management process groups, and a control system. Regardless of the methodology or terminology used, the same basic project management processes or stages of development will be used. Major process groups include:

- Initiation
- Planning
- Production or execution
- Monitoring and controlling
- Closing

In project environments with a significant exploratory element (e.g., research and development), these stages may be supplemented with decision points (go/no go decisions) at which the project's continuation is debated and decided. An example is the Phase-gate model.

- 1) *Initiation Process:* The initiating processes determine the nature and scope of the project. If this stage is not performed well, it is unlikely that the project will be successful in meeting the business' needs. The key project controls needed here are an understanding of the business environment and making sure that all necessary controls are incorporated into the project. Any deficiencies should be reported, and a recommendation should be made to fix them.

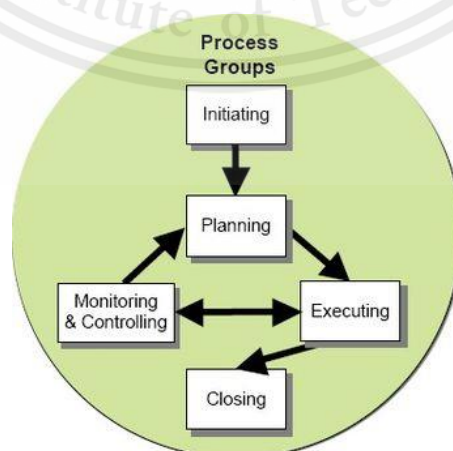


Figure 2. 2 The project development stages.

2) *Planning Process:* After the initiation stage, the project is planned to an appropriate level of detail (see an example of a flowchart). The main purpose is to plan time, cost, and resources adequately to estimate the work needed and to effectively manage risk during project execution. As with the Initiation process group, a failure to adequately plan greatly reduces the project's chances of successfully accomplishing its goals. Project planning generally consists of determining the project management methodology to follow (e.g. whether the plan will be defined wholly upfront, iteratively, or in rolling waves); developing the scope statement; selecting the planning team; identifying deliverables and creating the product and work breakdown structures; identifying the activities needed to complete those deliverables and networking the activities in their logical sequence; estimating the resource requirements for the activities; estimating time and cost for activities; developing the schedule; developing the budget; risk planning; developing quality assurance measures; gaining formal approval to begin work.

Additional processes, such as planning for communications and for scope management, identifying roles and responsibilities, determining what to purchase for the project, and holding a kick-off meeting are also generally advisable.

For new product development projects, conceptual design of the operation of the final product may be performed concurrent with the project planning activities and may help to inform the planning team when identifying deliverables and planning activities.

3) *Executing Process:* While executing we must know what are the planned terms that need to be executed: The execution/implementation phase ensures that the project management plan's deliverables are executed accordingly. This phase involves proper allocation, coordination, and management of human resources and any other resources such as materials and budgets. The output of this phase is the project deliverables. Project documentation: Documenting everything within a project is key to being successful. To maintain budget, scope, effectiveness and pace a project must have physical documents pertaining to each specific task. With correct

documentation, it is easy to see whether a project's requirement has been met. To go along with that, documentation provides information regarding what has already been completed for that project. Documentation throughout a project provides a paper trail for anyone who needs to go back and reference the work in the past. In most cases, documentation is the most successful way to monitor and control the specific phases of a project. With the correct documentation, a project's success can be tracked and observed as the project goes on. If performed correctly documentation can be the backbone of a project's success.

- 4) *Monitoring and Controlling*: Monitoring and controlling consist of those processes performed to observe project execution so that potential problems can be identified in a timely manner and corrective action can be taken, when necessary, to control the execution of the project. The key benefit is that project performance is observed and measured regularly to identify variances from the project management plan.
- a. Monitoring and controlling include Measuring the ongoing project activities (where we are)
 - b. Monitoring the project variables (cost, effort, scope, etc.) against the project management plan and the project performance baseline (where we should be).
 - c. Identifying corrective actions to address issues and risks properly (How can we get on track again)
 - d. Influencing the factors that could circumvent integrated change control so only approved changes are implemented.

Over the course of any construction project, the work scope may change. Change is a normal and expected part of the construction process. Changes can be the result of necessary design modifications, differing site conditions, material availability, contractor-requested changes, value engineering, and impacts from third parties to name a few. Beyond executing the change in the field, the change normally needs to be documented to show what was constructed. This is referred to as change management. Hence, the owner usually requires a final record to show all changes or, more specifically, any change that modifies the tangible portions of the

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finished work. The record is made on the contract documents – usually, but not necessarily limited to, the design drawings. The end product of this effort is what the industry terms as-built drawings, or more simply, "as built." The requirement for providing them is a norm in construction contracts. Construction document management is an incredibly important task undertaken with the aid of an online or desktop software system or maintained through physical documentation. The increasing legality pertaining to the construction industry's maintenance of correct documentation has caused an increase in the need for document management systems. When changes are introduced to the project, the viability of the project must be re-assessed. It is important not to lose sight of the initial goals and targets of the projects.

When the changes accumulate, the forecasted result may not justify the original proposed investment in the project. Successful project management identifies these components, and tracks and monitors progress, to stay within time and budget frames already outlined at the commencement of the project. Exact methods were suggested to identify the most informative monitoring points along the project life cycle regarding its progress and expected duration.

- 5) *Closing Process*: Closing includes the formal acceptance of the project and the ending thereof. Administrative activities include the archiving of the files and documenting lessons learned. This phase consists of:
 - a. *Contract closure*: Complete and settle each contract (including the resolution of any open items) and close each contract applicable to the project or project phase.
 - b. *Project close*: Finalize all activities across all the process groups to formally close the project or a project phase.

Also included in this phase is the post implementation review. This is a vital phase of the project for the project team to learn from experiences and apply to future projects. Normally a post implementation review

consists of looking at things that went well and analyzing things that went badly on the project to come up with lessons learned.

2.1.8 Type of Project Management Methodologies

Project management methodologies refer to how you choose to oversee a project. There are many different types of project management methodology and the type of methodology that's suitable for a project varies depending on its unique requirements. It's valuable to acquaint yourself with a few different methodologies, as this allows you to intuitively identify the type of management for a particular project that can be most effective. This is especially useful if you work on a freelance basis as you can adapt to a company's operation procedures, quickly and effectively.

Type of Project management methodologies there are numerous types of methodologies ready that you can use depending on the situation. Each methodology is appropriate for different types of projects and the one you choose to use may depend on the sort of result you want to see. The most common include:

- 1) *Waterfall methodology*: The waterfall model is also a very popular framework. But unlike Agile, waterfall is an actual methodology that is rather straightforward. The waterfall methodology, also known as software development life cycle (SDLC), is a linear process in which work cascades down (similar to a waterfall) and is organized in sequential order.

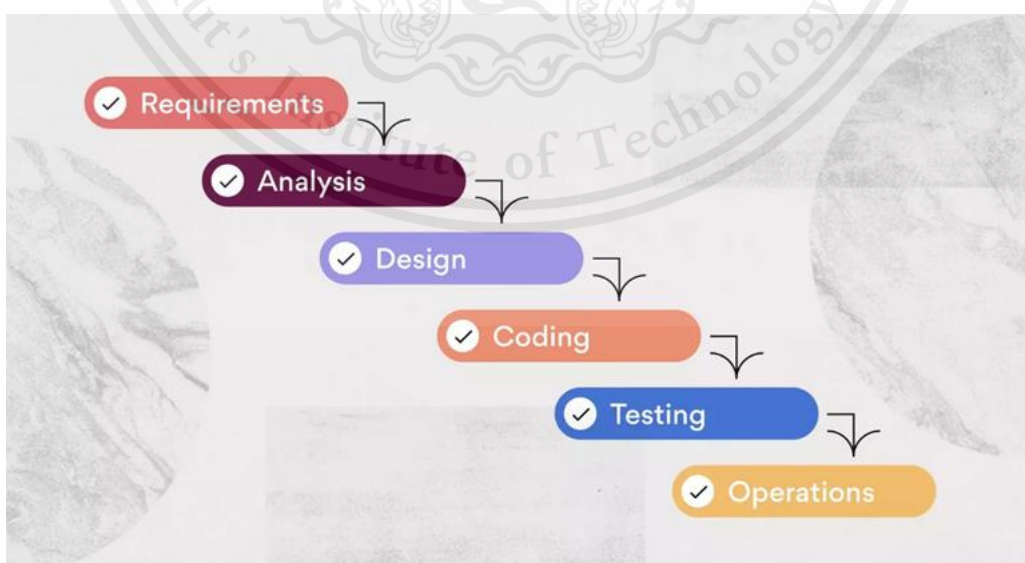


Figure 2. 3 The step of Waterfall Methodology

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To achieve this approach, each work task is connected by a dependency. This means each task must be completed before the next task can be started. Not only does this ensure that work stays on track, but it also fosters clear communication throughout the process. While viewed as a traditional approach by some modern organizations, this method is good for creating a predictable and thoroughly planned-out project plan. While viewed as a traditional approach by some modern organizations, this method is good for creating a predictable and thoroughly planned-out project plan.

2) Agile methodology: Agile methodology is another popular type of project management methodology. The predominant advantage of agile methodology is that it allows managers to split projects into smaller segments. Segment completion occurs one segment at a time, with time reserved for thoroughly inspecting and quality approving each segment before moving to the next. This promotes flexibility throughout the project, as you can adapt its strategy and steps depending on how the previous segment went. The main features of agile project management methodology are:

- a. adaptable style of project planning
- b. versatile use for a range of different project types
- c. simple and flexible style of management that's easy to adapt to

2.1.9 Industrial Project Management Processes

1) Scope Management Project scope management is a process that helps in determining and documenting the list of all the project goals, tasks, deliverables, deadlines, and budgets as a part of the planning process. In project management, it is common for a big project to have modifications along the way. With the scope in the project management defined right in the beginning, it becomes much easier for project teams to manage and make the required changes.

- a. **Importance of Project Scope Management:** For a project manager, managing the expectations of the stakeholders and clients is one of the most challenging tasks. With a definite project scope, managers can easily stay on track and ensure that all the deadlines are being followed throughout the project life cycle. A

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well-defined project scope management helps avoid common issues like:

- Constantly changing requirements
- Pivoting the project direction when you are already mid-way.
- Realizing that the outcome is not what was expected.
- Going over the discussed budget
- Falling behind the project deadlines

Effective project scope management gives a clear idea about the time, labour, and cost involved in the project. It helps to distinguish between what is needed and what is not needed for accomplishing the project. Scope in project management also establishes the control factors of the project to address elements that might change during the project life cycle.

b. Scope statement in project management: The project's scope statement is also called its scope document or statement of work. The project scope statement

- details all the boundaries of the project while also establishing the responsibilities of the team,
- defines all the procedures that need to be followed for verifying and approving the finished work, and,
- gives team members a definitive guideline for making project-related decisions.

When documenting the scope of a project, team members and stakeholders have to be as specific as possible to avoid scope creep, a situation where some parts of the project end up taking more time and effort than initially discussed due to miscommunication or poor planning. With effective project management, teams are able to ensure that the project is

finished on deadline, a proper project communication plan is done, and the final product aligns with the initial requirements.

c. Project Scope Management processes

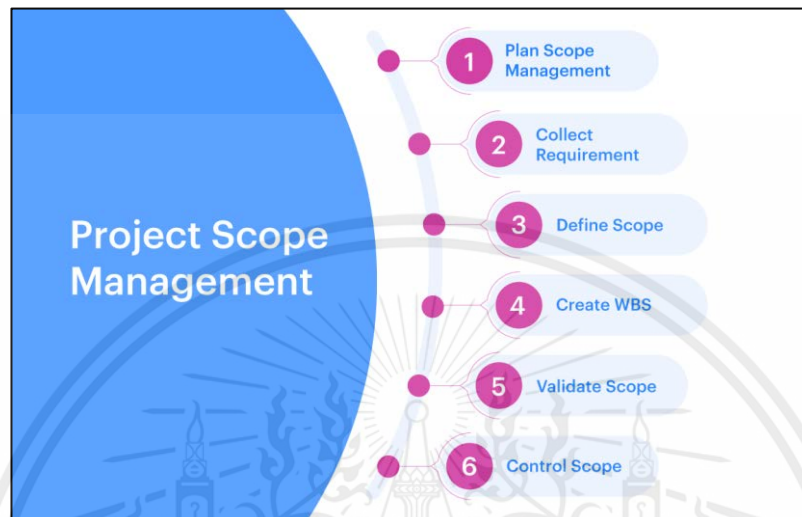


Figure 2. 4 The project scope management processes

1. Planning scope management: In the first process in project scope management, you create a scope plan document that you can refer to in the later stages. The document helps in defining, managing, validating, and controlling the project's scope. It includes:

- Detailed project scope statement
- Breakdown of all the project requirements
- Expected project deliverables.
- Project change control process

The document does not have to be detailed; it just must fit the purpose. You can also use a previous project's scope management plan as a reference for this.

2. Collecting requirements: The next step is to work out stakeholder requirements and expectations. You will be

required to document all the project requirements, expectations, budgets, and deliverables through interviews, surveys, and focus groups. This is a rather important step because often, stakeholders can have unrealistic requirements or expectations and the project managers would be required to step in to find a solution that is acceptable by everyone from avoiding project delays. At the end of the collection requirements stage, you should have the following:

- Functional as well as non-functional requirements
- Stakeholder requirements
- Business requirements
- Support and training requirements
- Project requirements

3. Defining the scope: At this step, you need to turn your requirements into a well-detailed description of the service or product that you are trying to deliver through the project. You will then have a project scope statement that you can then refer to throughout your project. While it is important to list what is in the scope of the project, it is just as important to note down what is out of the project scope. Any kind of inclusions to the scope would then have to go through the entire change control process to ensure the team is only working on things that they are supposed to work on. With a defined scope, you get a reference point for your project team and anyone else involved. In case there is something that is not involved in the scope, it does not need to be completed by the team.

4. *Making a project breakdown structure:* A project breakdown structure is a document that breaks down all the work which

needs to be done in the project and then assigns all the tasks to the team members. It lists the deliverables that need to be completed and their respective deadlines as well. You can use project management software for this step of the process to assign and prioritize project tasks which will make it easier to track the entire progress of the project and avoid any unnecessary bottlenecks.

5. *Validating scope:* In this step, the scope, and deliverables that you have recorded need to be sent to project executives and stakeholders to get the necessary approvals. Scope validation needs to be done before starting the project to ensure that if something goes wrong then it is easy to find where it went wrong.

6. *Defining the scope:* Project managers need to ensure that as the project begins, it always stays within the defined scope. In case there are some things that need to change, then the proper change control process should be followed.

2) **Schedule Management** Refers to a set of activities and procedures to direct and control completion of a project or process under a proposed schedule. It aims to develop a schedule that is effective in terms of time and resource estimates. A person or a group that follows such a schedule will be enabled to complete all scheduled tasks and activities on time and under resource needs. The term is used in project management to define a series of processes a project manager needs to carry out for sequencing project activities, estimating activity durations, determining resource needs, developing and controlling schedules. It is rarely used in business management to plan, manage and control business schedules and timelines. Regardless of where schedule management is used, a person or a team needs to step through the following processes to develop and control an effective schedule:

- Define the total amount of working hours required to produce a desired outcome.
- Estimate resource needs to determine the total number of employees required to produce the outcome within available working time.
- Estimate work effort.
- Use work effort estimates to determine how many labor hours are required for every employee to do every scheduled activity.
- Develop a schedule that is based on in the previous data.

3) Cost Management

a. Introduction and Background

Cost Management is one of the primary functions of Project Managers. When integrated with the scope/quality of the project and time management, these three functions form the core of Project Management. The cost management function maintains its important focus at every stage throughout the life cycle of a project. In listing the reasons for the success of a project, the management of cost is the most important as all project aspects affect this function. What counts for the owner is the “bottom line.” The initial Cost Management Task Group was chaired by Mr. D.W. Haeney, Stelco Inc., (a member of the PMI Southern Ontario Chapter) in 1983. Mr. P.G. Georgas, Stelco Inc., (also a member of the PMI Southern Ontario Chapter) is now chairing the Cost Management function of Project 121, Body of Knowledge assisted by G.V. Vallance, Stelco Inc. The preliminary report of the Cost Management Function Committee was completed for presentation at the PMI October 1985 Denver Workshop. The workshop reviewed, critiqued this preliminary report, and instituted several modifications. The time phase or the chronological progression of process and activities throughout the project life cycle was eliminated from the function chart. The result was that some processes were combined. The resulting two-dimensional modified workshop chart still did not meet the requirements of being fully integrated with other Project management functions. A matrix system was suggested, and this final report incorporates the matrix approach and the interface with other Project Management functions. This report is the final

submission of the 1985 Cost Management Function Committee. The report includes all the ideas and work from the initial report (August 1985), the modifications recommended at the workshop, the matrix chart, technical references, and all **Mr. Wideman's suggestions**. It is understood that the matrix and function charts, technical reference and glossary of terms will be used to establish a data library for education purposes (accreditation and certification) for all PMI members and students. There remains a great deal of thinking, discussion and writing before the Cost Management function of the PMI Body of Knowledge is complete. This report is only a beginning and future group will enlarge and refine the existing information.

b. 4 steps of Cost Management

- 1) *Setup*: The setup phase determines what's included in the cost management plan. It identifies who the stakeholders in the plan are, the tools used to manage costs and the data structure needed to track costs.
- 2) *Resource planning*: This planning phase identifies the resources needed to complete a project. These could be physical materials, information assets, staff, and cloud computing resources. Resource planning determines resource allocation, including how much of a resource is needed, for how long and how it will be allocated.
- 3) *Budgeting and cost estimation*: In this stage, project teams develop a project budget. Budgeted cost estimates get more specific as the project scope is refined. A picture of the full project costs emerges as resources are allocated. Project managers compare the current project to earlier ones to gain insight. They can use top-down and bottom-up estimation methods. In the top-down approach, upper management in an organization determines the project duration, the tasks and project activities involved and the estimated costs for each of them. In a bottom-up approach, each team estimates the duration and allocated budget of their individual tasks. Management uses that information to determine the project's duration and estimated budget.

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4) *Cost control*: This phase involves monitoring and controlling costs as the project progresses, using data from different project teams. Managers track how costs differ from the estimated budget and take action to accommodate cost overruns, reduce deviations from the budget and cap the budget when necessary. Effective cost management processes require accurate cost reporting. This involves access to real-time cost data and insight using data visualization. Variances from budgeted costs must be measured, and corrective measures taken.

c. Benefits of Cost Management

The benefits of cost management include the following:

- ***Reduces overspending***: Cost controls help project managers keep their budget on track and not let costs get out of control.
- ***Encourages planning***: Cost management helps identify what is and is not working. It provides insight into resources and processes that helps managers make faster and better decisions about the current project and future ones.
- ***Facilitates financial health***: Continuous monitoring, cost control and cost reporting contribute to a company's long-term financial health. These efforts provide the data necessary for good decision-making. Implementing a cost management structure for projects helps a business keep its overall budget under control.
- ***Mitigates risk***: Cost management typically involves setting a risk allowance for unforeseen costs, a useful step to prevent overspending.

- **Supports standards:** Consistent cost control, analysis and reporting help organizations adopt standards for assessing future cost data and productivity levels.
- **Improves visibility:** Many cost management tools for cloud services give real-time visibility into cost management metrics, like savings. They also provide a list of the users' assets, and some use machine learning to provide suggestions on areas where users can change behaviours to save money.

d. Challenges of Cost Management

Common challenges of cost management include the following:

- **Change management:** Project changes are inevitable. Teams must be able to adapt to changing circumstances and manage the budget accordingly.
- **Effective communication:** Reporting can be perceived in different ways, depending on who sees it. A project manager may view results differently than project stakeholders.
- **Tool sprawl:** Lack of a dedicated project management or cost management tool can make managing cost over multiple tools difficult and complex. This can cause data integrity issues and hamper reporting and visualization capabilities.
- **Project scope:** Poorly defined project scope can lead to cost overruns from inaccurate estimates.
- **Underestimation:** If a project manager underestimates costs that go into a budget, it can lead to a lack of resources and project delays.
- **Vendor lock-in:** Some cloud vendors offer proprietary tools to help IT teams calculate the cost of using their service.

4) Human Resources Management

a. Introduction

Human resource management is organizing, coordinating, and managing an organization's current employees to carry out an organization's mission, vision, and goals. This includes recruiting, hiring, training, compensating, retaining, and motivating employees. HRM staff also develops and enforces policies and procedures that help ensure employee safety. The HRM team manages adherence to federal and state laws that may work to protect employees' private information and ensure their physical safety and mental and emotional well-being. Organizations of varying sizes and industries rely on HRM to keep business running smoothly and efficiently.

b. Purpose of Human Resource Management (HRM)

The methodology behind HRM recognizes the value employees bring to an organization, also known as human capital. Investing in employees and strategically supporting their needs can improve employee satisfaction and employee motivation. Employees who are well trained, competent, valued, and supported by their employers will likely have the skills and incentive necessary to carry out the organization's goals.

5) Change Request Management

a. Introduction

Change requests act as these formal documents and are a core component of the change management process. These documents outline modifications to some aspect of the project or organization — usually at a high level, such as a project deliverable or organizational operations.

The requests for change can come from within or outside the organization, and while requested changes can vary wildly, the process for creating them is the same. This continuity simplifies the process of creating, submitting, monitoring, and approving (or denying) them.

b. Purpose of a Change Request

In any project or organization, there is the potential that processes or tasks will need to be changed. Change requests exist to officially document details about those aspects that need to be altered. Their purpose is to request a modification and control this change.

These modifications can be necessary when high-level goals and objectives and/or project deliverables change or are added on to. For example, a client may want to change the deliverables of a project, a company may want to expand its mission, an organization may want to improve communication or internal operations. The list goes on. Regardless of what the change is, change requests document the proposed modification.

These formal requests list all pertinent information and are then passed along to an individual stakeholder (or a board or comity of individuals) for approval. Change requests summarize everything they need to know and simplify how the change management process will progress.

c. Type of a Change Requests

Change requests can be sorted into different categories, depending on the objective of the change. Here are the four key types of change requests to be aware of. Each of these four can apply to both projects and organizations.

- **Normal Change:** A normal change request addresses a significant alteration to operations, existing systems, infrastructure, etc. This type isn't uncommon, but it does imply substantial, far-reaching changes need to be made. And, as you can imagine, normal change requests often result in additional ones.
- **Standard Change:** A standard change request proposes a low risk change that occurs often. As we have discussed, many changes are perfectly natural over the course of a project or in an organization. These changes can be thought of as evolution. They are proposals outlining what needs to

be modified, but the modification itself will follow a pre-existing system.

- **Major Change:** A major change request proposes a significant change that will require substantial financing. Major changes pose a high risk, but they can also reap high rewards. These changes don't occur often, and if they're handled poorly, they can do serious damage. That being said, they're necessary to make extreme modifications.
- **Emergency Change:** An emergency change request is a high-priority proposal for immediate change. This type is the result of a mistake or something not going as planned and can be used to prevent these unexpected circumstances from wreaking havoc.

6) **Quality Management** Scott and Cole (2000) claim that the quality effort is not readily linked to a well-identified, clearly specified set of ideas and practices but, rather, appears as a loosely coupled collection of orientations and practices. We disagree with this judgement. The seminal authors on quality have presented influential theoretical and philosophical starting points for quality. Unfortunately, those starting points fall outside the usual paradigms of management scholars, and they have failed to spot them. It is thus deserved to ask from where the theoretical and philosophical ideas of quality management can be found. We contend that there are three promising places:

- First, quality is usually, although not always, related to man-made artefacts that have been designed and produced. Thus, it seems natural to expect that the concept of quality is related to or embedded in concepts and theories of production.
- Second, for maintaining and improving quality, information and knowledge are needed. From where should that be acquired? The discipline studying such matters has traditionally been called

epistemology. So, it can be expected that that the concept of quality would entail epistemological considerations.

- Third, for perceiving and acting for the sake of quality, a conception on what is out there in the world is needed. The discipline studying such matters is ontology. It can be expected that the concept of quality would entail ontological considerations. In the following, the three identified topics are explored.

7) Risk Management

a. Introduction

- Risk management theory is technique businesses use to identify, assess, and manage risk. By identifying potential risks, companies can develop plans to avoid or minimize them.
- Risk management theory can help businesses protect themselves from financial losses, legal liability, and reputational damage. While no risk management technique is perfect, risk management theory can be invaluable for businesses that want to minimize risk exposure.

b. The benefits of effective Risk Management

Risk management is identifying, assessing, and controlling potential risks to an organization. It is an essential part of any business and can help protect against various potential problems. Effective risk management can help to:

- Minimize the likelihood of problems occurring.
- Reduce the impact of problems that do occur.
- Improve organizational resilience.
- Increase confidence and trust among stakeholders.

Several different risk management theories can be used to guide Practice. The most common approach is the risk management cycle, which consists of four key steps: risk identification, risk assessment, risk control, and risk monitoring. Each of these steps is important, but they must also be seen

as part of an ongoing process. For example, once a risk has been identified, it must be constantly monitored in case it changes or develops over time. Similarly, risk control measures must be regularly reviewed and updated to remain effective. By following these principles, organizations can ensure that they are well-prepared to deal with the risks they face.

8) Procurement Management

a. Introduction

Procurement management is responsible for overseeing all the processes involved in acquiring the products, materials, goods and services needed for efficient business operations. Depending on the business and industry, the terms “sourcing,” “purchasing” and “procurement” may be used interchangeably to describe the function of procuring supplies and managing the process, with sourcing considered more strategic, and purchasing and procurement used to refer to the actual operational function.

b. The importance of Procurement

Without procurement, it would be impossible for most business operations to function. Procurement management ensures that all items and services are properly acquired so that projects and processes can proceed efficiently and successfully.

More than a business necessity, procurement can be leveraged as a competitive advantage when optimized to save money, time and resources. But driving down costs by avoiding delays and errors and maximizing resources is just part of the reason procurement management plays an important role in a company’s bottom line.

Procurement management can be responsible for negotiating lucrative production and supplier contracts, spearheading innovative new processes and play an important part in taking a domestic business operation global. Procurement management can also play an important role in spearheading corporate social responsibility in diversity and inclusion by proactively seeking **diverse suppliers**. “Only focusing on cost is definitely not sufficient,”

says Alex Zhong, supply chain lead at IBM Sterling on Supply Chain Dive. Procurement management holds “a strategic position to really support the business growth from a revenue perspective.”

“When you take a look over the last five to 10 years, supply chain has taken on a much bigger role and encompassed procurement as a key function within the organization, as opposed to residing outside of the supply chain functions,” says Zhong.

c. The steps of the Procurement Process

Managing the procurement of products, materials, goods and services effectively consists of establishing and following process steps through the entirety of the procurement lifecycle. These process steps can differ by organization, based on company needs and business goals.

As detailed by Dr. Tobias Schoenherr, Hoagland-Metzler Endowed Professor in Purchasing and SCM at Michigan State University’s Eli Broad College of Business in his Strategic Sourcing course, the core “procure-to-pay” process (the general buying process that a company goes through when making a purchase) typically includes these key steps:

- *Step 1: Specifying and Planning*

Establish the product or service need, set the specifications for the product itself and conduct planning, or forecasting, based on existing data and projections, for when and how the product is ordered or reordered.

- *Step 2: Identifying and Selecting Suppliers*

Identifying and select a supplier to meet product needs, either from established relationships with approved vendors or preferred supplier or by researching new suppliers and sending out and RFX: a request for information/proposal/quotation

- *Step 3: Negotiating and Contracting*

Negotiate the best price and terms for the product through competitive bidding from suppliers with their quotes and then direct

negotiations to clearly communicate requirements and set expectations. With all terms agree upon, finalize and sign the supplier contract.

- *Step 4: Placing the Purchase Order*

The purchase order (PO) specifically defines the price, product specifications, and all terms and conditions of the product and/or service being supplied. It also serves as the “source of truth” of the product being procured for various impacted business units.

- *Step 5: Expediting*

Expediting the product order is sometimes necessary (i.e. earlier than expected product obsolescence, a schedule change, etc.). Examining the timeliness of deliveries during this step can reveal underlying issues to address, such as lack of clarity on payment dates, delivery times and completion of work.

- *Step 6: Receipt and Inspection of Purchase*

Review all orders against the established specifications and quality standards and conduct “a three-way match” of the PO with the invoice and the packing slip/receiving document. If what was delivered does not meet the standards specified, completing a receiving discrepancy report may be part of this step.

- *Step 7: Invoice Clearing and Payment*

Align purchasing and accounts payable to complete the process of buying the product after inspection and confirmed document alignment (PO, invoice, packing slip/receiving document).

- *Step 8: Maintaining Records and Relationships*

Retain all proper records in the case of an audit, for tax information, to confirm product warranty and for ease of product re-ordering. Provide data and feedback to the supplier based on key performance indicators to identify areas for improvement and/or needed changes in the product or the supplier contract.

2.1.10 Tools used in Project Management

Project Management has many challenges. But it does not mean that successful project management is impossible. In his section, it will explain about the tools and strategies for managing projects to be simpler and more effective as follows:

a. Gantt Chart

1) Introduction

A Gantt chart is a project management tool assisting in the planning and scheduling of projects of all sizes; they are particularly useful for visualizing projects. A Gantt chart is defined as a graphical representation of activity against time; it helps project professionals monitor progress.

Gantt charts are essentially task scheduling tools: project management timelines and tasks are converted into horizontal bars (also called Gantt bars) to form a bar chart. These Gantt bars show start and end dates, as well as dependencies, scheduling and deadlines, including how much of the task is completed per stage and who is the task owner. Gantt charts show planned activity against time; they are frequently used throughout projects, programs and portfolios after tasks have been identified using a work breakdown structure.

A timeline, like the Gantt chart is useful to keep tasks on track when there is a large team and multiple stakeholders. They are a useful time management and progress tracking tool – you can also use Gantt charts to find the longest path from project start to project completion which is known as the critical path.

As it's a bar chart format, it's possible to check progress with a quick glance. You can easily see:

- a visual display of the whole project
- timelines and deadlines of all tasks
- relationships and dependencies between the various activities
- project phases

Project management solutions that integrate Gantt charts give project managers insights into team workloads, as well as current and future availability, which allows for more accurate scheduling. Gantt charts have been around for nearly a century, having been invented by Henry Gantt, an American mechanical engineer, around 1910.

2) How to use a Gantt Chart

The underlying concept of a Gantt chart is to map out the tasks to be completed and their order. This can identify tasks that can be done in parallel – at the same time, or in sequence – one after another. If we combine this with the project resources, we can explore the trade-off between the scope (doing what needs to be achieved), cost (using more or less resources) and the time scales for the project. By adding more resources or changing the scope the project manager can see the effect on the end date.

To create a Gantt chart, you need to know all of the individual tasks required to complete the project, an estimate of how long each task will take and which tasks are dependent on others. The very process of pulling this information together helps a project manager focus on the essential parts of the project and begin to establish a realistic timeframe for completion.

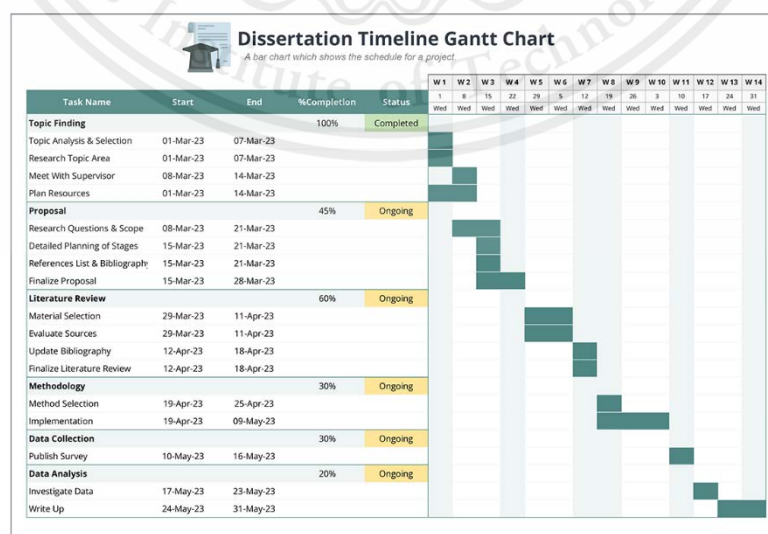


Figure 2. 5 Example of Gantt Chart when use in Project Management

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b. Critical Path Method (CPM)

1) Introduction

The critical path method (CPM) is a widely used project management technique that helps plan and schedule complex projects. It is used to identify the critical path of a project, aka the sequence of activities that determines the minimum completion time of the project.

The critical path method (CPM) is a tool used to plan and schedule complicated projects. It is based on identifying the critical path of a project and analyzing it to find the minimum completion time for the project.

The method considers the dependencies between different activities and the amount of time required to complete each activity. By understanding the critical path and the amount of “float” or “slack” time available in the schedule, project managers can better plan and control their projects.

2) When to use a Critical Path Method (CPM)

The critical path method (CPM) is an effective tool for planning and scheduling complicated projects. It is best for when the project has a large number of activities, many of which are interdependent. It's useful when there are a lot of dependencies between different tasks and activities that must be considered to schedule the project effectively.

The method can also be useful when there is a desire to accurately predict the completion date for the project, or if resources need to be allocated optimally.

The CPM is generally less effective for simple projects with only a few activities, or projects where the activities are not closely dependent on each other. The method is also not a good fit for projects that have low predictability and require flexibility since the critical path is based on predetermined dependencies and durations.

c. Work Breakdown Structure (WBS)

Work Breakdown Structure (WBS) is to divide the main duties in each project into duties or activities to manage and distribute resources more easily. The excellence work structure should explain the “Expected result” in each step.

We can do the structure of the work. According to each step of the project management (sub-steps of starting, planning, operating, checking, controlling, and closing the project) or can be divided according to the resources or duties in each team.

2.2 Related Research

Pornsuang Vorachapitak, 2017 A study of Project Management in office churning and reinstatement process: A case study of Financial Institute in Singapore.

From the research study, the author wrote,

- 1) ***Relocated the area in Project Management process*** - The relocation of employees, furniture and technology may be related to the change in the built fit-out of the area and/or building Services. This process can be divided into 3 phases and has the following details.

Phase 1: Planning/Programming/Pre-Implementation: This includes workplace migration planning, communication planning, hiring procurement planning, asset management planning.

Phase 2: Implementation: This includes 2 Which consists of two subsets, 1. Pre-Move, which involves hiring contractors, communicating with all levels of the organization, including clarifying workplace migration plans and preparations related to resource management. 2. Relocated the workplace (Move)

Phase 3: Post-implementation or Post-Move: Engaged in verification of accuracy, solving errors or claims from employees, facilitating and providing guidance on the use of office equipment, collecting warranty information, auditing, and closing accounts, and holding meetings to evaluate and close projects.

2) *The delivery of rental space to the building owner in Project Management process* – The delivery of rental space to the building owner

in Project Management process there will include in follows step:

Phase 1: Project Initiation: When the project owner receives a policy from the organization to hand over the rental space to the building owner, the first thing that a project owner should do is perform a Feasibility Study. The project owner must consider the terms of cancellation and the penalty for cancellations before the lease expires. The company owner can make a cost-benefit analysis with variables in terms of rental costs, administrative costs, and the cost of project execution, etc.

Phase 2: Project Planning: At this stage, the project owner should set up a core project management team, consisting of a project owner or project sponsor, a project manager, an information technology officer, a procurement team, a resource manager, and assign the project manager to a project meeting with the main project team to develop a project plan, starting with a breakdown of the work structure to get a full picture of the project, identifying and assessing the risks posed to 8 project managements, including:

1. Scope Management
2. Quality Management
3. Time Management
4. Cost Management
5. Communication Management
6. Contracts and Procurement Management
7. Human Resources Management
8. Risk Management

Project owners and project management teams can take lessons learned from previous projects with similar characteristics into consideration together with risk assessments. Next is the Critical Path Method, specifically the material equipment, which is classified as long-lead items, making plans,

timing, and scheduling. Next is hiring various relevant consultants to prepare a detailed project plan, meeting and coordinating with the building owners to understand how to implement the project to adapt the rental space to the requirements of the building owner. Then conduct pricing and procurement of the construction contractor.

Phase 3: Project Execution: When the project management team selects the construction contractor, the work is completed and enters the Pre-Construction phase, where the project team will work with the contractor to prepare a plan for the location, work schedule, construction site management plan, safety and environmental measures, documentation and permits as required by the project owner, such as Permit to work, Work Method Statement, Risk Assessment and Hot work permit, etc. This includes the deployment of staff to participate in training with the building administration. In the meantime, the project management team manages workplace relocation and asset management in conjunction. The construction contractor adjusts the site with the permission of the building owner and delivers weekly progress reports to the project manager so that the manager can track and control the quality and progress of the work as scheduled, as well as cost management with the relevant contractor.

Phase 4: Project Close-out/Space Hand-over: When the contractor has completed the rental process, the project manager invites the building owner to inspect and deliver the site by checking the building materials, equipment, systems, electrical, mechanical, and sanitary requirements, recording the water-light meters and handing over the keys (if any). The project manager holds a meeting to evaluate the project. Closes the cost accounts, collects, and delivers documents to the project owner, and closes it.

If you look at a comparison between the theory and actual practice of this financial institution's project, it will be found that the project management team misses the key steps in project planning, which are risk assessment and critical path methods. While the

project execution phase, the project clerk lacks effective project management in terms of tracking and control, stakeholder management, and risk or problem management.

Vichai Kijwatthanaboon, 2012 New approach in crash programming: Refurbishing an old factory to modern factory; A case study of Electronics Co., Ltd (Thailand) Construction management in the case of studying the upgrading of an old plant to a new plant in urgent circumstances, with time-specific variables being important. To manage such a project well within a fixed time frame and with standard qualifications, three major components must be residing within the entire project, including the management of staff within the whole project. Three main components include the administration of staff in all projects, both within the enterprise itself and the staff of the contractor's company. The second component is the planning of work and the determination of strategies, which have a definite purpose in operation and planning, including time-planning, funding, human resources, materials, equipment, planning in real operation. And, most importantly, risk assessment and solution for unforeseen events. The final element is the actual operation and operational processes, from the start of the project to the completion of the company's timely delivery of products to its owners. In addition, the implementation of the old factory repair is controlled by the operations as planned and methodically prescribed by the project manager. The project manager is the controller of the work in the picture as well as the project by allowing the workers in each work section to report on the work and are recorded before or during the work. And the type of work actually performed, which from the study of the relevant reporting documentation has been found to work according to the plan and order. The control and monitoring of the improvement of the factory is closely followed. This demonstrates the review of improvements in operations in each works section prior to project assignment. And studies have found that the problems and obstacles encountered in running the project are a matter of time, and the people employed in some parts are insufficient. From such problems and barriers are solved by increasing the workforce from other building agencies in charge. There is a good relationship to work on the parts that are still needed, until people are motivated to work for a specified period.

2.3 Framework of Research

The author aims to study about project management in the title of “A STUDY OF PROJECT MANAGEMENT OF ERAWAN PROJECT LOT1 AND LOT2 TO PRODUCE STEEL CORD OF TIRES” The author can classify as following:

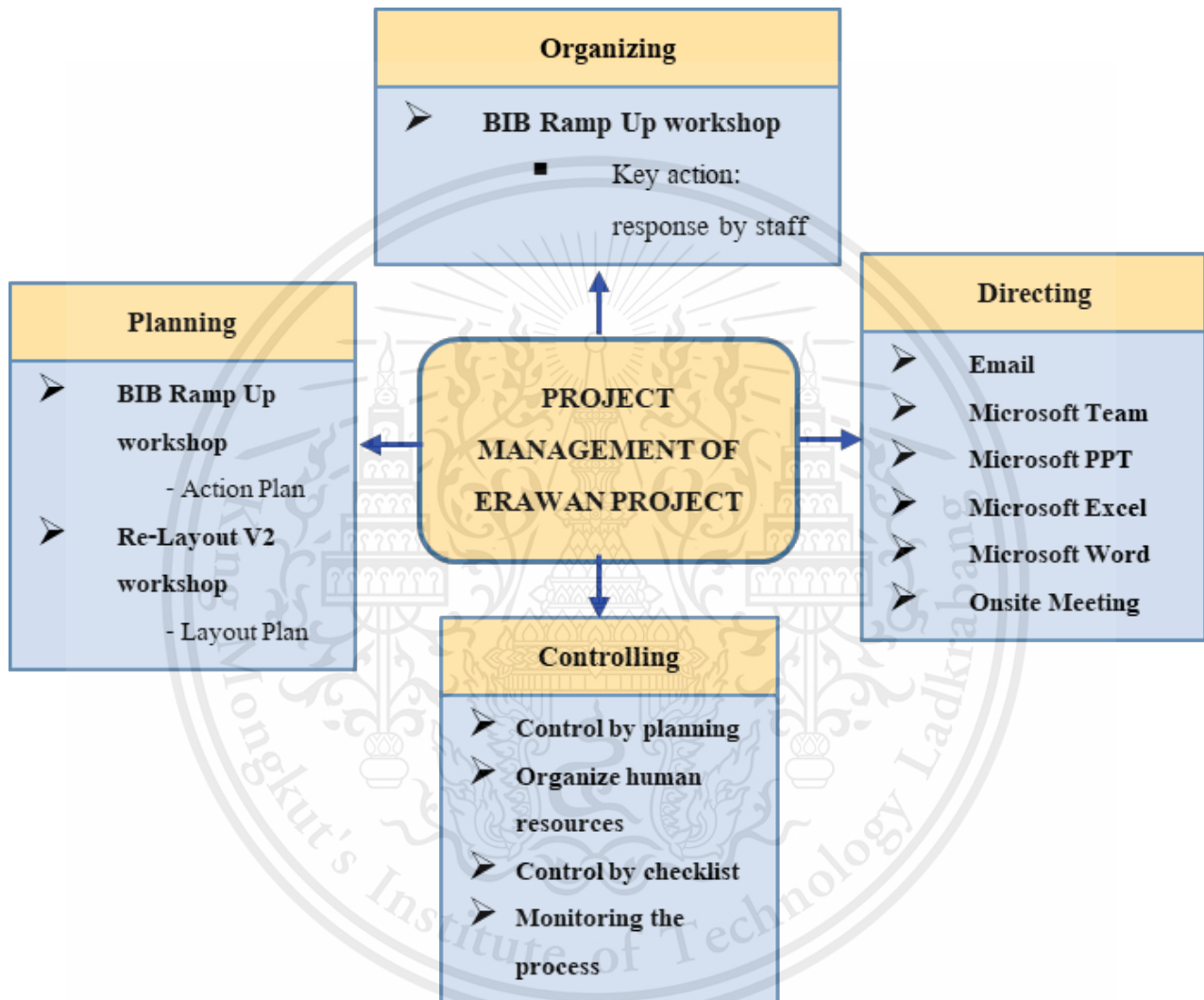


Figure 2. 6 Diagram of project management of Erawan Project

Chapter 3 Theory, Principles, and Methodology

This chapter shows an overview of the methodological approach the author used for studying project management in Michelin Siam RYG plant.

3.1 Background of Project Management in Michelin Company

The Erawan Project has been in operation since 2016 and was scheduled to end in 2020, when a severe COVID-19 outbreak caused the project's implementation to be suspended from 2020 to 2022, which will have a global impact and will also affect the project's start-up and production processes.

The Erawan Project was relaunched in 2023, with a new plan developed due to some of the original designs no longer being available. The quantity of items and the capacity have both been reduced. Lot 1 of the Erawan Project began in January and lasted in May 2023. The installation, machine commissioning, or system testing, will begin in May and continue until the end of the project lots.

In the project overview, the project can be divided into two parts. 1. Capacity evolution is an increase in capacity; and 2. Product evolution is not an increase in capacity but a demand for a new product that is constantly changing. The goal of product evolution is to increase the flexibility of the machine in all processes to reserve the changing of demand.

In the past, Michelin Siam RYG produced 1 thousand tons of steel cords. Later, when there was a new project, it could produce another thousand tons, which 1 thousand tons that increased can be both product A or product B, but next year it may produce the same amount or less than before. Maybe it will be able to produce up to only 800 tons, but there may be more product C, D, E, F.

In the past, when the machine was producing only A and B, if there is a need for product C, it will install a new machine to produce Product C, so it can produce both A B and product C, that is, an increase in capacity.

Currently, there are productions of product A, B, C, and Michelin is not planning to install more machines, but may remove the A machine that can produce product A B C in one machine. With the flexibility, the machine can produce different products in the same machine. Therefore, when the nature of the project changes, all we have to do is choose

a product that's obsolete or trending. The parts can be produced by the company or from partners.

Take the product out to keep the area available and take a new machine to make a new product, "Product Replacement." Michelin Siam Co., Ltd (RYG) was founded in 1996. During 1996–2012, the main solution used in steel cord production was capacity evolution. But after 2012, the main solution of the project changed from capacity evolution to product evolution, which is to produce a new product instead of an old product.

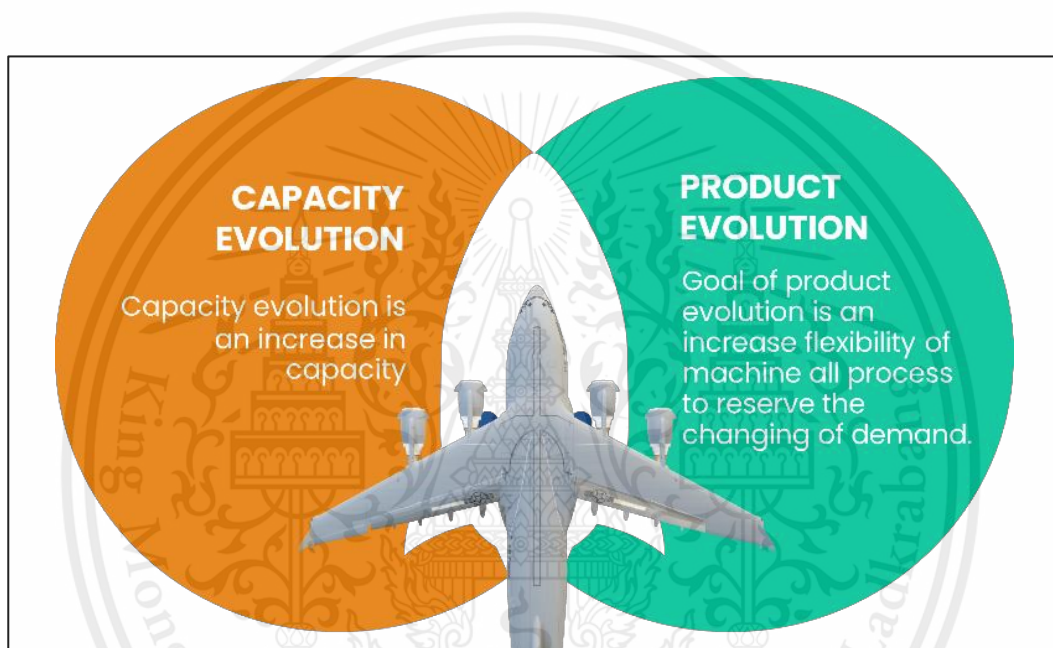


Figure3. 1 Type of evolution of Michelin Siam Co., Ltd

3.2 Tire Components and Production Process

3.2.1 The components of a car tire consist of nine parts:

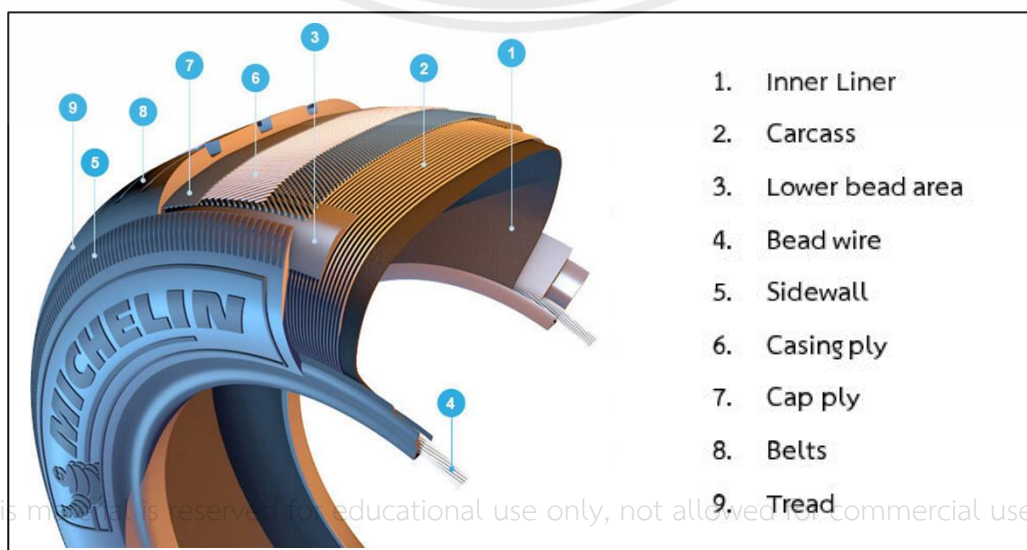


Figure3. 2 Tire components

- 1) **Inner Liner** Prevent the leakage of rubber.
- 2) **Carcass** The main component of a tire is to maintain the air pressure inside the tire so that it can bear the weight of the car, and to be resistant to impact and vibration from the road.
- 3) **Lower bead area** It's the position where the tire holds onto the metal edge where the power of the engine, including the braking force, affects the area in contact with the road.
- 4) **Bead wire** It's a group of steel wire lines that hold both ends of the rubber frame so that the edges are strong.
- 5) **Sidewall** It's the side of the rubber, serves as a wrapping and protector against damage to the frame.
- 6) **Casing ply** Maintains the air pressure in the tires to stabilize the shape.
- 7) **Cap ply** It's a fabric layer that adds strength to the rubber.
- 8) **Belts** Makes the tires face smooth and wide, distributes weight, strengthens the tires face, and prevents the rubber frame from being damaged.
- 9) **Tread** It's the position where the tire holds onto the metal edge where the power of the engine, including the braking force, affects the area in contact with the road.

3.2.2 Production Process

The rubber edge wire production process at the case study factory is divided into six processes and two areas:

- a. The RTO area has the following process:
 1. Descaling and Borax is a process by which raw material wire is carved to clean the coating of the wire and the borax coating.
 2. Dry drawing is a dry wire reduction procedure using soap powder to help lubricate while reducing wire size.
 3. Heat treatment is the process of adjusting the structure of the wire after it has been reduced in size.
 4. Brass Platin is a brass coating procedure before shipping to the RCD area.
- b. The RCD area has the following process:

5. Wet drawing (RC) is a process of reducing wire size from a wet RTO, using soap water to assist in lubrication while reducing the wire.
6. Cabling (RD) is the process of bringing wire into a spiral to increase elasticity, adding strength to the wire body. It is considered the final stage of the rubber edge wire production process.

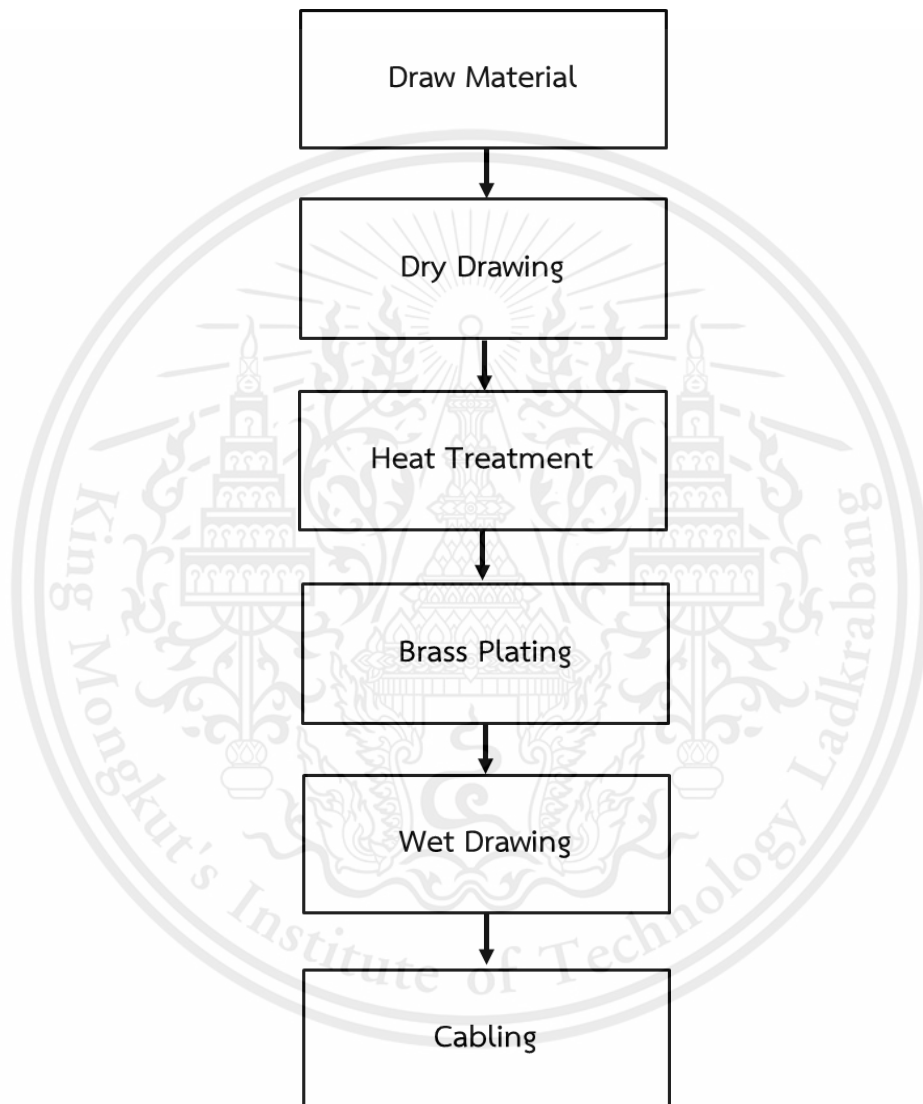


Figure3. 3 Production Process of steel cord

3.3 The Project Approach – Waterfall Approach

The project approach that Michelin Group is Waterfall project. This type of project approach is a step-by-step project, divided into phases of each step as following:

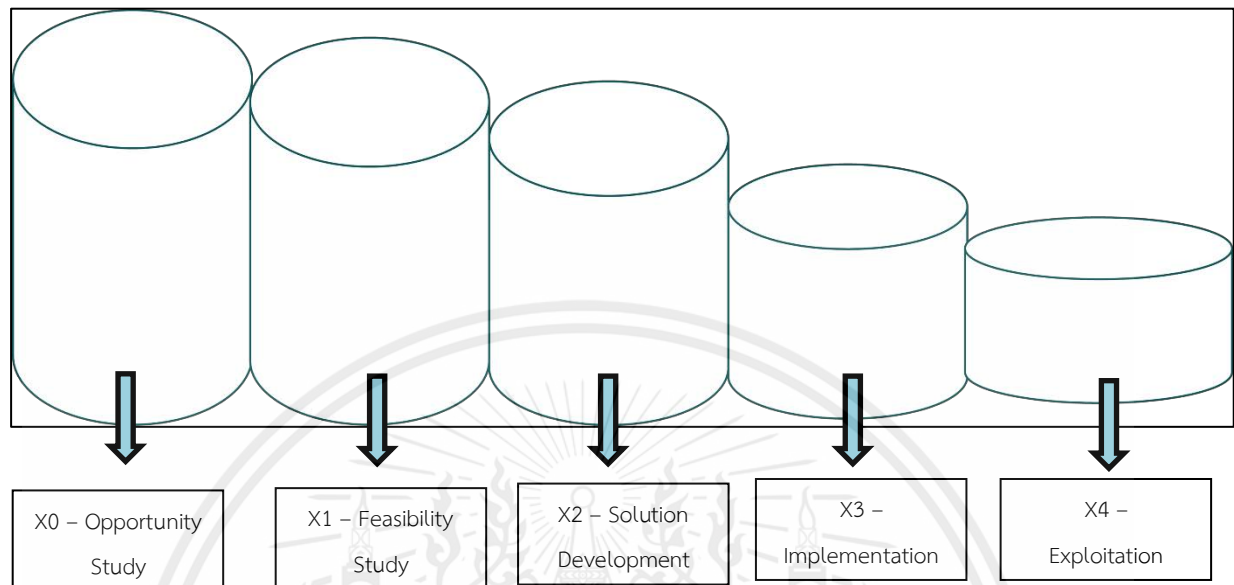


Figure3. 4 Michelin Milestone

- I. X0 is Opportunity Study or project launch. It is initial specifications launching the project. Reservation of required resources. For example: **What? For who? Why now? How much are we willing pay? Risks to do nothing?**
- II. X1 is Feasibility Study or Solution Study. about the choice of the solution(s) to explore such as **What solutions? Action plan, risks and Forecast balance sheet.**
- III. X2 is Solution Development or Project Implementation. This phase is using the solution that we get from phase X1. In this phase is to carry out the Project Major Expenses externals commitments with acceptable risks. A solution, robust and able to meet the requirements of the functional specification. Studied detailed map of implementation and Detail quote.
- IV. X3 is Implementation in this phase will be a Closure of the project. It will assessment of the project Transfer to the operational. Phase X3 must be Retail studies implementation (Deployment) Reception, report.
- V. X4 is Exploitation. In this phase will be an Actual contribution to the stake's capitalization like Achievement of the impact objectives, the benefits realized, actual contribution to the achievement of the impact objectives. In this phase

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will conclusion in how is the exploitation going? What contribution does the project's purpose bring to the issues?

3.4 Study on the Erawan Project.

As mentioned above, tires tend to change quickly because of the market's present commercial transition, as client needs grow and new product requirements emerge. The Erawan project name, which is the name of a wire production project, was formed by the manager of the project department with the intention of converting the capacity of an old product into a new one. Only at a factory that is overworked is the name utilized. The Erawan project is organized into lots so that each product category may be addressed with a defined capacity over time. Customers' demands vary extremely quickly, or what is known as "fluctuation of demand," which may result in project failure if a project is started for a continuous period of 5 years. As a result, the Erawan project is divided into five lots based on demand and predicted markets for the next three to four years, and the Erawan project is divided into five lots as follows:

1. **Lot 1:** Transformation of the workshop RCD1 and creation of a capacity around X tons of **product A** to cover the needs until 2022.
2. **Lot 2:** Creation of a capacity of X tons of **product B** after 2021
3. **Lot 3:** Creation of a capacity of X tons **product C** to cover the additional needs when needed.
4. **Lot 4:** Increasing of the capacity **product D** (X tons) to cover the Asian's, need when needed.
5. **Lot 5:** Conversion of X tons of **product E** into **product F**

3.5 Methods of study

The methods of study are divided into 2 projects as follows:

3.5.1 Erawan Project Lot 1

Erawan Project Lot 1 is a project to build a soap storage plant outside the building. During the time that the Erawan project was undertaken, it was in the process of making a ramp-up or installation of machinery, with the following assignments and responsibilities:

- I. The study of the Erawan Project from above stated that in lot 1, a building will be constructed to be a soap warehouse. This section is Project 24 R-EBU. In the

meantime, this project has installed machinery. There is a contract with the plant buyer to get a quotation for the motor that is related to this project.

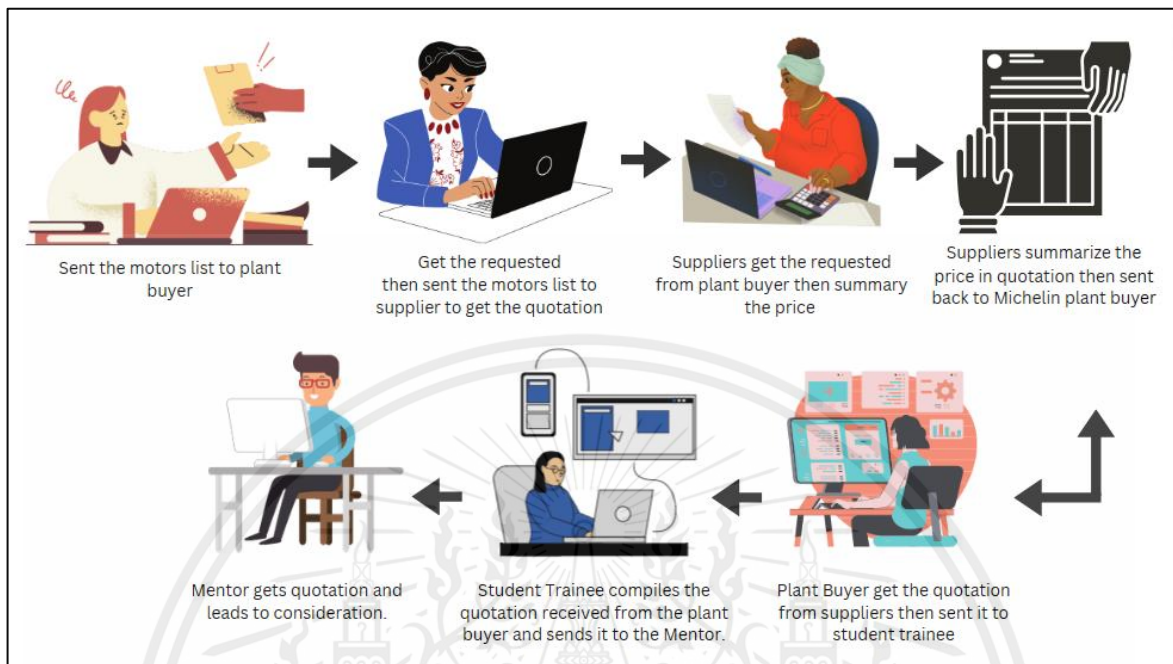


Figure3. 5 Procedure for receiving quotation

- II. Participate in the BIB Ramp Up workshop, which is an event about the period of planning to find out what needs to be added, installed, upgraded and corrected to be ready in those areas, with a summary of the key actions that are relevant to the implementation of the project and an action plan summary so that all stakeholders or the parties involved, including the operators, understand the objectives.
 - a. In the first phase of the workshop, project manager will be able to explain what you have to do today, what the purpose of this workshop is? what tools are used to carry out the project? and what you will get after this workshop?



Figure3. 6 BIB Ramp-Up workshop: Workshop Clarification

- b. After explain the purpose in this workshop, The people involved in each party will move separately to see if there is something to add, update, or edit in the RCD1 area and list the key actions needed.

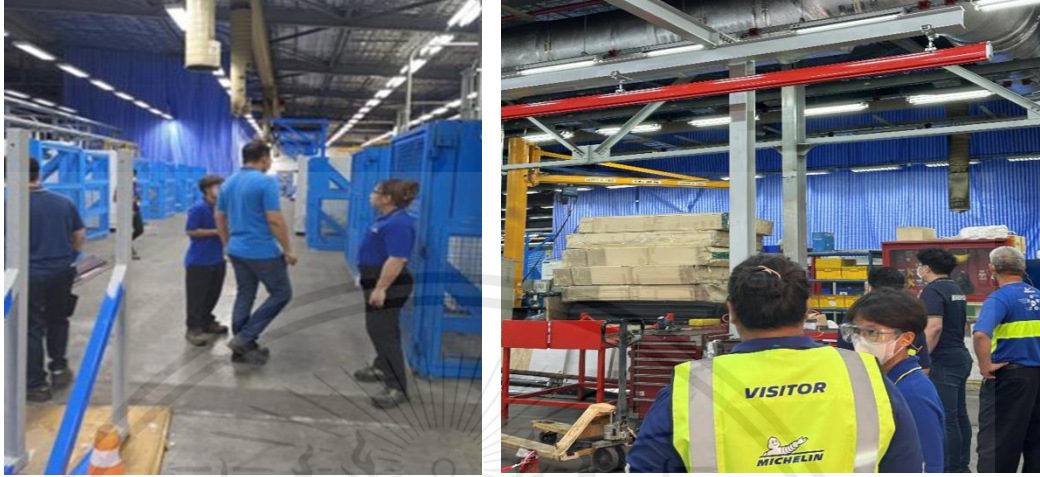


Figure3. 7 BIB Ramp-Up workshop: Site Observation

- c. After each site observation, a brainstorm to see who's got any comments, and summarize the key action and plan to start production.

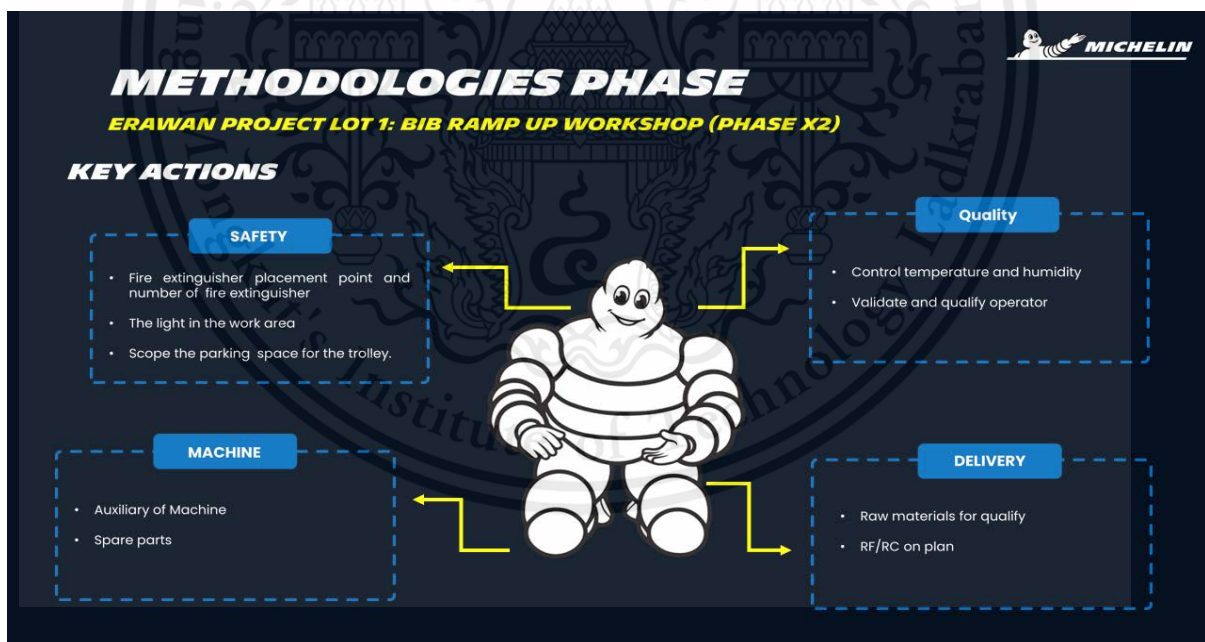


Figure3. 8 Key action of BIB Ramp Up workshop

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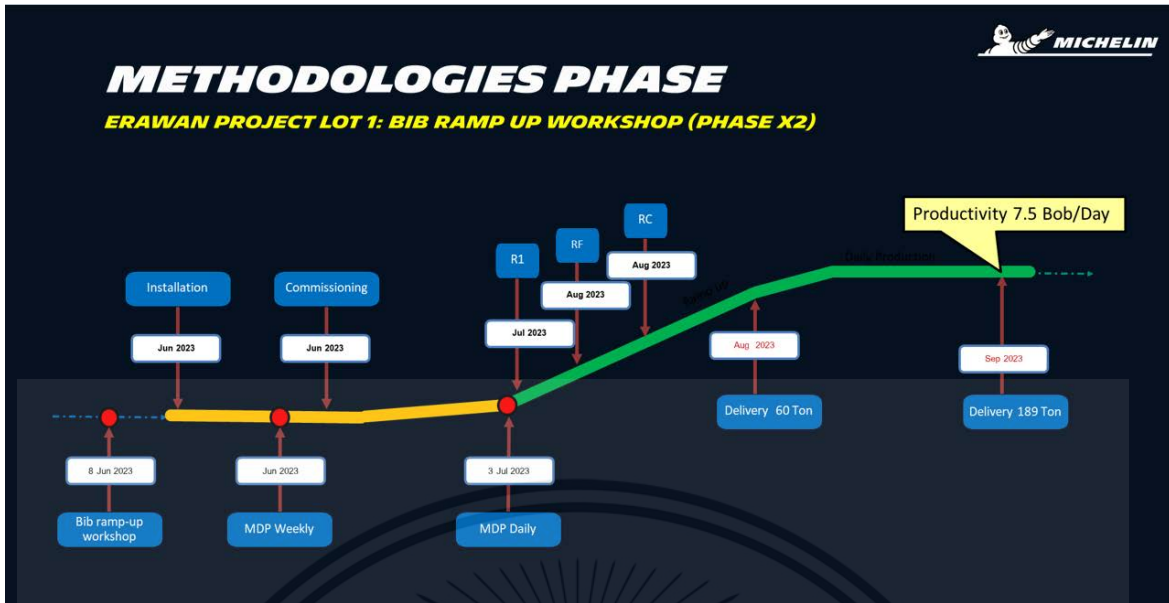


Figure3. 9 Action Plan to product the product

- III. From the key action that came to the conclusion after the BIB Ramp Up, Safety has to install an additional fire extinguisher,

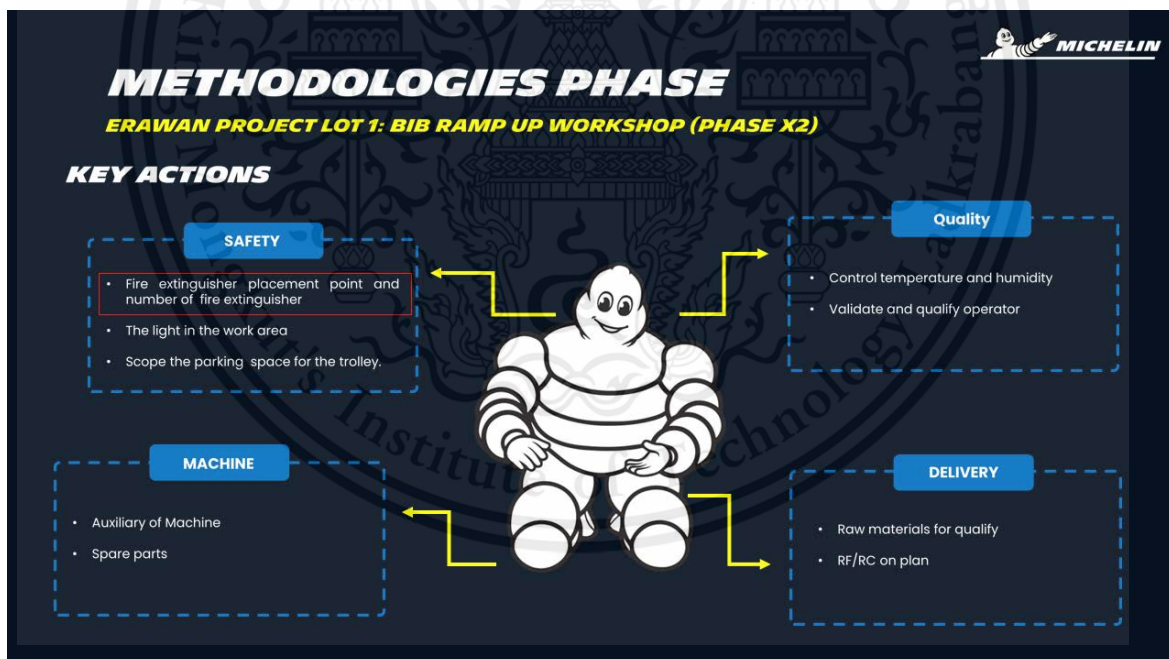


Figure3. 10 Responsibility task

Which is part of the responsibility of the Project Department to send a request for the installation of a fire extinguisher, which, prior to informing the EP Department, will have to go to survey the current number of tanks installed by exploring the area of RCD1 (the area of the Erawan Project) with the lay-out of

the factory and notify the purpose to the Safety Know, then the Security will send the requirement, which is as following:

- 1) The number of fire extinguishers in Erawan Lot 1 area compared to the size of the > area must have at least 10 fire extinguishers.
- 2) The fire extinguisher installation point identified with red painted pole, tag the image of a fire extinguisher, Fire extinguishers are installed with handles on more than 1 meter above the ground.
- 3) The fire extinguisher is within 15 meters of the operator's reach.
- 4) The distance between the fire extinguishers is no more than 20 meters.
- 5) Fire extinguishers must not be obstructed with objects or anything else that makes it difficult to access.

- a. After receiving the requirement and action from the Project Department, the program will start using a program to measure the distance between the extinguishing tanks. The desired number will be added using the 1:100 ratio in the Lay-out to get the actual standard size without dividing it into two difference diameters that are in 16 points at 15 meters and 20 meters, and 12 points at 15 meters.



Figure3. 11 Draft a circle of the space to install fire extinguisher in 16 points of fire extinguisher at diameter 15 meters and 20 meters

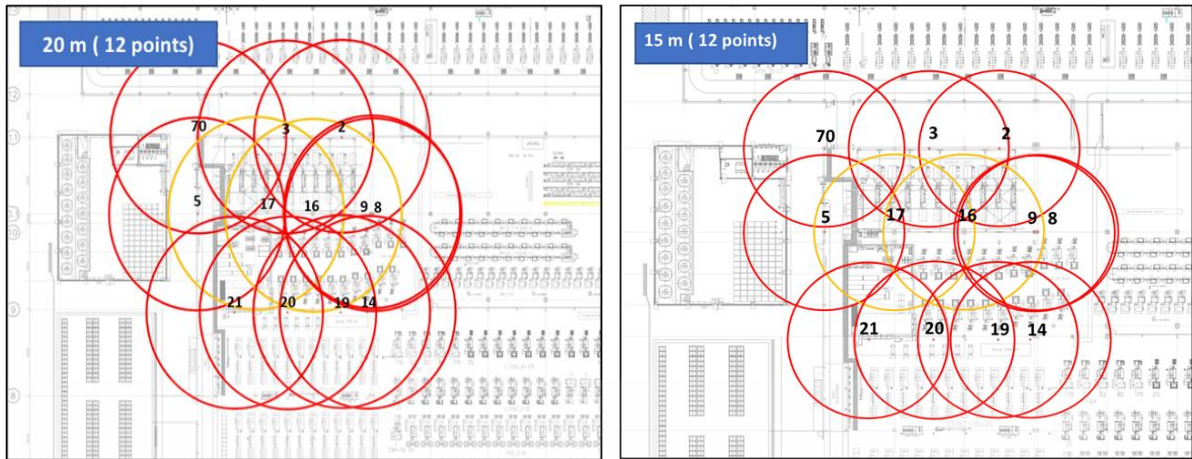


Figure3. 12 Draft a circle of the space to install fire extinguisher in 12 points of fire extinguisher at diameter 15 meters and 20 meters

b. Once the area has been defined, a summary will be sent to the EP (safety department) to validate the work in this section of the action.

2. ถึงขั้นหนึ่งอยู่ในระยะห่างระหว่างถังดับเพลิงห่างกันไม่เกิน 20 เมตร

- จากการศึกษาในรัศมี 20 เมตร พบว่าไม่มีพื้นที่ใดอยู่รอบกันหรือและอยู่ใกล้ว่าถึงขั้นหนึ่งที่จะติดตั้งตาม layout ถูกจัดตั้งอยู่ในระยะห่างระหว่างถังดับเพลิงที่กำหนด ซึ่งการติดตั้งสามารถแบ่งได้เป็น 2 กรณี คือ

- กรณีที่ติดตั้งถังดับเพลิงตาม layout จำนวน 16 ถัง ซึ่งระยะห่างระหว่างถังเป็น 20 เมตร
- กรณีที่ติดตั้งถังดับเพลิง 12 ถัง ซึ่งระยะห่างจากถังคือ ระยะห่างระหว่างถังไม่เกิน 20 เมตร

จากการพิจารณาจากพบว่า แต่ละตำแหน่งจะมีถังดับเพลิงที่อยู่ในรัศมีของกันดังนี้

- ตำแหน่งที่ 1 ถึงเบอร์ 13 ประกอบด้วย ถังเบอร์ 14, 18, และ 19
- ตำแหน่งที่ 2 ถึงเบอร์ 14 ประกอบด้วย ถังเบอร์ 13, 18, 19, และ 20
- ตำแหน่งที่ 3 ถึงเบอร์ 15 ประกอบด้วย ถังเบอร์ 13, 14, 15, และ 20
- ตำแหน่งที่ 4 ถึงเบอร์ 20 ประกอบด้วย ถังเบอร์ 14, 19, และ 21
- ตำแหน่งที่ 5 ถึงเบอร์ 21 ประกอบด้วย ถังเบอร์ 18, และ 20
- ตำแหน่งที่ 6 ถึงเบอร์ 18 ประกอบด้วย ถังเบอร์ 3, 17, และ 21
- ตำแหน่งที่ 7 ถึงเบอร์ 8 ประกอบด้วย ถังเบอร์ 17, 18, และ 70
- ตำแหน่งที่ 8 ถึงเบอร์ 70 ประกอบด้วย ถังเบอร์ 3, 8, และ 92
- ตำแหน่งที่ 9 ถึงเบอร์ 92 ประกอบด้วย ถังเบอร์ 2, 3, 17, และ 70
- ตำแหน่งที่ 10 ถึงเบอร์ 3 ประกอบด้วย ถังเบอร์ 2, 16, 17, 70, และ 92
- ตำแหน่งที่ 11 ถึงเบอร์ 2 ประกอบด้วย ถังเบอร์ 3, 8, 9, 16, และ 92
- ตำแหน่งที่ 12 ถึงเบอร์ 17 ประกอบด้วย ถังเบอร์ 3, 8, 16, และ 92
- ตำแหน่งที่ 13 ถึงเบอร์ 16 ประกอบด้วย ถังเบอร์ 2, 3, 8, 9, 16, และ 17
- ตำแหน่งที่ 14 ถึงเบอร์ 9 ประกอบด้วย ถังเบอร์ 2, 8, 15, และ 16
- ตำแหน่งที่ 15 ถึงเบอร์ 8 ประกอบด้วย ถังเบอร์ 2, 8, 15, และ 16
- ตำแหน่งที่ 16 ถึงเบอร์ 18 ประกอบด้วย ถังเบอร์ 8, 9, 13, 14, 16, และ 19

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Figure3. 13 The fire extinguisher summary file

3.5.2 Erawan Project Lot 2

Erawan Project lot 2 is a project aimed at relocated machine to install new machine in RCD1 to produce product B with the following assignments and responsibilities:

- I. Before we dismantle the machinery, the author needs to check which important parts are involved in the machine. When we move it all out, before we get in touch with the contractor, the author have to check the requirements of our route before the author wants to move, modify, or demolish and move.
- II. After the Observe, the author write the scope of work to the contractor.

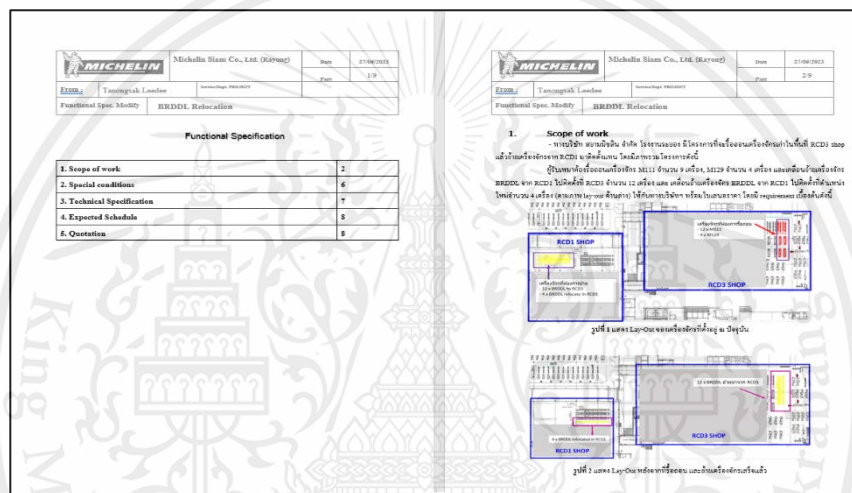


Figure3. 14 Scope of work of BRDDL Relocation

- III. After site observation and writing a scope of work, the contractor will be invited to visit the work page to clarify what the author needs to do then request the quotation.



Figure3. 15 Invite the contractor to visit the site.

- IV. Before a Re-Layout Validate Lot2 workshop is done, there is a real area survey. And what they are going to do in this section is measure the object or things that are located near the wall to find a space to move these items to another location and bring the information into the meeting room for internal consultation.

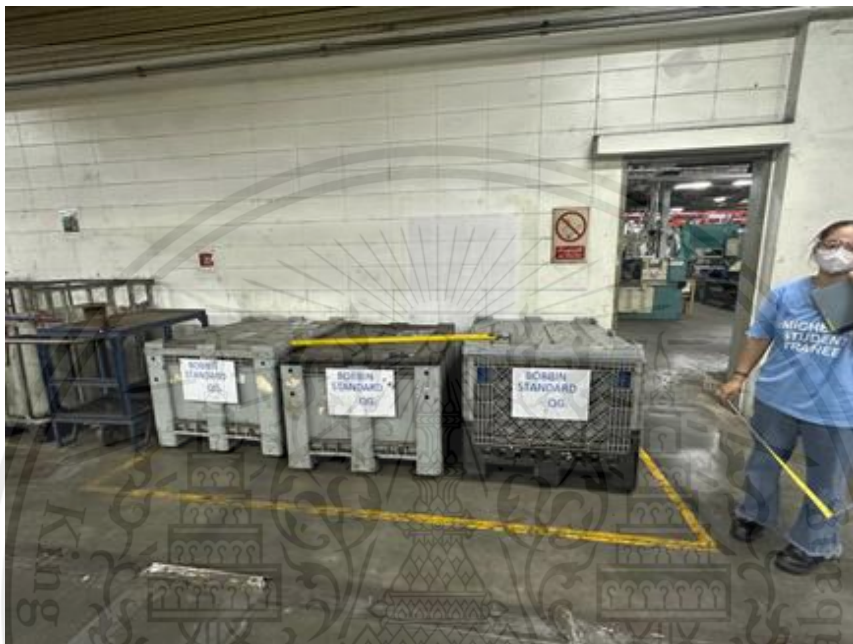


Figure3. 16 The box and the trolley



Figure3. 17 The storage and the box

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- V. After exploring the area, the first step is to make the workshop Re-Layout. Validate lot2 workshop a workshop with a view to ensuring that all parties understand where the machine will be installed. And when moving the machine, which path the employee or operator can take to work, which part of this section will be Industrial Engineering.

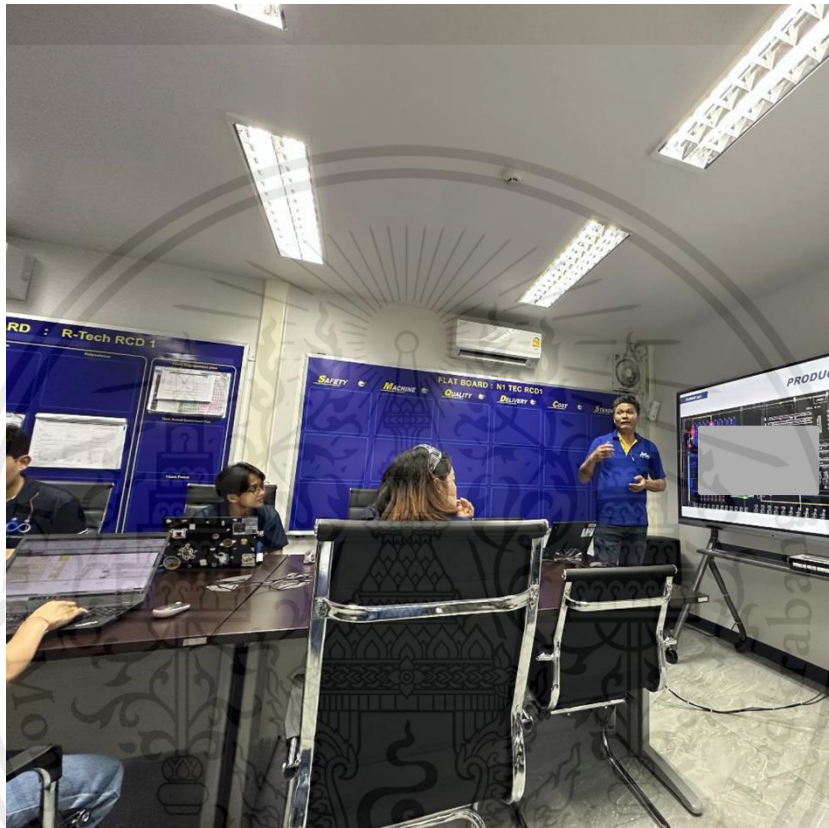


Figure3. 18 Mood of workshop

3.6 Development Tools

3.6.1 DRAFTSIGHT MECHANICAL

By the start of the program, this is the range that will move the machine to write the scope of work of Lot 2 and then use this program to draw the diameter distance to install the fire extinguisher.

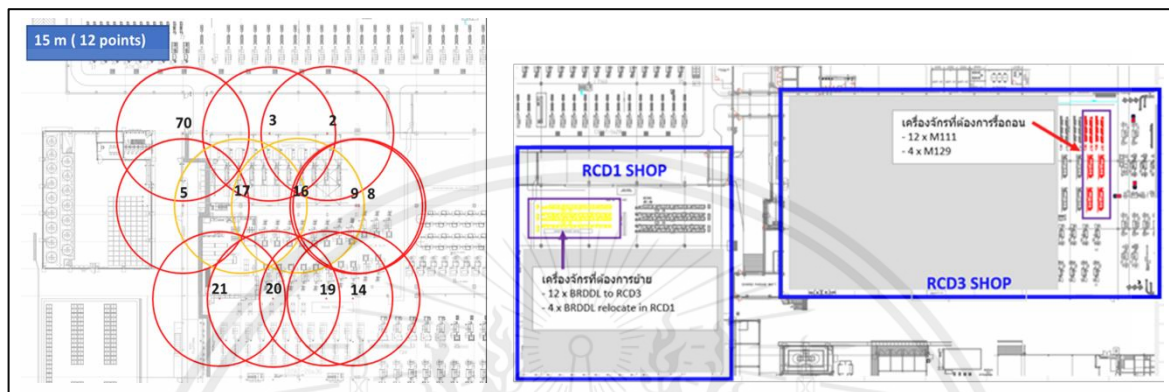


Figure3. 19 Draftsight Mechanical Programming

3.6.2 MICROSOFT WORD

Microsoft word is a program that Michelin Siam Co., Ltd (RYG) always use it and this time the author uses Microsoft word to write scope of work.

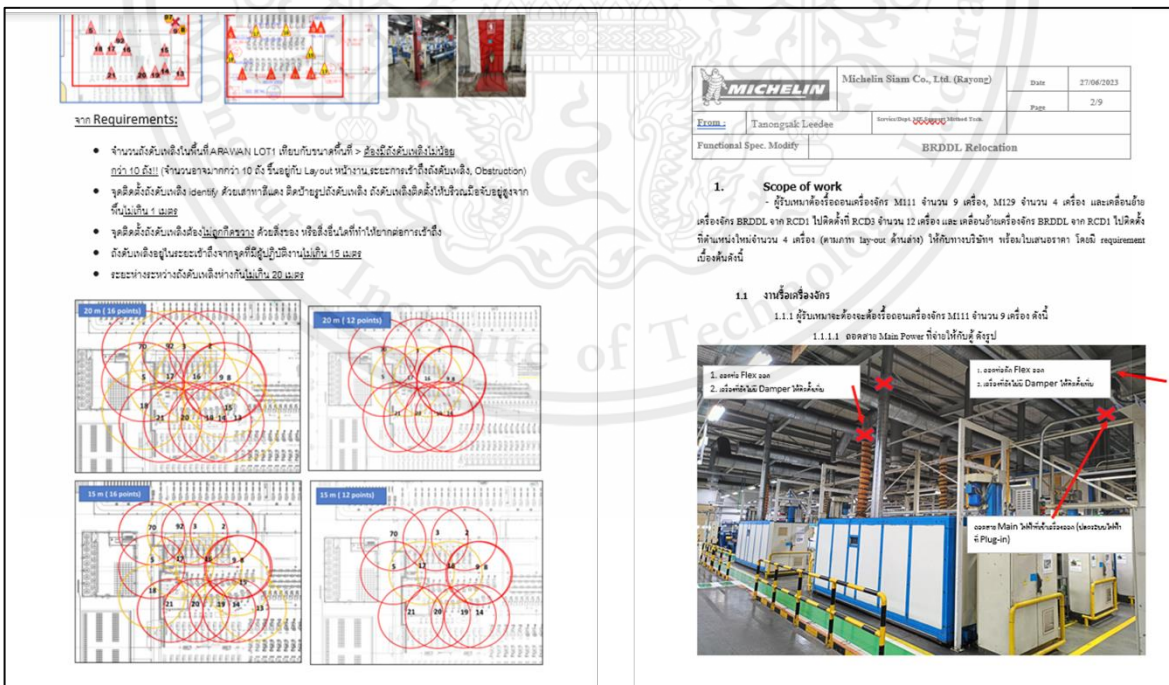


Figure3. 20 Scope of work form by Microsost Word

Chapter 4 Analysis and Results

In this chapter, the author analyzes the research then summarize the results the key parts of assignments. Finally, the author discusses all of the result that the author gets from the research and explain the difficulty of this research.

4.1 Erawan Project Summary

Michelin Siam Co., Ltd. (RYG) is a steel cord factory located inside a vehicle tire, and since the current number of vehicle users has increased significantly, the resulting number of vehicles has increased. The types of vehicles with a large number of users include tires and truck tires. The Erawan Project is a project that responds to the challenge of producing a product that is a product evolution project, with the aim of increasing capacity as tire tends to increase, requiring more wire capacity expansion, which is actually by Michelin Siam Co., Ltd. (RYG). There's a choice of manufacturing wire lines and buying the wire in, looking at the cost of production, but not all 100% of the own manufacture, which is divided into proportions. In the case of production, there are specialties and sensitivities such as know-how, value, and business risks.

The Erawan Project is a project that has focused on the manufacture of steel cord in truck tires since its inception. The truck tends to increase in use every year, thus increasing the use of tires, including increased manufacturing flexibility, such as the installation of one type of machinery that can produce four products in the same type of machine, and to meet the growing market demand in Asia. In the past, Michelin Siam Co., Ltd. (RYG) had a massive investment, which, on the day of the market prediction or forecast, found that over time the demand changed. Sometimes, many of the items produced did not meet all of the requirements. And investing in a large amount at once drowned out the funds. So, the Erawan Project that occurred was divided into 5 lots to keep track of changes each year and not need to spend much time running the project.

4.2 Project Management Life Cycle

The project life cycle is a series of phases or stages that a project goes through from its initiation to its completion. It provides a structured approach for planning, executing, and closing a project. "Phase" of Michelin group is the work required to answer questions about the project, resulting in the completion of one or more deliverables. The standard Michelin

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phases are opportunities Study, Feasibility Study, Solution Development, and implementation (Phase X0 – Phase X4). In Michelin’s Project Approach, the completion of a phase is called a “Milestone”. The generic industry definition is any significant event, such as completing a major task, delivery, or project phase. A milestone has no duration and objective of milestones is to controlled evolution of the project.

4.3 Project Analysis

During the implementation of the project, the results can be summarized into two lots according to the number of studies, as follows:

4.3.1 Erawan Project Lot 1

a. Project Tools

The tool used to run the project during phase X2 is Bib Ramp Up. Bib Ramp Up is used during this period, as phase X2 is the period between the installation of the machinery and preparation for production. Everyone involved in Project Lot 1 will have to participate in the Bible Ramp Up workshop.

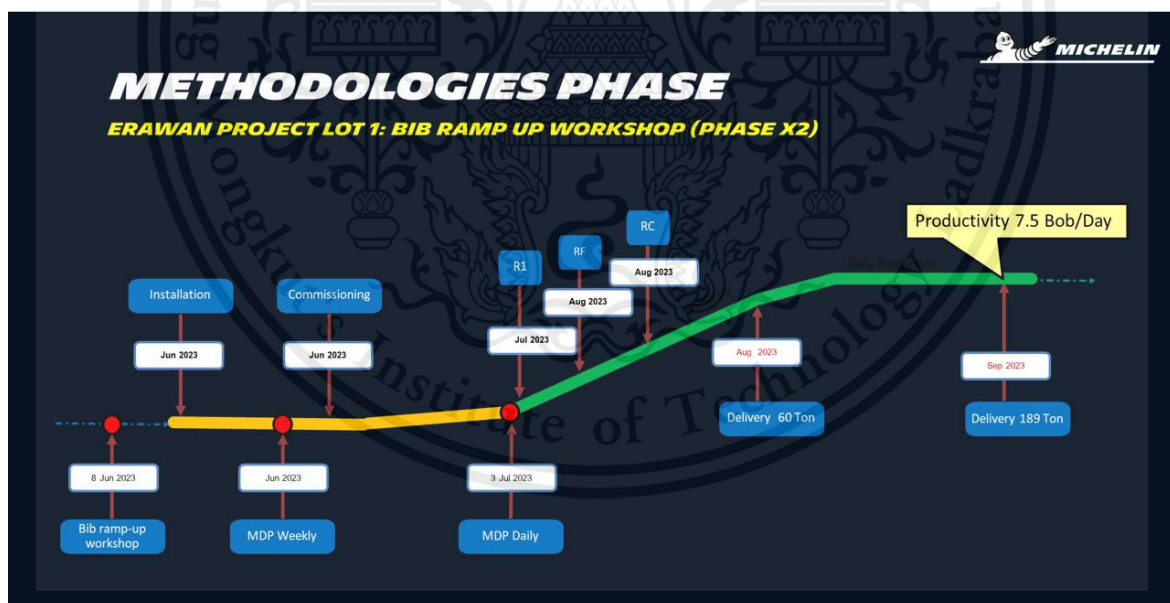


Figure 4. 1 Action Plan of the product

Bib Ramp Up is a tool to be implemented in the framework of Industrial Projects where there is a process to be ramped up between the Functional Acceptance or RF phase until the end of its Ramp up. The initialization of the tool is done by a workshop at least 1

month before the functional acceptance organized in a multidisciplinary team. This tool is under the responsibility of the Production and project manager.

b. Workshop Summary

After entering the workshop, the project team get the key action. After the site observation, it's something that everyone in the workshop sees, and it is important that we improve, install, modify, and prepare for the project. The key action is divided into four key parts for **S M Q D**.

- **S is a Safety.** The key action of a safety there will be:
 - The fire extinguisher placement points and number of fire extinguisher.
 - The light in the work area.
 - Scope the parking space for the trolley.
- **M is a Machine.** The key action of a machine there will be:
 - Auxiliary of machine
 - Spare parts
- **Q is a Quality.** The key action of a quality there will be:
 - Control temperature and humidity
 - Validate and qualify operator
- **D is a Delivery.** The key action of a delivery there will be:
 - Raw materials for qualify
 - RF/RC on plan

The responsibility of the project department is that, in the safety section, the equipment must be installed. When the purpose is sent to the safety department, the security department will notify them of the requirements (in order to be legally valid and avoid any problems in the future). When the requirements are received, the author had to measure how many more fire tanks need to be set up, which is sufficient. After a practical distance measurement through the program, it was found that there are two dimensions of a fire extinguisher: 15 meters or 20 meters at 12 or 16 tanks, which the project department selects as 12 tanks in a radius of 20 meters to reduce the cost of installation and are sufficient

numbers. Afterwards, the information is transmitted to the security department as validated to begin the installation and then to be part of the contractor responsible for the installation.

For the result of action plan, it's an operational plan before delivering the products to the customer and they were found that each session had problems followed by each time of attendance as a problem that we were unable to control, which was caused by internal and external misconduct.

- Internal Factor

Internally, the difficulty was that demand had to be postponed to the next year, leaving no output during this time period, as a result of a rubber factory. Because the wire would be phased out of manufacture when demand for automotive rubber declined.

- External Factor

The external factor is that the air is changing because the production start period is in the rainy season and the machinery installed is close to the doors that are in use, making it difficult to control temperature and humidity, resulting in wire waste or rust, which will collide when the wire is inserted into the tire, leaving the coated rubber untouchable, making the rubber structure unstable, and making the wires easy to break in case of high pressure in the tire. The Project Department team has made corrections, which are external information.

4.3.2 Erawan Project Lot 2

a. Bidding Process

The cooperative education period is the Bidding contractor company phase to be responsible for the project. A scope of work must be written and submitted to every company to be involved in the bidding process in order to know the purpose and function of the company. On the present day, each company will participate in a person-by-person presentation. After completion of the presentation, the actual work page will be viewed and the process will be described and a bid will be sent to run the framework. After that, Michelin Siam Co., Ltd will be the selector of the contractor to

assume responsibility for that project. Once selected, a meeting will be held to clarify the objectives and to explain the details to be understood by both sides.

b. Re-Layout Validate V2 Workshop

Since the X2 phase, it's been a long time since it started in 2019, so many things have changed. This time, it was like re-validating or making a new workshop to get more detailed. By making the layout valid, people from the IE area department will be involved in this workshop. The purpose of this workshop is to make sure that all involved are aware of how the machine will be placed, including the main machine, equipment, measurement tools, the devices used to control the machine, as well as the depths to avoid any problems, and how the flow is going to be defined. Which path can be used to work? So that the IE area can carry on the calculation, which is very important so that it doesn't hit or go into trouble during the ramp-up.

4.4 Analysis and Discussion

a. Analysis

Project Management can be divided into four major topics that can be summarized according to each of the topics:

- a. Planning:** Planning is a cognitive process that involves setting goals, determining the steps or actions necessary to those goals, and organizing these steps in a systematic and efficient manner. It is a fundamental aspect of human decision-making and problem-solving, as well as a key component in various fields such as psychology, business, project management, and artificial intelligence.

According to the research, the project was planned throughout the run-up, and the BIB Ramp Up tool was utilized to oversee the project's execution. The study findings suggested that a product will be delivered in the month of August. So, following a BIB ramp-up workshop, the newer installed machine would begin producing the product, but there was a change they were unable to control due to the project: The demand for the product was shifted to the next year, leaving no production during this period, and the wire produced was rusted (or wasted), which was caused by a period of project operation during the rainy season as well as new machinery installed near the entrance gate area, which made it difficult to control

the weather conditions. This made it necessary to change the timing of wire production, and in the meantime, the problems arising in terms of weather conditions were fixed.

- b. Organization:** In this part the organization is a Resource Allocation: Allocate the right amount of material, manpower, machine, and money to each project task based on its requirements. The 4M framework emphasizes the importance of a well-balanced and integrated approach to managing these resources. A successful project manager needs to ensure that all four elements are effectively coordinated to meet project goals and objectives.

For the organization part the main topics of 4m framework that relates to the cooperative education is Manpower. Manpower represents a valuable asset for any organization. It is often referred to as "human capital" because the knowledge, expertise, and skills of the workforce contribute significantly to the success and productivity of the organization.

From the study and explanation of the project process, it was found that most of the contacts were with individuals during the preparatory period for the project. Co-responsible persons can be divided according to the following activities:

Erawan Project Lot1:

- 1) BIB Ramp Up workshop there will have the responsible person as follow

	Create	Update	Present
Safety	K. Paksasawan	K. Paksasawan	K. Paksasawan
Machine	K. Siriporn	K. Siriporn	K. Siriporn
Quality + Cost	K. Natdanai	K. Natdanai	K. Natdanai
Delivery	K. Natnicha	K. Natnicha	K. Natnicha

Table 2: Responsible persons of Bib Ramp Up workshop

- 2) Installation the fire extinguisher there will contact with safety department to validate the project.

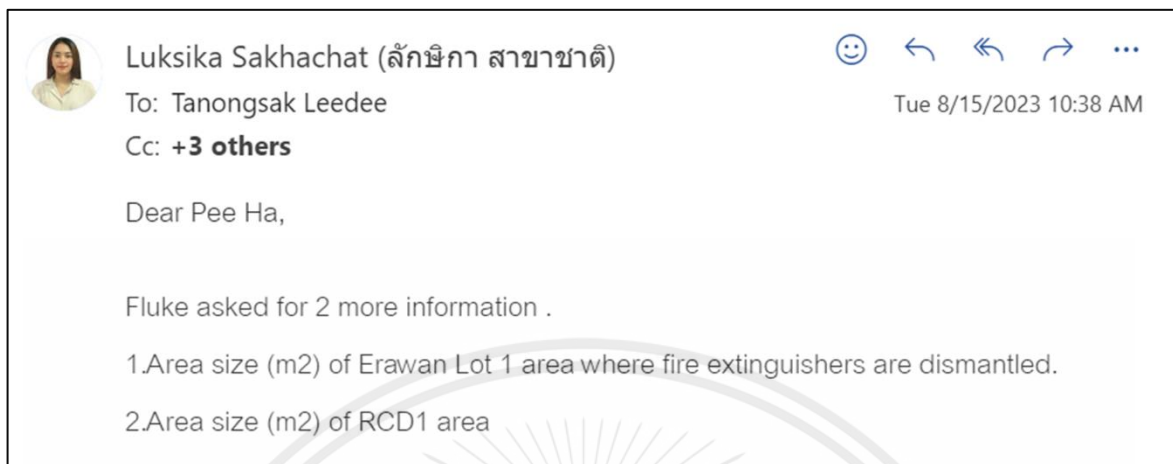


Figure 4. 2 Contact with safety department

From the installation of the fire extinguisher, communication is required through the Safety department to operate properly in accordance with the law and the plan so that the staff or operators can be supported.

From this section, it makes communication and working with people important. Communication is something that can tell the needs of the job or the control of the work to be done in a way that have planned or intended to.

- c. Directing:** In project management, directing is one of the key functions that involve overseeing and guiding the project team to ensure that the project progresses according to the plan and achieves its objectives. It is an integral part of the project management process that involves leadership, communication, and decision-making. The directing function primarily focuses on the execution and control phase of the project life cycle.

Communication plays a pivotal role in our project management process. Our inter-departmental communication primarily revolves around weekly meetings, which serve as vital updates on work progress and process evaluation, both on-site and online. For online meetings, the author relies on the Microsoft Teams platform, while our physical office meeting room serves as a supported location for internal

meetings. Effective communication is a cornerstone of our project management strategy, ensuring that everyone is informed and aligned.

Documentation is another essential aspect of our project management. Project managers meticulously maintain project documentation, encompassing progress tracking, decision records, issue resolution, and change management. This documentation is of utmost importance as it guarantees transparency and accountability. In line with our commitment to effective project management, we have established inter-study documentation practices. This includes creating documents for training on project administration and utilizing Microsoft Word for drafting comprehensive scopes of work, facilitating communication with relevant departments, and constructing detailed work plans for contractors.

In the Directing phase, our primary focus is on utilizing communication tools that enable comprehensive and clear control over the communication process. The project team recognizes the significance of robust communication in ensuring the smooth execution of the projects. It is through effective communication that tasks, machinery, and installations progress harmoniously, ultimately leading to the successful completion of our projects. The collective efforts of individuals working in tandem, facilitated by clear communication, ensure that projects proceed as intended, adhering to our standards of excellence.

- d. **Controlling:** In project management, "controlling" refers to the process of monitoring and regulating various aspects of a project to ensure that it progresses according to the project plan and stays within its defined scope, timeframes, and budget.

Monitoring stands as a fundamental pillar within the project management framework. This indispensable process involves the ongoing, systematic tracking and collection of data pertaining to project performance and progression. The objective is to meticulously evaluate and compare the actual progress to the meticulously outlined planned milestones and objectives. Through this rigorous monitoring approach, they are maintaining a steadfast commitment to ensuring that the

projects remain in alignment with their designated goals and timelines, thus upholding the highest standards of project management excellence.

From that research, the Bib Ramp-up workshop has found the key action that requires additional and corrective action. The part that needs to be controlled is the temperature and humidity to prevent waste from the wire so that the goods can be exported in a quality manner.

b. Discussion

The discussion is broken down into personal adaptation and factory parts. The first part is within personal adjustment to the work environment and the scope of work during the cooperative education period. At first when the author started joining the team, the information was hard to process due to the specific vocabularies. Michelin Siam Co.,Ltd. mainly use words that were translated from French which can be different from other companies, for example, the safety department is called EP which is shortened for Executive Protection, translated from a French word. Also, since the author joined the team when some processes were already started there were some works needed to catch up on. The problem was carried to the mentor right away and the author proceeded to study the project from the start. After understanding more about the project and work scope for each

Next, the difficulty in the factory of the Erawan Project Lot1. During the cooperative education period, it can be found that some situational conditions are uncontrollable even when the situations are forecasted and emergency plans are created beforehand. Also, it can be difficult to control the work process according to the schedule with no delays and without causing an affect to the other parts. After researching and studying the project, the author found that uncontrollable problems can occur at any time, and can caused by both internal and external conditions.

One of the difficulties is between the preparation of producing and transporting products to factories in order to produce the tires and send off to

the market, the problems that factories cannot control are Demand, temperature, humidity, and weather conditions. In the Demand section, the problem is when the Demand from the tire factory is postponed, causing the production of the metal cords to be interrupted as well. Also, the weather condition and air humidity that are external condition can lead to rusting and is hard to manage even when the temperature and humidity is the key action that needs monitoring. The machines were installed and working on production trial during the rainy season, and were placed close to the door. The humidity in the air outside flowing into the factory causing the steel cords to rust during the production trial. The company then had to overcome this problem using internal problem-solving method.



Chapter 5 Conclusion

In this chapter, summarize the work described in this report. Then, conclude key parts of the work and suggestion.

5.1 Conclusion

The Michelin Siam Co., Ltd. (RYG) project management methodology uses the Waterfall Approach, which consists of five components, including

- 1) Opportunity Study
- 2) Feasibility Study
- 3) Solutions Development
- 4) Implementation
- 5) Exploitation

with the following details during this period, the project team is in charge of the Safety section, which requires additional fire extinguishing tanks, and measures the distance to which the fire extinction tanks are installed, as for Safety.

Michelin Siam Co., Ltd. (RYG) focuses on quality, time, and cost, with the main focus being on product quality, operational control over time to stay within a set budget.

By being a part of the cooperative education, it has been observed that planning is considered a very important step for project management. A project should be properly planned in each phase so that everyone involved is aware of the time that the project needs to be carried out. When managing the project, there must be a schedule to control the period of each process and section. During the process, the team may face the difficulties that can be both predictable and unpredictable. The team members have to cooperate in order to quickly overcome and find solution to each problem they face. And from there, the organization can meet all the objectives. In terms of work between departments inside the factory, has studied the theories used in the administration of the Smithsonian company's project, and has participated in both the study of how the project starts up to the phase of implementation in each project.

Including getting more knowledge in programming that has never been used before, including being a good human being with colleagues and doing this study, increased responsibility and preparedness for work.

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5.2 Suggestion

In the next phase of the project, if I get the opportunity to study in next time, the author recommends to collect data by checklist (another one that create by student not from the company's checklist) to see the overview of the project to find the better way to study or solve the problem.



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