DEVELOPMENT OF FIT-FOR-PURPOSE PROJECT MANAGEMENT

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EXECUTIVE SUMMARY

The problem defined in this research is that the concept "fit-for-purpose" does not have a widely accepted definition in the research field of PM (project management). Also, the link between terms "fit-for-purpose" and 'project management" has not been conceptualized. The main objective of this research is to investigate the link between fit-for-purpose and project management and applications of FFP-PM (Fit-for-purpose Project Management) approach. The main research question is formulated as: *How can the term Fit-for-purpose and its development be defined in the field of project management?* This research adopted a coupling of bibliometric analysis and content analysis to comprehensively answer this question.

The bibliometric analysis was conducted on the literature from recent 20 years to investigate the link from a theoretical perspective. This stage follows a three-step method, with Step I looking into term "fit-for-purpose" in all management areas, Step II exploring different forms of adaptations in the PM, and Step III building the links between the previous two steps. FFP-PM was defined as a set of wisely selected adaptive methodologies, tools and expertise to manage project activities.

To investigate the links from the practical perspective, a content analysis was conducted on 117 student essays of the course WB3501 Fit-for-purpose Project Managementfrom the past 8 years (2013-2021). Many PM practices that are fit-for-purpose in nature were identified and included in the key findings of this analysis. These practices cover many aspects in PM and it was further concluded that FFP-PM consists of a broad set of PM methodologies that can manifest their ways in many aspects throughout the life-cycle of the projects.

To validate the results, the preliminary findings from the previous analyses were brought across to be tested with external practitioners via two in-depth interviews, to check weather and to what extent these findings reflect the PM in the real world. The results suggested that the majority of the findings are recognizable based on their experiences. A few adjustments were made after discussing comments through revisiting the literature.

The main research question was then answered by establishing a theoretical framework of FFP-PM, the components of which cover the need factors, enabler factors, characteristics and required skills and competences of the project managers under the framework of FFP-PM. Projects under FFP-PM are defined and shaped by specific values and strategies, and managed with conscious decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes.

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1 INTRODUCTION

This chapter is the introduction of this master's research. Information regarding the context, problem, objectives of this research is given. Divided into 5 sections, this chapter draws a line of how this research came into picture and what problem is to be solved. The context and problem definition of this research can be found in section 1.1 and section 1.2. Objectives and research question are formulated in section 1.3 and section 1.4. Section 1.5 shows the structure of this report.

1.1 RESEARCH BACKGROUND:FIT-FOR-PURPOSE NEEDED

The traditional project management approach, in its more than half a century of development and application, has seen new methodologies and concepts being incorporated to address frequently emerging issues [Chin et al., 2012]. However, researches show that some of the methodologies once considered as the guarantee of "Life Cycle Success" have never been able to practice their preach after being widely developed and applied [Newman et al., 2016]. As a result, since the 21st century, "9 out 10" large engineering projects worldwide were reportedly suffering from failures in terms of late delivery time and budget overrun to varying degrees [Reddy, 2019]. And these delays and overruns can further result in more serious consequences, such as trust breach and bankruptcies [de Jong, 2018]. Meanwhile, projects are facing the challenges brought by continuously increasing technical complexity and dynamics where the traditional project management approach can no longer guarantee the effective control of the desirable outcomes [Bosch-Rekveldt et al., 2011]. One of the reasons lies in the nature of the traditional approach: it is rooted in "linear and predictable project planning practices". This indicates that projects managed by this approach may be rather vulnerable to constant changes [Zavyalova et al., 2020]. This calls for project management approach adjustments that are more adaptable and flexible towards changes: Fit-for-purpose project management. This research will look into the concept of Fit-for-purpose Project Management and try to depict its development over past few years.

1.2 PROBLEM DEFINITION: DEVELOPMENT OF FIT-FOR-PURPOSE PROJECT MANAGEMENT

In the existing literature, the concept "fit-for-purpose" does not have a widely accepted definition in the research field of project management. Moreover,

the link between terms "fit-for-purpose" and 'project management" has not been conceptualized. In response to this call for clearly defining "Fit-for-purpose" in project management in the literature, the course WB3501 Fit-for-purpose Project Management was launched at TU Delft in 2013, aiming at bringing bachelor students insights into project management approaches that are "tailored to suit the characteristics" of the projects in various industries. The lecturers of this course are experienced staff and guest lecturers who work as project managers in different industry sectors. Throughout the course students are given cases from real-life projects and project management practices that are deemed fit-for-purpose by the lecturers. In the end, students are expected to define what fit-for-purpose is themselves in the form of a 3000-word essay. This brings curiosity. It would be a rewarding practice to investigate what learnings can be retrieved from these assignments and literature where the concept fit-for-purpose was touched upon. Combining the findings from literature (bibliometric) and the assignments could help formulate an appropriate definition of fit-for-purpose project management and its development over time. The objective of this research is to identify the trends in fit-for-purpose and to explore whether or to what extent these identified trends reflect real-world trends in project management, and thus to make clear role of fit-for-purpose in project management.

Two methods will be adopted in this research: bibliometric and content analysis. The former process aims at drawing insights from articles mentioning the term "fit-for-purpose" in the field of project management to understand how fit-for-purpose is used in project management researches. The content analysis will be conducted on the assignments from course WB3501 to identify the trends. The research method will be elaborated in Chapter 2.

1.3 RESEARCH OBJECTIVE

The data sources for this study are divided into three parts: papers published in related fields over the past 20 years, student assignments from WB3501 over the past 8 years (Academic Year 2013/14-2020/21), and interviews with speakers in the course. Based on investigation of this data set, the main objective of the research is to look into the concept of *Fit-for-purpose Project Management* and try to depict its development over years, by:

- Identifying the trends in fit-for-purpose adjustments in project management.
- Exploring whether or to what extent these identified trends reflect trends in project management in the real world.
- Formulating the up-to-date applications of Fit-for-purpose Project Management.
- Giving constructive recommendations of the focused sectors.

1.4 RESEARCH QUESTION

The main research question serves as focus of the whole research and should indicate exactly what information the researcher is aiming to find out. Therefore, taking into account the information provided in previous sections, the main research question can be formulated as follows:

How can the term Fit-for-purpose and its development be defined in the field of project management?

To comprehensively answer this main research question, a set of sub-questions has been formulated. Answers to each sub-question will further be summarized and concluded into a final answer to the main research question.

- **Sub-question I**: What are recognizable methodologies and practices of traditional and Fit-for-purpose project management approaches?
  This sub-question will establish the theoretical basis of the research. The question is expected to be answered via a literature research in the field of project management. Two mainstream approaches (Traditional and Fit-for-pose) and their respective evolution will be explained. The methodologies and practices concluded from this step will serve as the basis for the coding and categorization in content analysis of the assignments.

- **Sub-question II**: How are "fit-for-purpose" and "project management" linked in research?
  This question will be answered by a thorough bibliometric analysis on the existing literature in past 20 years. In this step the use of the term fit-for-purpose in project management research will be explored to find recognizable fit-for-purpose contributions to the project management practices and its development overtime.

- **Sub-question III**: What are the trends evolved in the interests of students in project management judging from the analysis of the students' viewpoint on fit-for-purpose?

  1. Over the years
  2. In different industries

  With the input from the answer to the first research question, this sub-question is expected to be answered in a qualitative approach: content analysis. By going through all the documents and coding the key contents via programming tool, the trends can be identified and visualized in a structured way. These trends are composed of two parts: trends in project management over the years and trends in different industries. The focused industries are process, infra/transport, food, shipbuilding, high-tech and ICT .

- **Sub-question IV**: Whether and to what extent do these trends reflect the actual trends in project management?

This sub-question is answered to evaluate the findings from the Sub-question II and III, as the findings of qualitative analysis may be subjective and lack generalizability. This was achieved by inviting the guest lecturers (experienced practitioners) of the course to in-depth interviews/ structured surveys to discuss the findings. Through eliminating biased arguments and interpretations from the analysis, the broader understanding of the concept fit-for-purpose is thus formed.

1.5 REPORT OUTLINE

This research report is organized into 8 chapters. The first chapter is the introduction of the research, where the background information, research objective, problem definition and structure of the report are given. The main research question and corresponding sub-questions are also formulated in this chapter. Chapter 2 is mainly about the design of the research, where the collection and description of the data are explained along with methodologies used and main procedures of the analysis tools. In Chapter 3, a literature study has been carried out to first distinguish some key concepts that have been frequently mentioned in the report ("Approach", "Methodology", "Practice" etc.), discuss project management approaches and their own evolution, and in the end discusses the detailed information of the WB3501 course final assignment. Chapter 4, the fourth chapter, is centered around the bibilometric study of the papers selected from past 20 years. A conceptualized link between the two terms ("Fit-for-purpose" and "Project Management") is investigated and the development of the concept *Fit-for-purpose Project Management* is also presented. Chapter 5 is centered around content analysis of the assignments from WB3501 from the last 8 years. Trends evolved in these essays are identified and displayed. Chapter 6 evaluated the findings from the previous chapters (especially from Chapter 4 and Chapter 5) via discussing them with experienced project management practitioners. The discussion of the research findings is presented in research The conclusions are given in Chapter 8.

2 RESEARCH DESIGN

This chapter presents an overall strategy of approaching this research. The scope of this research is defined and presented in Section 2.1. A coupling of bibilometric and content analysis was chosen as the analysis tool to approach the problem. The application of the two methods is explained in Section 2.3 and Section 2.4 respectively. The results from applying the coupling are evaluated through interviewing external experts. The description of this step can be found in Section 2.5.

2.1 RESEARCH SCOPE

The selection of research method should be appropriate and feasible, in order to achieve the objectives and answer the research question properly. Therefore, the research method chosen is a coupling of Bibliometric and Content Analysis, a mixed research method combining quantitative and qualitative research tools. The overall structure of the body of the research is threefold. As can be seen in Figure 2.1, the body consists of 4 parts: Literature Study, Bibliometric Analysis, Content Analysis and Evaluation. The tasks of each part will be explained in the following sections.

2.2 BACKGROUND STUDY

The literature aims at providing a theoretical framework for the following analysis procedures. There are three issues to be addressed in this early stage of the research. Firstly, three important terms ("Approach", "Methodology" and "Practice"), whose interchangeable use in project management research is proven to have negative impact on the readability of the articles, are distinguished. Examples and definitions of each term to be adopted throughout this research are given. Secondly, the study will review the mainstream project management approaches and their evolution over time. Also, a comparison between the traditional and fit-for-purpose approaches will be conducted and their recognizable methodologies and practices will be explored, which is the used to answer Sub-question I. The third step is to give a detailed description of the course WB3501 and final assignment. This stage of research plays a role of providing theoretical basis for further exploration on these concepts.

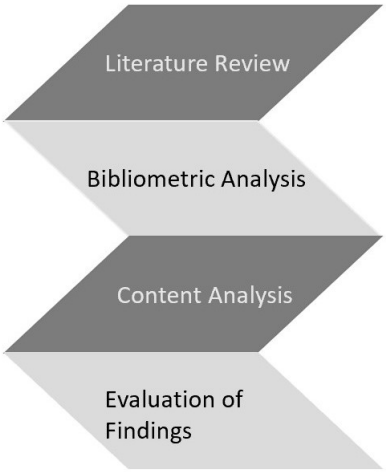

Figure 2.1: Three-fold structure of the research body

2.3 BIBLIOMETRIC ANALYSIS

As suggested in section 1.2, the two concepts "Fit-for-purpose" and "Project Management" haven't been conceptually linked together in management research. This bibliometric analysis, the second stage of the research, aims at investigating the link between two concepts and proposing a definition of a *Fit-for-purpose Project Management* approach. This analysis collects data (academic articles) from Scopus in the time frame of past 20 years (2000-2020). This stage of the research is conducted in a three-step methodology. The first step looks into the concept of "fit-for-purpose" in management literature in general and investigates how this concept has been used by the researchers. Key activities involved in this step are: author analysis, keywords analysis and co-citation analysis. The second step focuses on the concept "project management" and its adaptations. Some synonyms of "adaptations" will also be included in this step, such as "adaptive", "adaptable", "flexible", "flexibility", "contingency" and "process management". In this way, a broad understanding of adaptations and the evolution of them is formed. The third step is to bring the findings from the previous two steps together to depict the link of these two concepts. This is to be achieved by focusing on which fit for purpose concepts overlaps with similar topics that are also discussed as a factor of adaptations to project management. The workflow of this stage can be found in Figure 2.2. The result of this stage is to answer Sub-question II: *How are "fit-for-purpose" and "project management" linked in research?*

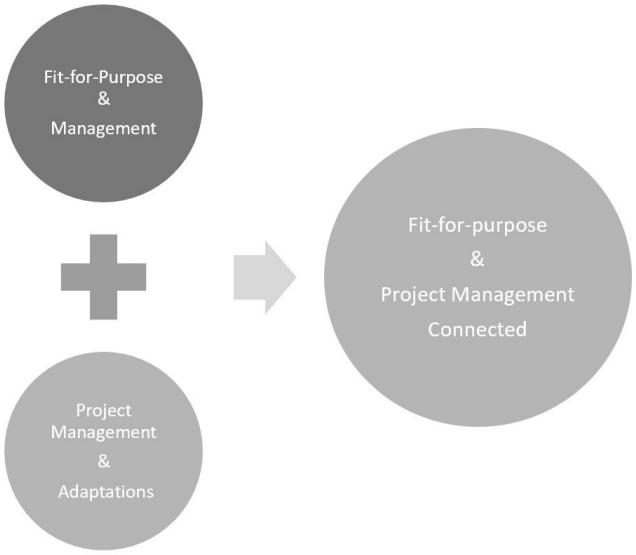

Figure 2.2: Approach of Bibliometric analysis to connect fit-for-purpose and project management

2.3.1 Co-citation Analysis

A co-citation describes a fact/phenomenon that two documents are referenced together by other files documents. The more often two documents are co-cited, the higher the strength of their co-citation and the greater their semantic relevance [Small, 1973]. Co-citation analysis is therefore a forward-looking analysis tool that uses statistical methods such as cluster analysis, multidimensional scale analysis, and factor analysis to identify core authors and references and predict future development in a subject area according to this "distance". Also it is represented graphically in order to visually identify and analyze the scientific community in the subject area [Chen, 2017], the output of which is a co-citation network. In a co-citation network, every node in the network represents a reference and the size of the node reflects the burstness of the reference: the larger the radius of node, the longer the duration of citation burst burst history [Chen, 2017]. The color of the node indicates the time when the document is published.

2.3.2 Silhouette Value

Silhouette value is value that is frequently used in clustering of the co-citation network. Silhouette refers to "a method of interpretation and validation of consistency within clusters of data. The technique provides a succinct graphical representation of how well each object has been classified." [Rousseeuw, 1987]. A Silhouette value is a real number in range between 0 and 1, positively reflecting the consistency within clusters of data. This index is used in the bibliometric analysis to suggest the reliability of the clustering results. For example. a co-citation cluster with a Silhouette value of 0.98 indicates that topics of the references are closely clustered.

2.3.3 Citation Burst Detection

Term "Burst" in Citation Burst detection has several common translations such as mutation, burst, spike, etc in literature [Chen, 2017]. The basic meaning is that the number of times by which a document was cited changes significantly in a short period of time. The references with a burst tend to be of great value in its research area and providers of "High-level Concepts" [Chen, 2017].

2.4 CONTENT ANALYSIS

2.4.1 Purpose & Method

The purpose of this research stage is to investigate trends evolved in fit-for-purpose project management, thus to answer the third sub-question: *What are the trends evolved in the interests of students in project management judging from the analysis of the students' viewpoint on fit-for-purpose?* The content analysis is to be conducted on the final assignments in the past 8 years - from 2013/14 till 2020/21. There are 15 assignments submitted per year, so the dataset is a collection of 120 essays in principle. The assignments are disclosed and accessed via the course staff for the purpose of research. To make the analysis more structured, the dataset is divided into 8 year-groups based on the year the assignment is submitted.
This stage of the research is to translate text into conceptual structure. It is centered on two focus points: trends over the years and trends in different sectors within each year. The analysis of the first point is focused on sub-questions selected in the assignments. For each year-group, the answers to every sub-questions are gathered, and summarized to be further compared with other year-groups. Therefore, the trends are to be identified by thoroughly comparing the results on each sub-question of one year-group with another. By following the same manner but changing the criterion for grouping into the sectors for which they made the statement, the trends evolved the project management of the 6 different sectors can also be identified. The focused sectors are: Process, Transport/Infra, Food, ICT, Shipbuilding and High-tech [TU Delft, 2020a].

2.4.2 WB3501 - Fit-for-purpose Project Management

Background and Set-up: A Contingency Approach Wanted

The course WB3501 Fit-for-purpose Project Management was first launched as one of the courses assigned in the minor Project Management for engineering background students who are pursuing bachelor's degrees. The purpose of this minor is to bring project management insights to students with strong interests in the management aspect of various technical projects. According to the official web page of the minor, hands-on practices and real life examples are important to help students form good understanding of this particular discipline. Students under this minor are expected to expe-

rience all aspects of project management working in mini project teams in a half year period consisting of two quarters. In the first quarter, the main fields which the courses of this minor touches upon are: basic project management knowledge, the legal aspects, and the economic usefulness and necessity of projects. And, the second quarter aims at deepening the student's knowledge of project management with theories from other management areas such as process management and decision-making theory [TU Delft, 2020b].

WB3501 Fit-for-purpose Project Management was launched to respond to the suggesting in project management literature that contingency approach is increasingly needed to cope with the "ever-more-complicated" projects from various industries on an "ever-larger" scale [TU Delft, 2020a]. As was argued by a number of researchers in the recent two decades, the continuously growing complexity in terms of technological advancement, organizational strategies and environmental influences has already made projects extremely difficult to control under the traditional project management approach, which depends highly on the linearity and predictability of the projects and treats project as an isolated group of tasks from its surrounding reality [Bosch-Rekveldt et al., 2011; Hertogh and Westerveld, 2010; TU Delft, 2020a]. This course is designed to bring the "fit-for-purpose" philosophy into project management education and conveying the important message to students with engineering backgrounds that the projects should be a shaped by a tailor-made management system to suit one particular project based on its context.

This course is taught in the second quarter of the minor programme when the students are already familiar with all basic principles and theories of project management. The lectures of the course are taught by staff experienced from both industry and academia and by a group of guest lecturers who are experienced project managers from 6 different industries. The staff are mainly responsible for the opening and closing lectures, giving general introduction of the course and the requirements of the deliverables and the final assignment. The guest lectures take up the main body of this course where 12 lectures are given from six different industries: Process, Transport/Infra, Food, ICT, Shipbuilding and High-tech. Also, during each lecture, there are two case-based presentations given by two guests lecturers from a client company and a contractor company respectively of the particular industry of interest. In this way, students get to know whether and how the management of projects is conducted differently from the two sides. In addition to generic information of the project, the lecturers also show some specific preferences for managing their own projects. They demonstrate what "fit for purpose" means for their specific projects, based on their own 10 do's and don'ts in their philosophy [TU Delft, 2020a]. Taking the course held in academic year 2020-2021 as an example, the companies invited to present are listed in table 2.1.

Assignment

The assessment object of WB3501 Fit-for-purpose Project Management is the final assignment submitted in the form of a scientific article to the staff. In

Table 2.1: Client companies and contractor companies invited to WB3501 Fit-for-purpose Project Management in academic year 2020-2021

Industry	Client Company	Contractor Company
Process	Royal Dutch Shell	Fluor
Transport/Infra	NZL	Alstom
Food	FrieslandCampina	Fluor
ICT	NS	KWD
Shipbuilding	Van Lent	Voogt
High-tech	ASML	VDL

this article, students are asked to define what fit-for-purpose management of projects is and indicate what activities are minimally needed to have a fit-for-purpose project management approach. Students mostly get to choose three to four aspects of managing projects such as complexity, risk and project managers to formulate their hypothesis or sub research questions, which are to be answered in the article based on their findings they have gained from the literature and conversations with the project managers in the lectures (guest lectures).
In this assignment, students are free to choose 3 of these sub-questions/ hypothesis and are first asked to conduct a literature review of maximum 800 words to test their selection. The targeted literature are the standard project management practices from the basic course, best practices identified in recent project management literature, and project management Value Improving Practices (VIPs). And after that they are expected to answer the sub-questions with the information gathered from the lectures. In the end, the closing week of the course, the articles should be submitted to the staff with clear links to the literature identified, all sub-questions answered, and the answer to main research question formulated.

2.5 RESULTS EVALUATION

Having expert interview to test the findings is necessary for empirical studies, because, in most cases, there is not sufficient empirical evidence to support the applicability and generalizabilty of the findings [Chen, 2017]. By discussing the results with experts from the related field and taking into account experts' opinions, the findings can be steered and modified towards a higher level of accuracy and applicability. In this research, the form of the expert interview is interviewing the presenters of the course WB3501 and discussing the results gained from previous research stages in depth. These presenters are experienced project management practitioners from the focused sectors. In this way, a better understanding of whether and to what extent these findings reflect the trend in the real world of project management in various industries and sub-question IV formulated in section 1.4 is answered.

3 THEORETICAL BASIS

A thorough background study was conducted to provide theoretical basis for further stages of this research. There are 3 sections in this chapter. Three terminologies, "Approach", "Methodology"and "Practice", are distinguished from one another in Section 3.1. Then the traditional and a number of fit-for-purpose project management approaches are explained in Section 3.2..

3.1 APPROACH VS. METHODOLOGY AND PRACTICE

In the past few decades, numerous researches have been conducted in the field of project management. And, in those papers a few terminologies have been frequently used to describe the "ways" in which the projects are managed such as Approach, Methodology and Practice [Gemino et al., 2020]. As they have been inconsistently used in literature and highly inter-changeable, it can become confusing for the readers to distinguish one another and might result in misquoting and misinterpretation in literature [Andiappan and Wan, 2020]. Studies have looked into this issue to help researchers use these terminologies appropriately in the field of project management.In order to avoid any fuzziness or doubts in understanding these terms, the three terms are to be distinguished in following subsections.

3.1.1 Approach: the Highest Abstraction

In a recent study of Andiappan and Wan [2020], the term approach was defined as "the basic philosophy or belief concerning a given subject matter. It is a way or direction used to address a problem based on a set of assumptions" based on a bibliometric analysis of literature in system engineering from past 15 years. In other words, an approach is the highest abstraction of the problem solving and the use of the approach shapes the biggest portion of how the problem is going to be solved [Gemino et al., 2020]. Therefore, the project management approach should describe how a project is created and governed in the highest level of abstraction. In proceedings of this research, we can adopt the definition formulated by Špundak [2014], thus a project management approach is: "a set of principles and guidelines which define the way a specific project is managed".

Some examples of project managements approach can be given: Traditional project management, Agile project management, Adaptive project management etc [Gemino et al., 2020].

3.1.2 Methodology: a System of Practices

According to a conceptual framework, which presents the interrelations of terms in system engineering, proposed by Andiappan and Wan [2020], methodology lies in a lower level than approach hierarchically and it was defined as "A methodology describes the general strategy to solve a problem. Methodologies are required in order to realize the approach defined previously". Methodologies are usually prescribed in the "Guidelines and Principles" of a specific approach [Špundak, 2014]. This indicates that the methodologies are executed by practitioners within specific detailed boundaries and limits (or guidance) to reach the desirable outcomes [Gemino et al., 2020]. Moreover, another term "Framework" was pointed out by Andiappan and Wan to bear the same features and functions as methodology, thus can be interchangeably used. The definition for project management methodology can be adopted from the Project Management Insititue [2017]: "a system of practices, techniques, procedures, and rules used by those that work in a discipline".

Some of the commonly used project management methodologies are: PMBok,Prince II, SCRUM, Kanban etc. [Gemino et al., 2020].

3.1.3 Practice: Manage an Aspect of Methodology

As was mentioned in subsection 3.1.2, project management methodology is defined as "a systems of practices..." . Gemino et al. [2020] stated that the "practice" in the definition represents an abstraction of techniques, tools and procedures. Therefore a practice is an action to take following the methodology and approach chosen.

Commonly used project management practices may contain: Critical Chain Method, Stakeholder Mapping, Risk Register, Work Breakdown Structure (WBS), using Kanban to visualize progress etc. [Gemino et al., 2020].

In the light of the conceptual framework established by Andiappan and Wan [2020] and all the findings from the section, a diagram was made to illustrate the interrelationships of the three key terms in project management discussed in this section. This diagram can be found in Figure 3.1.

3.2 TRADITIONAL VS. FIT-FOR-PURPOSE PROJECT MANAGEMENT

This section builds a comparison of a traditional project management approach and 4 other well-established project management approaches that are widely considered to be fit-for-purpose for their emphasis on tailoring the management styles and actions to fit the unique objectives of the targeted projects and ensuring certain level of flexibility.

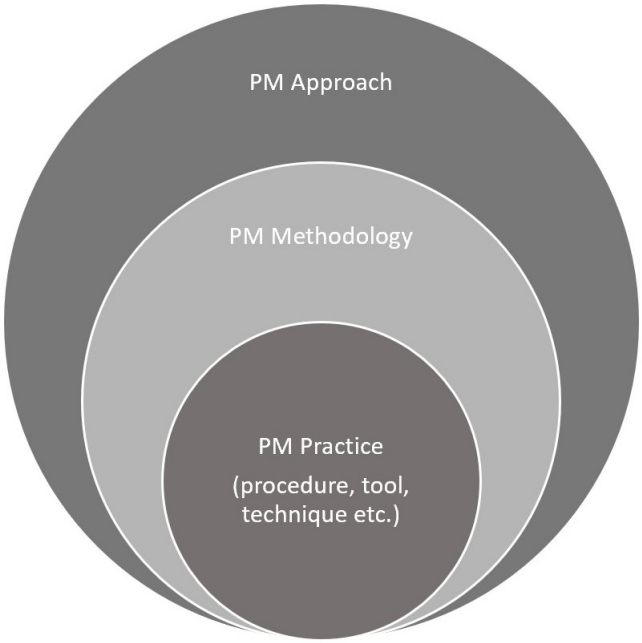

Figure 3.1: Interrelationships of Approach, Methodology and Practice in project management (freely inspired by [Andiappan and Wan, 2020])

3.2.1 Traditional Approach: Inappropriateness in Complexity

The emergence of a body of knowledge for project management in application in projects can be traced back to late 1950s or early 1960s [Van Der Waldt, 2011]. And it was first integrated and published in 1996 by Project Management Institute in the PMBOK Guide (Project Management Body of Knowledge), which has been recognized as the predominant standards and guidelines for classic model of project management. According to Špundak [2014], one of the reasons behind this domination of such approach is that it became well established in 1980s when it was "the only" guideline for project management practice. Špundak [2014] suggests that the ultimate goal of traditional project management is "optimization and efficiency in following initial detailed project plan, or, having said in usual way, to finalize project within planned time, budget, and scope".

According to the definition given by Project Management Institute in the sixth edition of PMBOK Guide, the life cycle of a project is organized into 5 different "Process Groups", which is also interpreted as "Phase" in many other articles [Wirkus, 2016]. These process groups are linearly organized as follows:

- **Initiating Processes**: a grouping of processes to define a project.
- **Planning Processes**: a grouping of processes to build up the scope, actions, objectives of a project.
- **Executing Processes**: a grouping of processes to perform and execute what has been defined in previous groups.

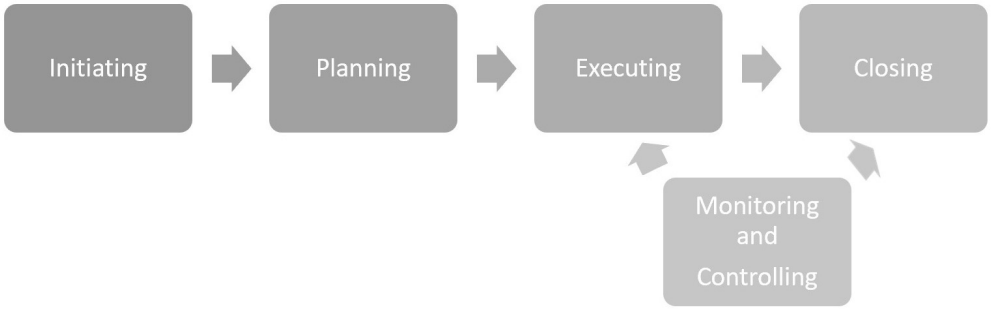

Figure 3.2: Life cycle of projects in process groups [Project Management Institute, 2017]

- **Monitoring and Controlling Progresses**: a grouping of processes,normally in parallel to executing group, to track, review, and regulate the progress and performance of the project.
- **Closing Processes**: a grouping of processes to complete and close a project.

The flow of the groups is depicted in figure 3.2.
The traditional project management approach is established on a set of assumptions. For instance, it is assumed that all the events in a project are predictable , that finished tasks can not be revisited, and that tools and techniques prescribed in the standards are understood and can be used indiscriminately in any project [Bergmann and Karwowski, 2019]. The ideal is that the tools and techniques prescribed in the standards should be used uniformly in projects and "Robustness" as one of its advantages should be given great emphasis, which is, however, frequently recognized as one of the main disadvantage of such approach, especially in the literature from the past two decades.
The assumptions, around which the traditional project management is built, are deemed to be "isolated" from the environment of the project [Špundak, 2014]. As complexity and dynamics of the project environment are widely recognized [Bosch-Rekveldt et al., 2011], this isolation makes such approach, where there is little room to adapt, rather vulnerable given any form of changes in the environment. This fact shapes a big portion of the inappropriateness of the traditional project management approach in today's reality.

3.2.2 Fit-for-purpose Approaches : Considerations into Tailoring

In this subsection, three dominant project management approaches are chosen and discussed, which are *Process Management*, *Adaptive Project Management*, and *Agile Project Management*. All though these three approaches are chosen because they all put high emphasis on tailoring the management styles and actions to fit the unique objectives of the targeted projects and ensuring certain level of flexibility, thus are in line with concept of fit-for-purpose [Zavyalova et al., 2020; De Bruijn et al., 2010; Bergmann and Karwowski, 2019]. The explanation and evolution of each approach are presented next.

Process Management

The process management approach is a management approach proposed by De Bruijn et al. [2010] in 2010 to manage complex decision-making systems, where usually a complex network of interdependent stakeholders are involved and multiple requirements are to be satisfied. The projects taken as examples in this book are centered on municipal planning or change projects in the Netherlands. The core idea of this process management approach is that, instead of developing a structured project and managing it by following prescribed guidelines, the "process designer" develops a change process along with its implementation and management to reach the desirable substantive outcomes [De Bruijn et al., 2010]. The process management approach is proposed to tackle the disappointments noticed in previous projects where traditional project management had failed to function well. The two disappointments found by De Bruijn et al. are as follows:

- The initiator of such projects (municipal planning and changes) is often subject to a "network of inter-dependencies". A "one-sided" design can not be accepted by all actors.
- A group of actors with varying interests and objectives in a project is not likely to achieve an "unambiguous substantive solution" easily. Designing a process containing rounds of negotiation is only way to create convincing outcomes.

An important assumption is that all the choices to be made in a project are debatable and the "knowledge" is always a subjective term in the process. De Bruijn et al. puts: "Those who choose a substantive strategy of change regardless of the unstructured nature of problems will only create conflicts." In other words, one-sided way of managing would only cause chaos and hindrance to the delivery of the outcomes. This statement, to some extent, explains one of the indicators of unsuccessful projects suggested by Hertogh and Westerveld [2010]: "Angry Stakeholders". Therefore, a successful project managed by this process management approach requires higher level of involvement of the interested actors when formulating the problem and selecting strategies(methodologies and practices) to approach the problem. In this way, important issues such as system boundaries, methods and scope are discussed and accepted by all actors by the time the project commences. The decision making activities in project managed by process management approach take place on a network level, while the traditional approach makes choice in a hierarchical way [de Bruijn and ten Heuvelhof, 2018]. The actors with varying interests are interdependent to one another, which indicates that no single actor can achieve their objectives without interacting and compromising with others.

Table 3.1: Hierarchical vs. network management (adapted form De Bruijn et al. [2010]).

	Hierarchy	Network
Decision-making	Dependence on superior	Interdependence
Interests	Uniformity	Pluriformity
Communication	Closeness	Openness
Organization	Stability, predictability	Dynamic, unpredictability

Table 3.2: Traditional project approach vs. process management approach (adopted from De Bruijn et al. [2010]).

	Traditional Project	Process
Decision-making	Regular	Irregular
Life-cycle	Phases	Rounds
Behavior	Actors are stable, behave loyally	Actors join and leave, behave strategically
Start & End	Starting point and end clear	No isolated starting point and end
Orientation	Problem to solution	Solution to Problem

Also, low-interest actors tend to be less willing to corporate and may "hamper" progress when their values are violated or there is shift of strategic expectations in their organization. The option for actors to leave the process is also negotiable, thus the network is usually not static during the process. The project-like management approach, which favors command and control, stand almost no chance of success because of resistance arisen by lack of knowledge and power to implement one's own expectations. A comparison of the management styles in both hierarchy and network can be found in table 3.1.

In the book of De Bruijn et al. [2010], the comparison of this process management approach and traditional project management is discussed. Four important preconditions of using traditional project management model are pointed out : "a clear goal, a time schedule, a clear framework and a predefined end product." However, none of them match the complex reality thus the "linear and structured" way of decision making might be counterproductive. De Bruijn et al. [2010] suggested such linear decision-making process (traditional project management) be replaced by process management approach to cope with difficulties caused by internal and external dynamics. Therefore, instead of making decisions following structured phases (called process groups in subsection 3.2.1) , the process should go forward via rounds of negotiations where actors in the network participate and behave cooperatively. Table 3.2 shows the differences of the two approaches during the life-cycle of one initiated project.

Adaptive Project Management

In the 21st centrury, many studies noticed that the environment of projects in various industries is becoming complex and hard to manage [Bosch-Rekveldt et al., 2011]. The reason behind this growing complexity was summarized into internal and external factors in a study of Van Der Waldt [2011] where the possibility of adaptive project management as a new paradigm of project management in municipal planning was investigated. The internal factors are centred on the dramatically increasing size/scale and technical complication of the projects, while the external factors are mostly found in political demands and economical pressures etc. Very similar to the emergence of agile approach, adaptive project management approach came into the picture, aiming at providing a new paradigm that can better handle balancing control and flexibility [Van Der Waldt, 2011].

According to Van Der Waldt [2011], the origin of adaptive project management is recognized as "Adaptive Management", which was first introduced to the field of natural resource management in 1970s. But due to the "technical difficulties" and lack of professionals, this theory had not been applied into project context until 2000s. It was considered appropriate to the management of complex projects because of its high emphasis on the flexibility and adaptability in its management style. Similar to agile approach, the adaptive project management also has a strong focus on constant improvement of the outcomes, as well as the lessons learned from previous actions and decisions. Based on that, Van Der Waldt [2011] argued that "The main benefit of APM (Adapative project management) is thus that it provides a framework for better management since the project team can systematically test assumptions and strategies." In simple terms, new techniques and tools are allowed during the course of the project managed by this approach, and the use of them can be constantly corrected based on learnings.

Compared with other approaches, Adaptive Project Management is not as well-established and still a developing concept in both research and practice aspects. Till now only limited applications in real-life projects are discussed in literature, mainly focused on preparations and enablers of the approach being applied in projects [Wirkus, 2016; Van Der Waldt, 2011]. It was also noted that, regarding the life-cycle of projects managed by such approach, there has not been a paradigm agreed to most authors like in traditional and agile approaches. According to the attempts of using such approach in infrastructure and municipal planning projects, the life-cycle diagram proposed by Van Der Waldt can be adopted, which can be seen in figure 3.3. It is interesting to notice that the life cycle combined some features from both traditional and agile project approaches. For example, the phases continues the division of phases in traditional approach (discussed in subsection 3.2.1) and the blocks on top of the life cycle that illustrate the feedback information resembles the "lessons learned and adjustments" in agile approach.

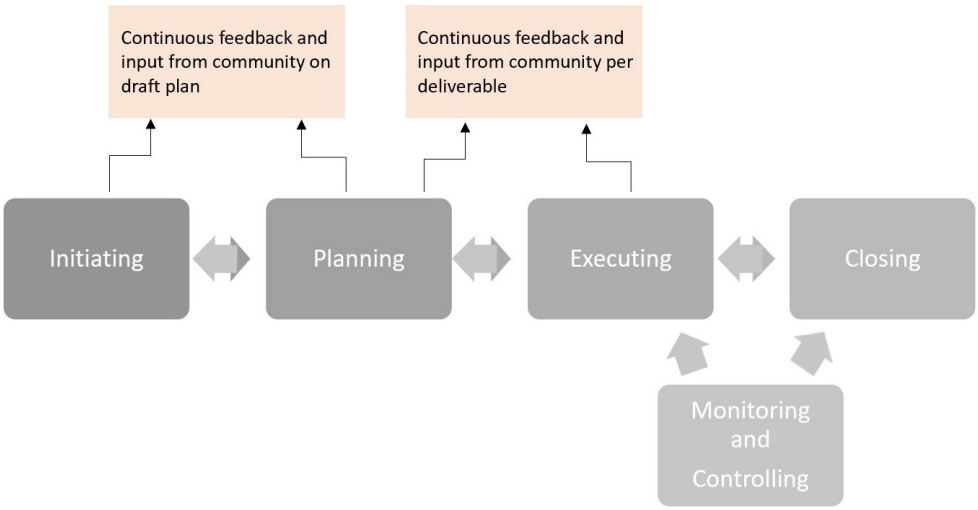

Figure 3.3: Life cycle of projects in adaptive project management (adopted from [Van Der Waldt, 2011]).

Agile Project Management

Agile project management was first introduced as a "flexible approach" for product development two decades ago in the software industry to cope with the difficulties arisen by the use of linear phase-gated waterfall approach (similar to traditional project management) in complex reality [Conforto et al., 2014]. After the development of twenty years, agile project management has become well-established and one of the most mainstream project management approaches worldwide favoured by both researchers and practitioners in IT industry. According to Gemino et al. [2020], agile project management approach is defined as a "common conceptual foundations", where all the agile methodologies and practices are incorporated. And this foundation is characterized with "the ability to adapt to changes and divide the work into distinct iterations throughout the project" [Gemino et al., 2020]. The core value of agile approach is given in the Agile Manifesto written by a group of authors from Agile-Alliance [2001].

- "Individuals and interactions over processes and tools."
- "Working products over comprehensive documentation."
- "Customer collaboration over contract negotiation."
- "Responding to change over following a plan."

Based on these values and his observations from agile projects, Gemino et al. [2020] summarized what set the agile approach apart from the traditional approach into three key points: the focus on short-term outcomes and allowing changes, collaborative project teams with lower hierarchy and higher level of stakeholder inclusion.

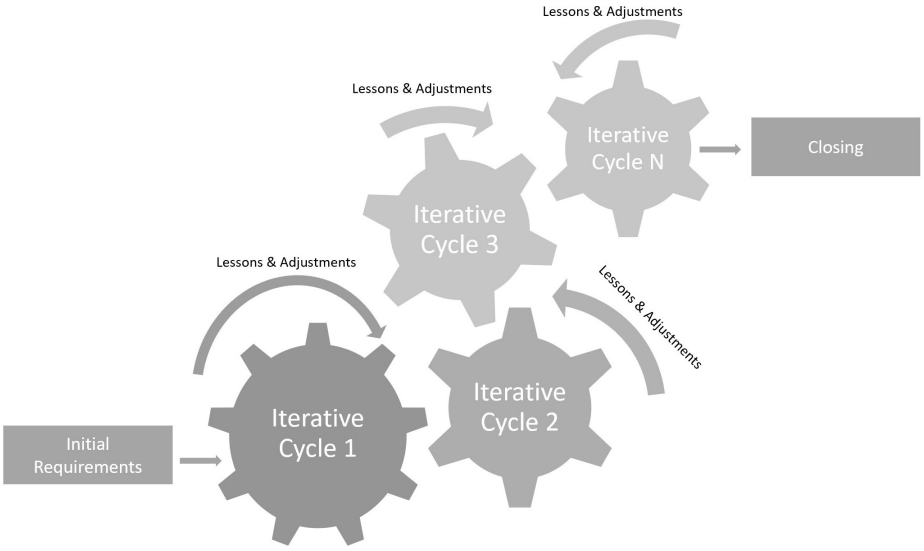

Figure 3.4: Life cycle of projects in agile iterative cycles [Bergmann and Karwowski, 2019].

The planning process of the agile approach is composed of a number of iterative planning and development cycles rather than linear and irreversible task groups Bergmann and Karwowski [2019], which opens up the room for constant and "just-in-time" review and adjustment of the short-term outcomes with the close inclusion of the stakeholders. The life cycle flow of the agile approach is depicted in Figure 3.4.
Up till now, software development still takes up the majority of the use of the agile project management, but research in recent five years starts to investigate the possibilities of applying this approach for other types of projects [Bergmann and Karwowski, 2019; Gemino et al., 2020]. Conforto et al. [2014] argued that the most likely expansion of agile project management approach are the projects whose characteristics are similar with the ones of software development projects, thus the project types that are " innovative and have a dynamic development environment experiencing constant change." Also in this study, Conforto et al. identified a group of 6 agile project management practices through a systematic literature study, which are "unique" and able to set the agile approach apart from other approaches, which can be found in table 3.3 along with author's explanations.

Table 3.3: Unique Agile Project Management Practices (adopted from Conforto et al. [2014]).

#	Agile Project Management Practices	Explanation
1	*Use of "product vision" concept*	The use of visual artifacts, such as visual boards, sticky-notes, figures, or drawings, to convey information.
2	*Use of simple plan communication tools and processes*	Simplified tools to identify the key aspects of the project rather than the form of work breakdown structure.
3	*Use of iterative planning*	Planning is iterative and repeating, constant delivery of outcomes of every cycle.
4	*Developing activities using self-managed and self-directed teams in the project plan*	The project team's involvement isencouraged in the project plan can ensure commitment and better progress control.
5	*Use of self-managed and self-directed teams in the project plan monitoring and updating activities*	The involvement of the team in monitoring and updating has a positive effect on the improvement of the interaction and effectiveness.
6	*Frequently apply project plan monitoring and updating processes*	The project plan is ideally revised at the end of every iteration

Up till now, software development still takes up the majority of the use of the agile project management, but research in recent five years starts to investigate the possibilities of applying this approach for other types of projects [Bergmann and Karwowski, 2019; Gemino et al., 2020]. Conforto et al. [2014] argued that the most likely expansion of agile project management approach are the projects whose characteristics are similar with the ones of software development projects, thus the project types that are " innovative and have a dynamic development environment experiencing constant change." Also in this study, Conforto et al. identified a group of 6 agile project management practices through a systematic literature study, which are "unique" and able to set the agile approach apart from other approaches, which can be found in table 3.3 along with author's explanations.

3.3 CHAPTER SUMMARY

The background study was conducted to provide theoretical basis for further stages of this research.
Three frequently used terminologies in project management, "Approach", "Methodology"and "Practice", are first distinguished from one another using literature. A project management approach is defined as "a set of principles and guidelines which define the way a specific project is managed". The term methodology lies on the lower level of abstraction: "a system of practices, techniques, procedures, and rules used by those that work in a discipline". Term "practice" represents an abstraction of techniques, tools and procedures, thus it is an action to take following the methodology and approach chosen.
Then this research explores the traditional project management model and project management approaches with fit-for-purpose nature and identified the most representative characteristics and practices of each approach.

The flow of the traditional project management model is organized linearly as

- **Initiating Processes**: a grouping of processes to define a project.
- **Planning Processes**: a grouping of processes to build up the scope, actions, objectives of a project.
- **Executing Processes**: a grouping of processes to perform and execute what has been defined in previous groups.
- **Monitoring and Controlling Progresses**: a grouping of processes, normally in parallel to executing group, to track, review, and regulate the progress and performance of the project.
- **Closing Processes**: a grouping of processes to complete and close a project.

Process management put high emphasis on the decision-making in a network of interdenpencies and using negotiation as the to reach the substantial results. Compared with the traditional hierarchical way of decision-making, the network way is characterized with pluriformity in interests, openness in communication, and dynamic and unpredictable organization. The process management approach of managing projects uses rounds instead of phases (process groups) to define the life cycles without specific starting and ending points. Actors involved in projects are rather unstable and may behave strategically during the negotiations. The orientation of workflow mostly is characterized as ”from solution to problem”.
The agile project management are characterized with the use of ”product vision” concept, simplified communication tools, and iterative planning. Therefore the effective application of agile project management requires well-trained developed project teams with self-managing and self-directing mentalities. Also, it requires more frequently applied project plan monitoring and updating processes to make sure the project plans are revised at end of each iteration.

4 A BIBLIOMETRIC VIEW OF FIT-FOR-PURPOSE

This chapter presents a bibliometric analysis of the two key concepts in this study: *Fit-for-purpose & Project Management*, aiming at investing the link between them and answer the sub-question II formulated in section 1.4: *How are "fit-for-purpose" and "project management" linked in research?*. This stage of the research follows a three-step approach. After the quick scan in the database in 4.1, the first step explored of the use of the term fit-for-purpose in management research in general in section 4.2. Then the second step looked into the field of project management and its adaptations in 4.3. In section 4.4, the findings from the previous step are connected to build the conceptual link between these two concepts, thus formulating the definition of *Fit-for-purpose Project Management*.

4.1 A BIBLIOMETRIC QUICK SCAN

Bibliometric Analysis is a quantitative analysis of documents by mathematical and statistical methods. It is a comprehensive body of knowledge that integrates mathematics, statistics, and literature and focuses on quantification. The main objects of bibliometric analysis are often the volume of literature, the authors (individuals or groups), and terminologies. This section serves as the preparation work before digging into the literature of interest, by going through the selected database (Scopus) and analyzing the search results. The main purpose of this step is to grasp a basic understanding of what has already been researched and what the outcomes are in the interested field - combination of ”fit for purpose” with ”project management” and ”management” in general.
As the aim of this stage of the research is to build the connection for the two concepts, the dataset to perform further analysis should be built with the documents that satisfied this criterion : Terms ”fit for purpose” and ”project management” appear in combination of one another at least in their titles, key words and abstracts. In order to retrieve the data that meet this criterion, the search on Scopus is conducted under the following search query with advanced search tool:

- **(TITLE-ABS-KEY (”fit for purpose”) OR TITLE-ABS-KEY (”fitness for purpose”) OR TITLE-ABS-KEY (”fit-for-purpose”)) AND (TITLE-ABS-KEY (”project management”))**

This search delivered 86 documents of various types. By analyzing the search reports generated automatically by year, author and keywords, etc., a basic understanding of this topic can be established from the ”exterior”

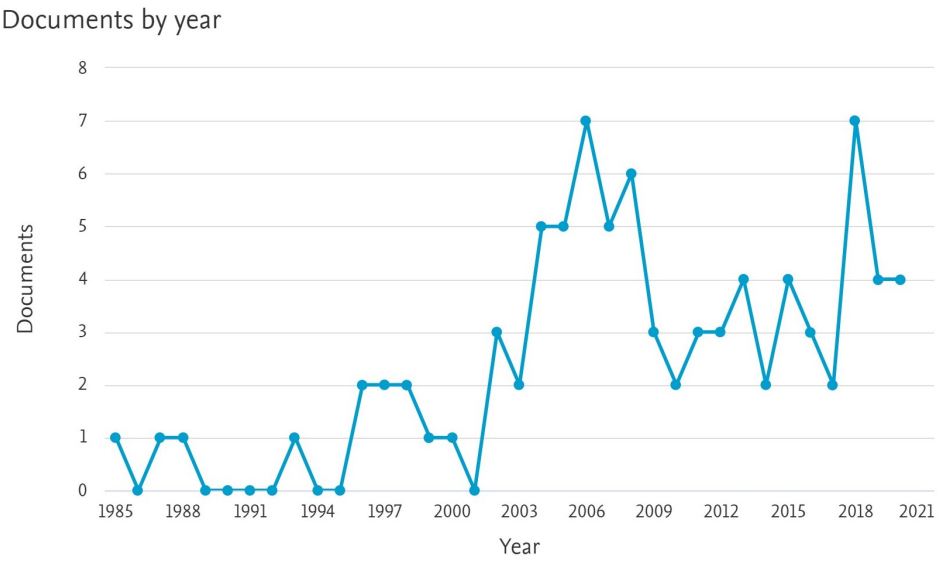

Figure 4.1: Overall trend of 86 found documents in the quick scan

information of the existing literature. The overall trend of the searched results is shown in Figure 4.1. A steep increase can be noticed in earlier 2000s and it reached a peak during the year of 2006 and 2008. Another burst can found in the year 2018 when 7 out of 86 documents satisfying the criteria were detected. Although there are some obvious fluctuations in this trend, it can still be recognized as a rather flat trend considering the small number of available documents.

In table 4.1, we can see the number of documents that have been produced by the top writing authors that have interlinked these two concepts. In this case, it shows that there are 5 authors that all have written two articles and 2 authors with 1 article. The authors with 1 article in this topic are not fully listed in this table. After a closer review on the articles, it was found that the two articles from Brnak et al. includes author Petrich, B. and Konopcynski, M.R., which are in fact two same study. The authors describe the fit-for-purpose in relation oil reserve recovery with: "The objective is to reduce unnecessary cycling of CO 2 between injectors and producers, improve sweep efficiency, increase oil production and improve ultimate oil reserve recovery. This is done with cost effective, fit-for-purpose intelligent well systems." [Brnak et al., 2006].

Also, the two articles produced by Becker and Giese are in fact the same study named "Application of model based functional specification methods to environmental control systems engineering". The authors propose a new management approach for "functional specification of complex and highly integrated aircraft control systems", where some project management concepts are incorporated. In this research fit-for-purpose is described with: "This enables the aircraft manufacturer to consistently specify the ECS in a uniformly structured manner with fit-for-purpose tools and the ability to simulate and to validate its specified functions and interfaces." [Becker and Giese, 2011]

Table 4.1: Top authors in FFP and PM research

Rank	Author	# of Articles
1	Becker,C.	2
1	Brnak, J.	2
1	Giese, T.	2
1	Konopcynski, M.R.	2
1	Petrich, B.	2
6	Abdelbaky, A.	1
6	Abeynayake, D.	1

In table 4.2, 11 keywords filtered by its relevance to this research with an occurrence of more than 5 times in all 86 documents are listed. It can be seen that offshore oil well production (Row #1) is a highly favored industry in this topic of FFP and PM, with an occurrence of 12 times. At same time, the construction industry and software engineering are also touched upon relatively frequently in this topic. Articles that touched upon these industries are to be revisited to investigate the roles of fit-for-purpose play. Also, a number of project management concepts are also ranked high in this list, such as risk assessment, cost effectiveness, planning etc. These fit-for-purpose adjustments on these concepts are to be the focus of the following sections of this chapter.

Table 4.2: Top keywords in FFP and PM research

Rank	Keyword	# of Articles
1	Offshore Oil Well Production	12
2	Construction Industry	8
2	Risk Assessment	8
3	Cost Effectiveness	7
3	Planning	7
3	Risk Management	7
4	Quality Control	6
5	Software Engineering	5
5	Strategic Planning	5
6	Benchmarking	4
6	Decision Making	4
6	Offshore Pipelines	4

4.2 STEP I: FIT-FOR-PURPOSE IN MANAGEMENT

The main purpose of this section is to investigate how the term *fit-for-purpose* is used in management research in general. The data set retrieved from Scopus is described in Subsection 4.2.1 and co-citation analysis and term-keywords analysis conducted via Citespace can be found in Subsection 4.3.2 and 4.2.2.

4.2.1 Data Description: a Body of Knowledge

The term fit-for-purpose is also widely used in many other contexts, making it hard to discern the relevant aspects of the term of fit for purpose. In order to have appropriate data set to perform further analysis, the documents are filtered with "fit for purpose" when they also have a relation to search term "* management", where the asterisk stands for any management areas or forms. As a search in term in either title-abstract or key word. But to be inclusive, we also decided to include source title as well, as many journals are focused on management, and have named their journal to reflect this. The search was conducted with the following query:

-(TITLE-ABS-KEY ("fit for purpose") OR TITLE-ABS-KEY("fitness for purpose") OR TITLE-ABS-KEY ("fit-for-purpose")) AND (TITLE-ABS-KEY ("* management") OR SRCTITLE ("* management"))

1215 documents were found after limiting the results to articles and conference papers written in English, which is an interesting and sufficient base for advanced bibliomertic analysis. The overall trend by year is visualized in figure 4.2 and it can be easily noticed that, over the past 35 years, the publications on fit for purpose in all management forms has increased dramatically, showing a strong up-going trend.
The top authors in the topic are listed in Table 4.3, which unsurprisingly gave out a very different list of authors with more productions than the results from previous search shown in Table 4.1. As is suggested in Table 4.3, there are 5 authors with 5 publications on the domain of fit-for-purpose in management: Bauer, S. (row #1), Brown, R.R.(row #2), Linke, H.J. (row #3)., Singh, B.(row #4) and Wagner, M. (row #5). Considering that there are still several authors with at least 3 publications not being listed in the report table from Scopus, which is deemed as sufficiently frequent, it is therefore necessary to see how these top authors are connected with one another by building up a co-author network. However, it turned out that few connections and interrelationships of these author are detected after processing the author-related information of the dataset in Citespace. Under this topic, there have been many productive authors during the course of developing in the past two decades, but cooperation of the authors are not as frequent and steady and the co-author network is rather scattered.

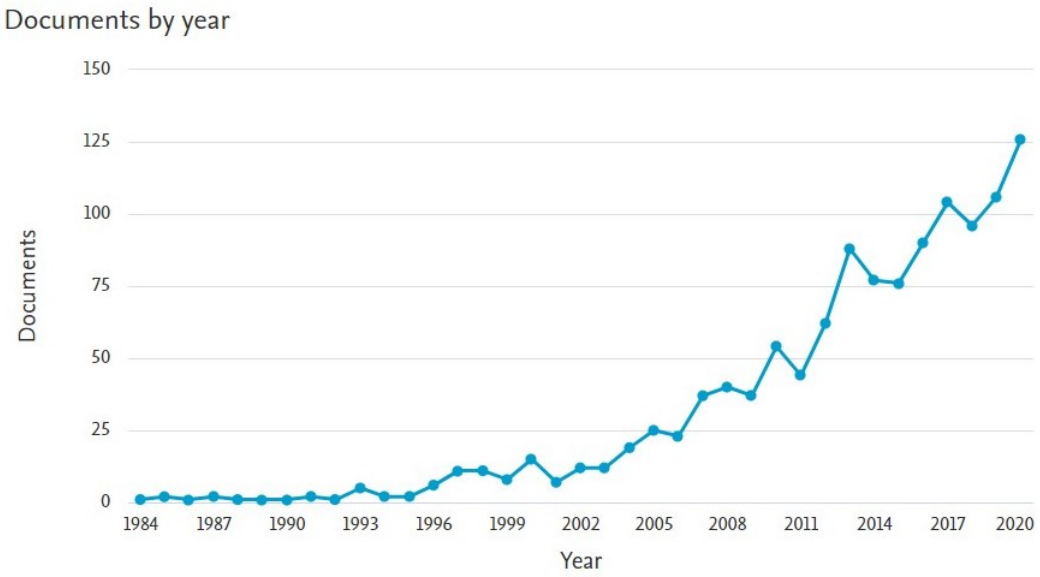

Figure 4.2: Overall trend of 1215 found documents of Step I by year.

Table 4.3: Top authors in "Fit-for-Purpose and Management" documents found in Step I.

Rank	Author	# of Articles
1	Bauer, S.	5
1	Brown, R.R.	5
1	Linke, H.J.	5
1	Singh, B.	5
1	Wagner, M.	5
6	Behnisch, J.	4
6	Bennett, R.	4

Table 4.4: Top keywords in "Fit-for-purpose and Management" documents found in Step I

Rank	Keyword	#	# in FFP-PM	Rank in FFP-PM
1	Human	190		
2	Risk Assessment	103	8	3
3	Decision Making	98	4	6
4	Risk Management	93	7	3
5	Organization And Management	91		
6	Project Management	73		
7	Offshore Oil Well Production	71		
8	Gas Industry	62		
9	Quality Control	58	6	4
10	Information Management	49		
11	Water Management	43		
13	Quality Assurance	40		

Two keywords that stand out in the dataset are risk and quality, both of which has an occurrence of more than 100 times. Risk appeared in forms of "Risk Assessment" and "Risk Management" (row #2 and #4 in table A.1) and the occurrences of quality are found in "Quality Assurance" and "Risk Control" (row #9 and #13). The insight drawn from this is that quality and risk are two management aspects that play dominant roles in fit-for-purpose. Further analysis are to dig deeper into the representative articles to see how fit-for-purpose or fitness-for-purpose are defined from the risk and quality aspects. What can also be interesting to look into are the keywords "organization" (Row #5 in table A.1) and "information" (Row #5 in table A.1), which have few occurrence in the 4.2 where top keywords of the topic FFP & PM are listed and ranked rather high in this topic. The fit-for-purpose practices in these two aspects can be good lessons for the development of fit-for-purpose project management.
The discussion over other top keywords of comparably less relevance to the scope of this research can be found in Appendix A.

Landscape View

Figure 4.3 is the co-citation network generated from the documents from 1995 to 2020 in the searched results. 847 top references out of total 24940 identified from 1204 articles were used to construct the synthesized this co-citation network. This network conveys a similar message as the author analysis that nodes are rather scattered distributed and it lacks significant interlinking references that bridge different areas under this topic. It is weakly clustered due to the fact that only 6 clusters were found by Citespace. These clusters are labeled by category terms from their own citing documents. The largest cluster is cluster #0: "local transport authorities". Cluster 0 has 124 members,which takes up 14.6% of all the nodes, and a silhouette value of 0.962, which indicates that its nodes are clustered with good homogeneity. The most active citing document in this cluster is produced by Allocca et al. [2020], which conducted several case studies to " examine the relationships between tools and bio-bank adaptability" in COVID-19 era. Fit-for-purpose was mentioned when introducing international bio-banks standards as "associated data of appropriate quality". This however is also of no relevance to this study. Another active citing article is produced by Shah and Axelsen [2016] and titled "Resilient Highways Asset Management for Local Transport Authorities". The use of fit-for-purpose in this paper is to describe the status of large engineering assets: "Local Authorities invest large proportions of their annual budgets in infrastructure assets for maintenance, upkeep and to ensure they remain fit for purpose. "[Shah and Axelsen, 2016].

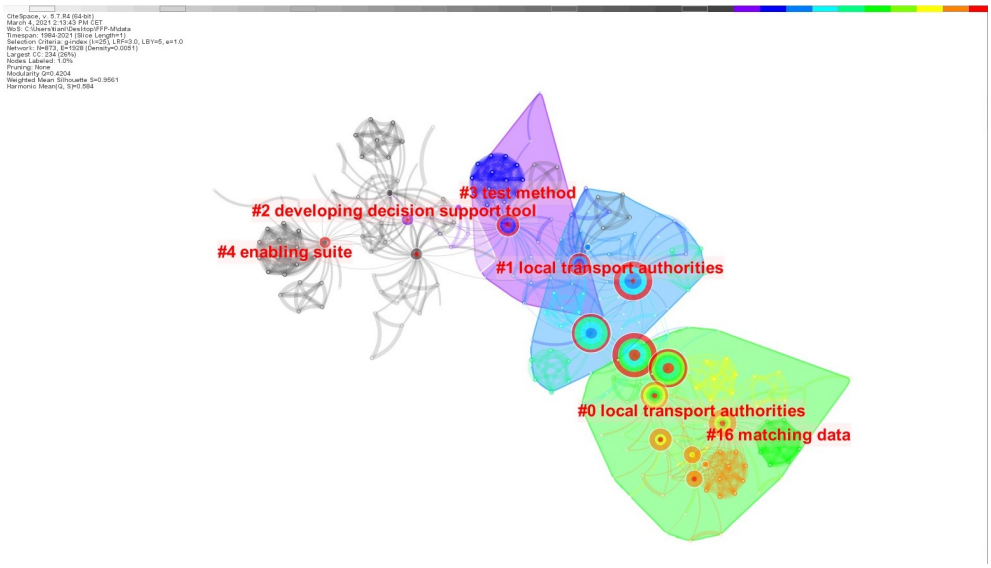

Figure 4.3: A landscape view of the co-citation network, generated from data from 1995 and 2020 (LRF = 3, LBY = 8, and e = 1.0).

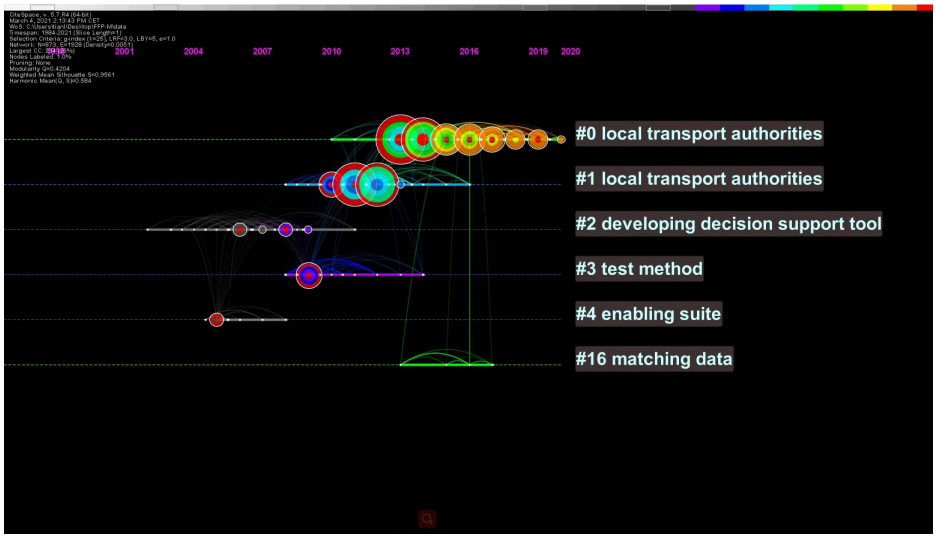

Figure 4.4: A timeline view of the 6 clusters.

Timeline View

The timeline visualization tool equipped in Citespace is to visualize the development of every cluster (from left to right) and the interactions among them in a horizontal timeline(figure 4.4). The clusters are sorted in descending order of size [Chen, 2017]. It is noticeable that cluster #0 "local transport authorities" , the largest cluster in the co-citation network, is also the cluster with the longest duration and most large size nodes. And more importantly, it is still active although the burstness (the radius of the treerings) has been declining year by year since it reached a peak in 2013.

This timeline view of co-citation analysis also supports the idea from another aspect that the connections of documents are mostly loose in terms of the links among the clusters.

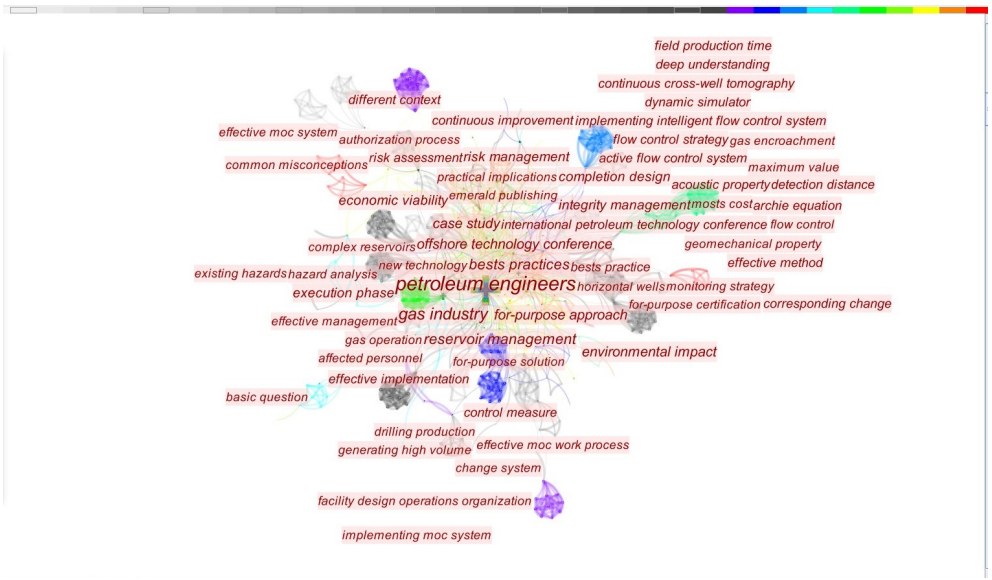

Figure 4.5: A landscape view of the term-keyword network, generated from data from 1995 and 2020 (LRF = 3, LBY = 8, and e = 1.0).

4.2.2 Co-term & keywords Analysis

Landscape View

Following the preliminary analysis of the keywords conducted in subsection 4.2.1, a more in-depth analysis is performed in a network approach in Citespace. Citespace can detect and extract noun phrases (terms) in abstracts that can be added to the keywords to build up a more complementary term-keywords network, which can be seen in figure 4.5. In this case each node represents a noun phrase that was extracted from keywords or detected from abstract by Citespace and the font size reflects the level of occurrence.

Also the nodes are arranged by dual-dimensionally: the more a term occurs in the data, the closer it would be placed to the center of the network. As can be seen in figure 4.5, the term-keyword network is centered around terms: Petroleum engineers, Gas industry, off-shore technology, Gas operation etc. It is not hard to recognize that the majority of the centered terms are related to oil & gas industry to different degrees. Oil & gas industry again stands out as the predominant industry in research on fit-for-purpose. This is in line with the assumption made in section 4.1 that the oil & gas industry could be the key in connecting the two concepts of project management and fit-for-purpose.

The clustering of this network shows a more positive trend than the one synthesized in the co-citation analysis, delivering 17 clusters with varying sizes among which there are six clusters with more than 30 members. The largest cluster,cluster #0, was labeled quite differently by different labelling methods. TFIDF (term frequency–inverse document frequency) labeled this cluster as ”immunization” and LLR (log likelihood ratio) labeled it as ”effective management”. The silhouette value of 0.705 to some extent explained this deviation for the fact that it contains 146 of the 1012 nodes detected in in total with a considerably low homogeneity level.

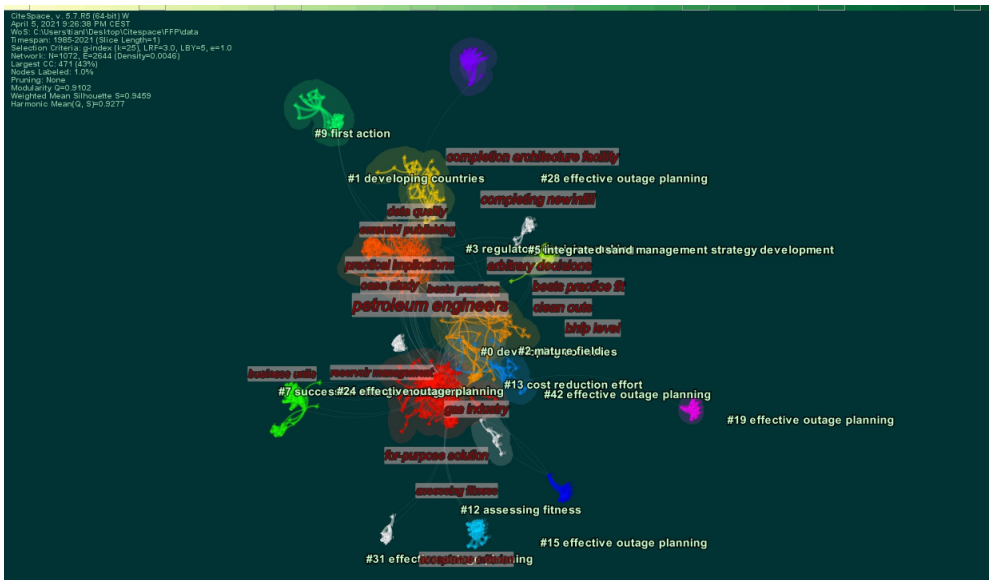

Figure 4.6: A landscape view of 17 clusters of the term-keyword network.

The second largest cluster #1 shows the most promising relevance to this study judging according to its label, homogeneity and citing articles. This cluster has 43 members and a silhouette value of 0.977,which can be regarded as a high level of homogeneity considering the size of this cluster. Because the silhouette value mostly is negatively correlated with the size of the cluster [Rousseeuw, 1987]. It is labeled as "effective management" by both LLR and TFIDF. The focus of most of the citing articles in this cluster is to propose or to investigate management methodologies or framework to deliver effective outcomes. Interestingly, the most active citer to this cluster of effective management is produced by Laskar [2017]. In this article, a fit-for-purpose MOC (management of change) system is proposed to cope with process and procedure changes generated in the various operations involved in upstream oil and gas industry. Fit-for-purpose is defined as a wisely designed process that can avoid future losses generated from present changes. It is also emphasized by the author that such systems is not a necessarily "overwhelming or so difficult" to be applied and it does not "inhibit" unexpected changes [Laskar, 2017].

Timeline View

The timeline view of this network has suggested another cluster that might be of interest for this research. As suggested in figure 4.7, cluster #3 has about the same time trajectory as cluster #1 and a number of links connecting it. It has 39 members and a silhouette value of 0.912. The label of this cluster is given as "successful change management" by both LLR and TFIDF and the silhouette value is 0.912, showing great level of relevance and homogeneity. Interestingly, it is also noticed that Laskar [2017] is among the active citers of this cluster.

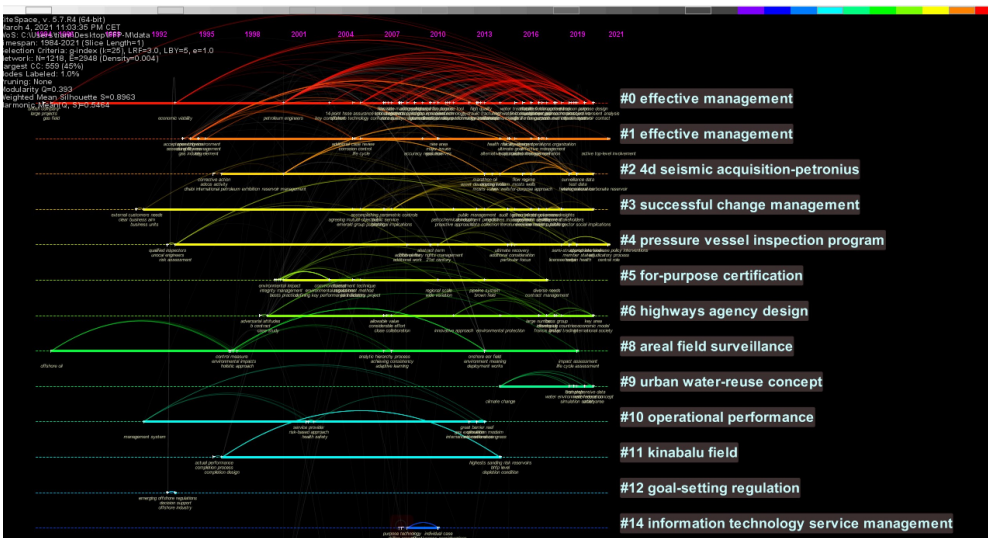

Figure 4.7: A timeline view of co-term network.

To conclude, the result of the author analysis and the co-citation analysis on this topic is rather negative as the synthesized networks appeared to be big but flat without much interlinks, which suggest that fit-for-purpose has not formed a shared or common understanding across management areas. The follow-up co-term analysis does deliver a much better composed network than keywords alone where most nodes are linked with another with single link. However, terms related to top keywords found in the first network did not stand out with more input from abstracts added to the network, such as management in quality and risk. Better composed network delivered more convincing clustering of the nodes and several important insights were drawn from several large clusters. Oil and gas industry and water management have been playing key roles in defining fit-for-purpose practices in the past 10 years. Also, ”effective management” and ” successful change management” turned out to be terms of interest in the step of the bibliometric study.

4.3 STEP II: ADAPTATION & PROJECT MANAGEMENT

In this section, the results of the second step of three-step bibliometric analysis are presented. It focuses on the concept ”project management” and its adaptations. The procedures and visualization tools to be followed are the same as the first step. In this way, a broad understanding of what has been adapted and how they have been adapted in project management is formed. The basic information of data-set retrieved from Scopus is explained in subsection 4.3.1. The co-citation analysis and the co-term analysis are presented in subsection 4.3.2 and subsection 4.3.3 respectively.

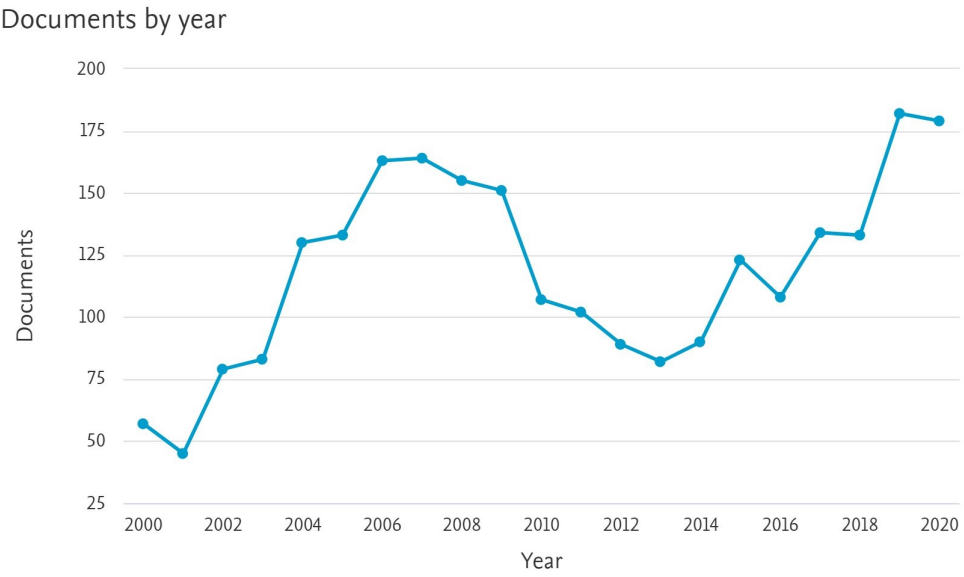

Figure 4.8: Overall trend of 2528 found documents in Step II by year.

4.3.1 Data Description

In order to generate a broader data-set with as much as useful information, synonyms for "adaptation" are added to the search. After learning from the context and consulting some experts, it was noticed that in project management context, the forms of adaptation can be found in "adaptable", "adaptive" and "adapted". Also, the concept adaptation is also related to the level of flexibility and contingency of management pratices, thus "flexible", "flexibility" and "contingency" are also added to the search. So, the search is conducted following this query:

- **(TITLE-ABS-KEY ("project management")) AND (TITLE-ABS-KEY ("adapt*") OR TITLE-ABS-KEY ("contingency") OR TITLE-ABS-KEY ("flex*"))**

2528 in total documents were delivered from this search as the results are limited to journal articles written originally in English from the last 20 year for the sake of easing the burden of software. This number of 2528 can already be considered as sufficient to conduct an in-depth bibliometric analysis. As is suggested in figure 4.8, there are two productive periods spotted in the past two decades under this topic, first of which can be found from the year 2006 till 2010 when around 160 articles were produced each year. Another peak was reached in the year 2019 with a production of 182 journal articles under this topic and it stayed as productive (above 175) in the year 2020 when 179 articles were found to be published. So this topic of project management and adaptation has been a considerably active research field in terms of productions in the past two decades although it went through a short low period when the production per year stayed in double digits. The trend of these documents by source along with its discussion can be found in appendix C.

Table 4.5: Top authors in "PM and Adaptation" documents found in Step II.

Rank	Author	# of Articles
1	Müller, R.	11
2	Walker, D.H.T.	8
3	Eriksson, P.E.	7
3	Kock, A.	7
5	Chan, A.P.C.	6
5	Chua, D.K.H.	6
5	Hertogh, M.	6

When looking at the authors, top authors who stand out in this topic are listed in table 4.5. As can be seen in the table, the most productive author is Müller, R. (row #1 in table 4.5) with 11 publications. Among these publications, the majority of them have a clear focus on project-based organizations and project governance when taking a close look at the documents. 8 articles were found produced by Walker, D.H.T. (row #2) who was active in this field roughly from 2008 to 2013 with a focus on project alliance and management of innovative projects. The third most productive author in this topic is Eriksson, P.E. (row #3), 7 articles were found produced by him with a focus on management of complex projects. Kock, A. also has had 7 articles that fell into the search results, this author's works are centered on portfolio management and agile approach. Also, there are other three productive authors listed in the table, who are Chan, A.P.C. (row#5), Chua, D.K.H. (row#6) and Hertogh, M (row#7). The productivity of this topic does show a more promising potential to draw a better composed co-author network.

4.3.2 Co-Citation analysis

As was stated in section 4.2, the burstness of a reference is an key indicator of abrupt changes in direction and various other types of information of the interested research subject. The burst detection of the references cited by this data-set was conducted. In total 25 references with citation burst history for at least two years was identified and the results are shown in figure 4.9. After filtering these sources with potential transform value, 5 of these 25 references were visited in detail to grasp the transformative insights.
The first reference of interest is Winter et al. [2006]. In this paper, the author proposed a framework composed of five key directions in project management research as an agenda to "inform" and "stimulate" the research activities. The five directions pointed out by Winter et al. [2006] are "project complexity", "social process", "value creation", "project conceptualization", and "practitioner development". Second reference of interest is textbook *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* produced by Wiley, which is written for nontraditional purpose. It was pointed out that projects are widely subject to "obstacles" factors and the author summarized them into "Project complexity", "Customer's special requirements", "scope changes", "Organizational restructuring", "Project risks", "Changes in technology" and "Forward planning and pricing". A certain level of overlapping with future directions pointed out by Winter et al. can be noticed.

References	Year	Strength	Begin	End	2000 - 2021
Winter M, 2006, Directions for future research in project management, V24, P638-649	2006	4.52	2008	2011	
Flyvbjerg B, 2014, What you should know about megaprojects and why, V45, P6-19	2014	4.24	2016	2019	
Bakhshi J, 2016, Clarifying the project complexity construct, V34, P1199-1213	2016	3.88	2019	2021	
Yin RK, 2009, Case Study Research, V0, P0	2009	3.65	2013	2014	
2004, 2004, 2004, V0, P0	2004	3.49	2008	2009	
2006, 2006, 2006, V0, P0	2006	3.49	2008	2009	
Petit Y, 2012, Project portfolios in dynamic environments, V30, P539-553	2012	3.46	2014	2017	
Engwall M, 2003, No project is an island, V32, P789-808	2003	3.28	2005	2008	
Kerzner H, 2009, Project Management, V0, P0	2009	3	2011	2012	
[Anonymous], 2004, I, @ I, @ , V0, P0	2004	2.91	2008	2009	
Cicmil S, 2006, Rethinking project management, V24, P675-686	2006	2.91	2008	2009	
Pellegrinelli S, 2015, Facilitating organizational ambidexterity through the complementary use of projects and programs @ International Journal of Project Management, V33, P153-164	2015	2.73	2018	2021	
Svejvig P, 2015, Rethinking project management, V33, P278-290	2015	2.7	2017	2021	
Too EG, 2014, The management of project management, V32, P1382-1394	2014	2.63	2018	2019	
Klein L, 2015, Improvisation in project management, V33, P267-277	2015	2.63	2018	2019	
Ahola T, 2014, What is project governance and what are its origins?, V32, P1321-1332	2014	2.61	2015	2018	
Geraldi JG, 2008, The balance between order and chaos in multi-project firms, V26, P348-356	2008	2.39	2012	2013	
**PROJECTMANAGEMENTINSTITUTE, 2008, A Guide to the Project Management Body of Knowledge, V0, P0	2008	2.39	2012	2013	
Brady T, 2014, Managing structural and dynamic complexity, V45, P21-38	2014	2.28	2017	2019	
Ramazani J, 2015, Project managers and the journey from good to great, V33, P41-52	2015	2.21	2019	2021	
Olsson NOE, 2006, Management of flexibility in projects @ International Journal of Project Management, V24, P66-74	2006	2.19	2008	2010	
Dvir D, 2004, Plans are nothing, changing plans is everything, V33, P1-15	2004	2.18	2007	2009	
Martinsuo M, 2013, Project portfolio management in practice and in context @ Int J Proj Manag, V31, P794-803	2013	2.11	2017	2018	
Atkinson R, 2006, Fundamental uncertainties in projects and the scope of project management @ International Journal of Project Management, V24, P687-698	2006	2	2008	2011	

Figure 4.9: Results of the burst detection.

The third burst of interest is the article produced by Petit in 2012 , which investigated the management of project portfolios in dynamic and uncertain environments. Uncertainty is also treated as a key aspect of the research. It was argued that a better practice to manage risk is to investigate the relationship between sources of the uncertainty and the "organizing mechanism" to minimize the negative impacts. The fourth reference is the article produced by Flyvbjerg with a burst from 2016 to 2019. The traditional way of managing mega projects was criticized to be wasteful and leading to massive misallocation of resources and the reform has reached the "light at the end of the tunnel". An important statement is made in this paper that good first step has been taken by the banks and funds to bring their own advisors to conduct forecasts independently rather than accepting the face value given by the project promoters, This is considered to be helpful for rebuilding the trust among stakeholder as knowledge becomes negotiable [Flyvbjerg, 2014]. Davies and Brady [2016], the fifth burst reference, drew a similar conclusion as Petit [2012], arguing that "the relationship between dynamic and project capabilities is reciprocal, recursive and mutually reinforcing" [Davies and Brady, 2016]. The findings of this subsection are to be coupled with the co-citation network to form a broad understanding of what brought changes to adaptations and what have been adapted during its course of its development.

Landscape View

The co-citation network is synthesised by 787 nodes representing individual references with co-cited history and connected with 1050 links. The landscape view of the visualized co-citation network is presented in figure 4.10. Compare with the co-citation network synthesized in section 4.2, which turned out to be rather loose and flat, this network is more composed and the clusters found tend to show more clear boundaries with one another. With clusters being standing away from each other, the network shows more potential to give meaningful insights such as which reference links two different clusters or which reference has brought the development of this topic to a further level.

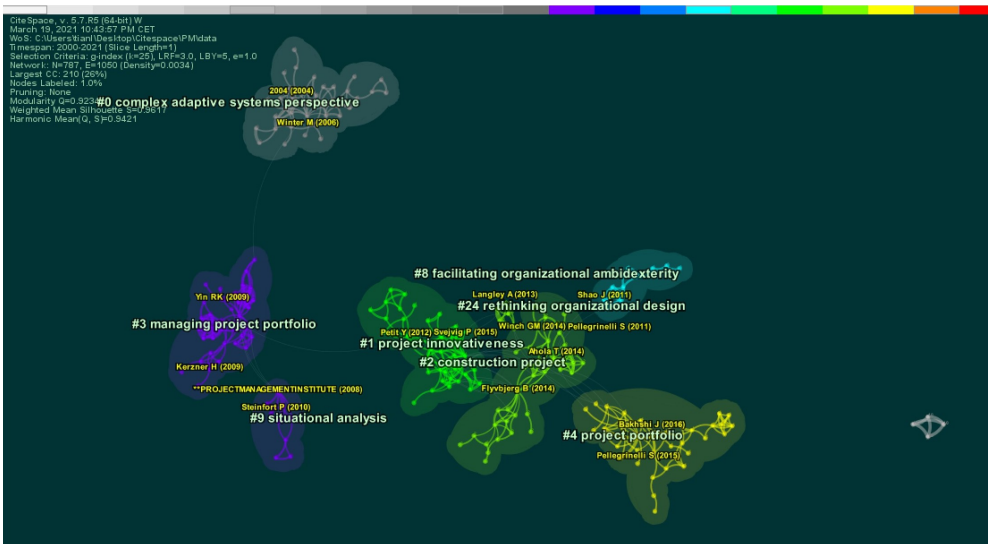

Figure 4.10: A landscape view of the co-citation network, generated from data from 2000 and 2021 (LRF = 3, LBY = 8, and e = 1.0).

The network is divided into 8 co-citation clusters. These clusters are labeled by index terms from their own citers. The largest cluster #0 has 40 members and a silhouette value of 0.997, a very high level of homogeneity. It is labeled as "complex adaptive systems perspective" by LLR, "human activity" system by TFIDF. Interestingly, many other index terms detected by MI indicated that one of the most two major focuses of this cluster are the complexity the human's behaviour in projects, for example "intervening condition", "stakeholders" and "managing complex project". The most active citing article of this cluster is produced by Small and Walker in year 2011 and titled *Providing structural openness to connect with context: Seeing the project entity as a human activity system and social process*. The author argues that projects, once considered as predictable practice, should be recognized as social process where complex reality and human interrelations play dominant roles. In simple terms, the new paradigm of project management should be more sociable and the cultural and political effects should be taken into account. Interestingly, many of the implications in this article are in line with the core features of the concept process management by De Bruijn et al., which was explained in detail in section 3.2.2. Also, Small and Walker [2011] was published one year after De Bruijn et al. [2010]. The region of interest of the former is the Middle East while the latter focuses mainly on the projects in the Netherlands. It is interesting to notice that the importance of interplay of social and political aspects of managing projects are realized at a similar time in two different regions that are culturally different.

The second largest cluster #1 has 39 members, 1 member fewer than the cluster #0, and a silhouette value of 0.965. It is labeled as "project innovativeness" by LLR and "management" by TFIDF. Also, some TI labels such as "new conceptual model", "international development", "situational analysis" , and "rethinking organizational design" etc. have delivered an impression that the focus of this particular cluster is centered on reforming and rethinking the classic model of managing projects. Citers to this cluster all share a perception that traditional project management model is no longer

applicable in the highly-dynamic modern world and project management practices should be adapted as they are introduced to another industry. The most active citing article to this cluster is Nguyen et al. [2018] where the use of effectuation decision-making in project management is investigated as an alternative decision-making logic. It turned out that the effectuation is more likely to be adopted by projects with innovative nature. It was argued that projects as such tend to require less formality in controlling and under high uncertainty and complexity, available resources are preferable over pre-defined goals to define projects and guarantee certain level of flexibility/adaptability, which is desired in modern project management [Nguyen et al., 2018].

The third largest cluster #2, labeled as ”construction projects” by both LLR and TFIDF, has 37 members and a silhouette value of 0.924. After taking a closer look, it was found that citers to this cluster tend to pay more attention to ”evolution” , critical factors found in cluster #0 such as complexity and flexibility-focused project management play a role in this cluster. Also, introducing proven concepts from other industries into management of construction projects. The most active citing article to this cluster possess all the characteristics stated above. It is produced by Li et al. [2018] and explores applying Evolutionary Governance Theory for mega event projects. World Expo 2010 held in Shanghai was analyzed as case. It was concluded that constantly evolving governance structure and elements are the key to achieve goals of mega events projects applying Evolutionary Governance Theory. Another important statement made by Li et al. [2018] is that in complex project systems, it is always welcomed to ”draw” proven theories from other disciplines to establish theoretical foundation to adapt to its complex context.

As can be seen in figure 4.10, both cluster #3 (36 members) and cluster #4 (34 members) are labeled with ”project portfolio” and in fact these two cluster share certain amount do share some members. They both have a high value of silhouette higher than 0.95. The only significant difference is that the mean year of cluster #3 is 2005 while cluster # 4 is in 2013. Therefore these two clusters can be explored combined as a larger cluster whose contribution mainly lies in the management of bundled projects from a organizational level. Two important citers to this combined cluster are Ritson et al. [2012] and Jerbrant and Karrbom Gustavsson [2013], both with a coverage of 8 (cited 8 of members of the cluster). The article by Ritson et al. [2012] suggested that methodology complex adaptive systems, which is characterized as unclear and constantly changing strategies, can be a fitting alternative to manage programs by keeping aligning the formulation and implementation of organizational strategies dynamically. Jerbrant and Karrbom Gustavsson [2013] on the other hand confirmed the importance of this alignment in managing portfolios after analyzing the actions of two large project-based organizations.

Figure 4.11: A timeline view of the co-citation network, generated from data from 2000 and 2021.

Timeline View

The timeline view tool can help visualize the evolution of the clusters of this topic by providing information such as duration and burstness from a timeline perspective. As suggested in figure 4.11, cluster #0 "complex adaptive systems perspective", the biggest co-citation cluster, is active from roughly year 2002 to 2008 and stand as the only one emerged cluster in this topic during its first 2 years. Thus this period is the time when the interplay of social and political influence on projects across the industries began to be widely realized and adaptations were considered necessary to be applied in project management.

The second cluster came into the picture is cluster #3&4, which was viewed combined as one previously due to the fact that these two clusters are considerably similar and have many shared citing articles. This cluster came into picture since 2004 can continued to be active till 2019. These two similar clusters showed that during this period researches kept being conducted to investigate the possible adaptations that can be made on the organizational level to cope with the increasing complexity and uncertainty, especially in project-based organizations where considerable efforts have been spent to find and evaluate proven methodologies from other management fields or other industries applied in managing programs or portfolios. Also, alignment of the formulation and execution of the strategies is one of the most key purpose of the related researches [Jerbrant and Karrbom Gustavsson, 2013; Chin et al., 2012]. Along the evolution of this cluster, an insight is drawn that from an organizational perspective that projects have began to be shaped by values expected to be delivered rather than predefined goals.

Year 2009 is the watershed of the researches in this topic. Before 2009, as indicated previously, there were only two clusters (cluster #0 and cluster #3&4) and one of them had not yet started evolving as few nodes are labeled with burstness (treerings). However after this point in time, clusters begun to emerge in large numbers as can be noted from 4.11 that the timelines are visibly more occupied with nodes. And majority of the references with strong burst history discussed earlier in the subsection are also found after 2009.

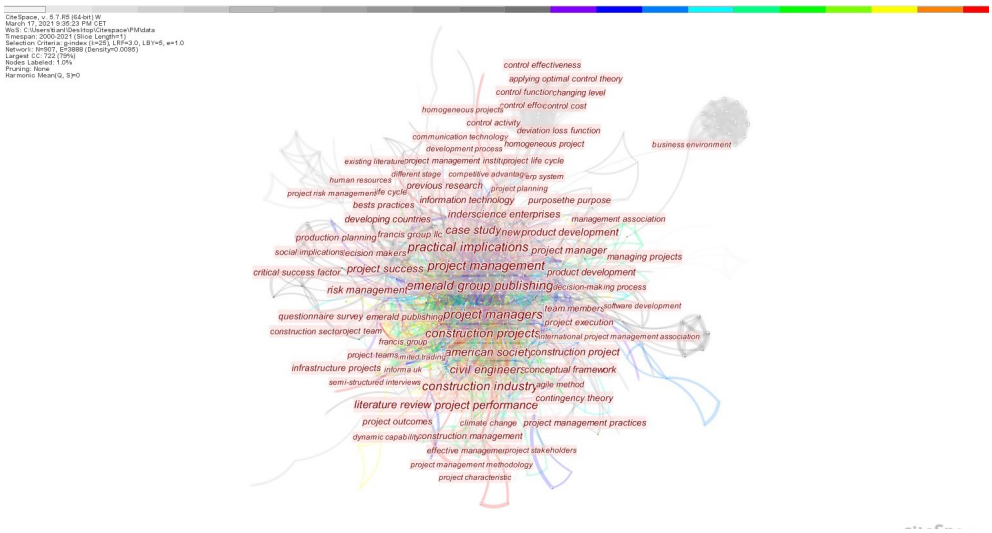

Figure 4.12: A landscape view of the co-term network, generated from data from 2000 and 2021 (LRF = 3, LBY = 8, and e = 1.0).

Cluster #1 and cluster #2 are the ones that stood out and remained dominant and active roughly since 2009. This evolution of this topic reached a prosperous period as on one hand, the innovativeness of projects are realized and necessary tailoring was needed to cope with this new feature of projects and newly emerged project management approaches such as agile began to be considered as alternatives in managing construction projects to "challenge" the traditional project management. Large amount of research was done to rethink and reflect on the traditional model of managing projects .

4.3.3 Co-term & keywords Analysis

Following the co-citation analysis, the co-term analysis is performed to investigate the use of terms in this topic to draw more useful insights to get depict the development of project management and its adaptations. The terms in this analysis are adopted from the titles, keywords and abstracts of the articles from the data-set. The process report suggests that this co-term network is composed of 907 nodes(terms) connecting 3888 links. The is shown in figure 4.12. As was stated in subsection 4.2.2, the basic logic of the network is that the closer a particular term is positioned to the center of the network, the more frequently it has been mentioned the topic information of the selected articles. For instance, term "project management" is placed in center with larger font size, which indicates that project management is mentioned with comparably higher frequency by the articles in this data-set. Terms that might be of similar importance are "project managers", "construction projects ", "project performance" etc. However, given the context and the searching criteria of the this research, it is hard not to mention these terms when formulating narratives of articles under this topic. They are rather vague and abstract considering the purpose of this step of the bibliometric analysis. Therefore, to gain more useful insights, these "abstract" terms are filtered out and the remaining top terms are shown in figure 4.13.

Freq	Burst	...	...	Σ	...	Keyword
15	5.85	...	...	...	...	project outcomes
14		...	...	...	...	project execution
14		...	...	...	...	questionnaire survey
14		...	...	...	...	project planning
14	6.38	...	...	...	...	production planning
13		...	...	...	...	infrastructure projects
13		...	...	...	...	agile method
12	4.16	...	...	...	...	project management practices
12	3.35	...	...	...	...	contingency theory
12		...	...	...	...	conceptual model
12		...	...	...	...	effective management
11	3.34	...	...	...	...	development process
11		...	...	...	...	life cycle
11		...	...	...	...	different stage
11	4.99	...	...	...	...	management association
11		9	...	...	...	licensee mdpi
11	6.09	...	...	...	...	purposethe purpose
11	4.95	...	...	...	...	project management institute
11	6.10	...	...	...	...	business media llc
10		...	...	...	...	social implications
10	3.38	...	...	...	...	risk assessment
10	3.83	...	...	...	...	agile project management
10		...	...	...	...	software development
10	5.10	...	...	...	...	real options
10		...	...	...	...	human resources
10		...	...	...	...	project implementation
10		...	...	...	...	critical success factor
9		...	...	...	...	complex adaptive system
9	3.91	...	...	...	...	hong kong
9		...	...	...	...	managing projects
9		...	...	...	...	design process

Figure 4.13: List of top terms after removing "abstract" ones.

As can be seen from seen from this list, "project outcomes" stands out as the top term in the filtered network with a frequency of 15, followed by "project execution" and "questionnaire survey" with 14 times being mentioned. An impression of this list is that the word "planning" has a high level of occurrence, such as in "project planning" and "production planning". This is in line with the argument made in the literature research in subsection 3.2.1 that the majority of the critique come from the use of static planning tools, which has been deemed by may researches as inappropriate in the dynamic reality. Also, the appearance of "agile method" and "contingency theory" in this list is very interesting because it is a proof from another aspect of the fact these are the most popular theories when speaking of adaptations in project management and exploring their way of wider applications. It is noticed that terms such as "risk assessment", "effective management" and "complex adaptive systems" are also found to be top terms in the bibliometric analysis of the topic "fit-for-purpose & management" in section 4.2. These terms might be another region of interest for linking the concept of project management and fit-for-purpose. The involved articles from both steps are to be revisited to investigate where the link lies.

4.4 STEP III: THE LOOK OF FIT-FOR-PURPOSE PROJECT MANAGEMENT

In this section, the areas of interest found in Section 4.2 and 4.3 are revisited on a greater level of detail to investigate the link connecting the fit-for-purpose and project management and give an state of the art definition as conclusion of this stage of this research. And the Sub-question II *How are "fit-for-purpose" and "project management" linked in research?* is answered. This section is subdivided into two sub-sections. The first Sub-section 4.4.1 discusses the lessons gained from other management fields that can be applied in project management. The definition of Fit-for-purpose Project Management is formulated in Sub-section4.4.2.

4.4.1 Fit-for-purpose Lessons for Project Management

As was found in the Section 4.2 in the co-term network, the oil & gas industry and water management stood out as the predominant research fields that have frequently touched upon the term fit-for-purpose. After taking a deeper look at the co-term network (figure 4.5), research on another few industries was found to be active user of the terminology "fit-for-purpose" and "fitness for purpose", which are transport, healthcare and food industry. The fit-for-purpose lessons from these areas are retrieved after revisiting the top articles found by Citespace.

Process Industry

The process industry is the most active user of the term fit-for-purpose and this term has already been defined in many management areas. Firstly, fit-for-purpose solution defined by Singh et al. [2010] in a article addressing offshore operation management. It was argued in this paper that fit-for-purpose solution to offshore operations should appraise the "root causes" of threats with previous experience and case histories. And a fit-for-purpose operation solution reconnects the interlinks of "urgency to build", "knowledge transfer", and "management of change" [Singh et al., 2010]. Regarding the reservoir management, Bhark and Dehghani [2014] proposed a workflow that can best guide the modelers to simulate the flow in order to support the existing and future operation in loss prevention. Fit-for-purpose is defined as a set of best practices that delivers that guidance.
With regard to the management of the interfaces, Geehan and Zamora [2010] suggests that fit-for-purpose has its contribution on a collaborative viewpoint. It is was argued that actors should work on on a common automation language, appropriate interface protocols, and a disciplined technology road-map [Geehan and Zamora, 2010]. Safety management is also an very important concept in process industry due to fact that the activities are more likely to be influenced by incidents from nature. The role of fit-for-purpose in the area is defined by Allen and Fee [2010] where the authors discussed the reasons for the failure to achieve significant improvement and the possibilities for applying real-time monitoring technologies in land transport activities. Fit-for-purpose in this case is defined as: a "shift towards a ded-

icated function" with appropriate tools, software and expertise to manage every journey from planning phase till the final safety delivery [Allen and Fee, 2010].
According to Laskar [2017], fit-for-purpose has also an important role to play in the effective/successful management of change in process industry. It is defined as a wisely designed process that can avoid "future losses" generated from present changes with the emphasis on a welcoming altitude towards unexpected changes. It can be noticed that there is strong pattern taken shape that in process industry, although the definitions of fit-for-purpose differ in different management areas, they all share very high emphasis on the prevention of losses.

Healthcare Industry

Healthcare industry also turned out to be an active user of the term fit-for-purpose in this bibliometric analysis. The use of fit-for-purpose or fitness-for-purpose can be noticed in many articles published in the field and defined in many management areas [Langlois et al., 2016; Bhark and Dehghani, 2014]. With regard to the area of policy-making, it was advocated by Bhark and Dehghani [2014] that the policies should be made in a approach that is fit for purpose. The authors indicate that the healthcare-related policies should be developed interventions that are "tailored" to the specific context and policy needs". This definition given by Langlois et al. [2016] is in line with what is advocated in the field of project management in recent two decades, which has been discussed in the research in section 1.1. Two factors of great importance in achieving policy making approach as such are pointed out by the authors: "iterations" and continuous engagement of researchers and policymakers as "different needs in policy-making cycles require adapted processes and knowledge" [Langlois et al., 2016].
Also according to Langlois et al. [2016], collaboration of organizations or multiple sites within one organization should also be given "due considerations" to better boost the improvement of the policy making and implementation in healthcare industry. The better and more frequent sharing of knowledge and information can deliver stronger support to the process "from evidence to policy". In authors' view, in this way the policies are made by policymakers with clear and accurate view of the situations, thus can be deemed fit-for-purpose.
The role of fit-for-purpose in risk management of healthcare industry is defined by Dearfield et al. [2014]. The authors state that "a risk assessment is ideally 'fit for purpose' and directly applicable to risk management issues of concern". The definition given by the authors is that the assessment of risks should be reflective to the requirements of risk management, for the purpose of properly informing regulatory or non-regulatory decision. In simple terms, the risk assessment should be conducted by personnel who are familiar with the specific utility and approaches. It was pointed out that the lack of understanding could have negative impact on the decisions made by the risk manager [Bhark and Dehghani, 2014]. Besides, fit-for-purpose risk assessment should be based on a uniformed platform where the use of terminologies of would not cause misinterpretation [Bhark and Dehghani, 2014].

Therefore, fit-for-purpose risk assessment requires effective communication among the assessment personnel, risk manager and the stakeholders.

Food Industry

The third most active user of the term fit-for-purpose found is the food industry. The usage of this term in food industry is not as well-established as in the process and healthcare industry where fit-for-purpose have commonly recognized definitions in many management areas. The occurrences of fit-for-purpose mainly were found in the risk management and management of uncertainties. The role of fit-for-purpose in risk management is defined by Devos et al. [2019], it was stated that "In this challenging era where scientific advice on food safety has never been in greater demand, risk managers should effectively navigate the interplay between facts and values and be able to rely on robust and fit-for-purpose risk assessments to aid them", where the "interplay" refers the compounded effect of science, risk assessment and the management of the risks. It is quite clear that the role of fit-for-purpose risk management in health industry and food industry have very high level of similarity: the assessment of risks should be responsive to the needs, effective/robust to aid the decision-making of the risk manager. And more importantly, it should not be operated "at a distance" from the values of the stakeholders to reduce potential resistance and misinterpretations [Devos et al., 2019; Langlois et al., 2016].
With regard to the management of uncertainties in food industry, [Lyn et al., 2005] states that each routine protocol has its optimal level of uncertainty and this optimal level should ideally be reached in protocols so that the expected financial loss can be minimized. The fit-for-purpose management of the uncertainty is to estimate it using sampling and analytical procedures. And the system of these procedures is called "optimized uncertainty" method by the author. The practices that either reduce or increase the level of uncertainty to reach the optimal level are deemed fit-for-purpose by the author [Lyn et al., 2005]. It is notable that the role of the fit-for-purpose here is again focused on the prevention of the losses.

Transport/Infra Industry

The role fit-for-purpose plays in transport/infra industry is rather limited compared with the other industries discussed above. The use of fit-for-purpose was only found in the management of large engineering assets. The defining article is in the industry is produced by Shah and Axelsen [2016]. The term fit-for-purpose was touched upon in this paper where the author made the following statement: Local Authorities invest large proportions of budgets in infrastructure assets for "maintenance, upkeep and to ensure they remain fit for purpose". [Shah and Axelsen, 2016]. In simple terms, fit-for-purpose in asset management or maintenance management refers to the status of the the object assets that the desired functionality and cost-effectiveness can be continuously delivered.

Table 4.6: Fit-for-purpose lessons from in different industries.

Industry	Management Area	Role of "Fit-for-purpose"	Source
Process	Operation Mgmt	Reconnection of "urgency to build", "knowledge transfer" and "changes". Good use of previous experience and case histories.	[Singh et al., 2010]
	Reservoir Mgmt	Set of best practices that can best guide the modelers to accurately simulate the flow in order to support the loss prevention	[Bhark and Dehghani, 2014]
	Interface Mgmt	Common automation language, appropriate interface protocols and a disciplined technology road-map.	[Geehan and Zamora, 2010]
	Safety Mgmt	A function equipped with appropriate tools, software and expertise from the planning to the delivery.	[Allen and Fee, 2010]
	Change Mgmt	A wisely designed process that can avoid future losses with a welcoming attitude towards unexpected changes.	[Laskar, 2017]
Healthcare	Policy-making	Policies should be developed interventions "tailored" to the specific context and policy needs. Iterations and continuous engagement of researchers policymakers.	[Langlois et al., 2016]
	Collaboration	"Due consideration" should be given to collaboration of organization or multiple sites within one organization. More frequent knowledge sharing can deliver stronger support to the process "from evidence to policy".	[Langlois et al., 2016]
	Risk Mgmt	Assessment of risks should be reflective of requirements of risk manager to inform sound decisions. The personnel should be familiarized with the utility and approaches. Risks are assessed and reported using uniformed terminologies among assessors, managers, and stakeholders.	[Dearfield et al., 2014]
Food	Risk Mgmt	"Risk managers should effectively navigate the interplay between facts and values." Risk assessment should not be operated "at a distance" from the stakeholders.	[Devos et al., 2019]
	Uncertainty	The optimal level of uncertainty should ideally be reached to minimize the expected financial loss. Fitness is reached when selected sampling practices increase or decrease uncertainty to the optimized level.	[Lyn et al., 2005]
Transport	Asset Mgmt	The desired functionalities and cost-effectiveness of the object asset can be continuously delivered.	[Shah and Axelsen, 2016]

These fit-for-purpose lessons for project management that were gained from revisiting the important articles are summarized and presented in the Table 4.6. These methodologies and practices discussed in the table have potentials to be incorporated into the management of projects in to varying degrees. Although the term fit-for-purpose does not have a interlinked role across industries and management areas, the link between fit-for-purpose and project management can still be established based on the similarities of roles fit-for-purpose play. In the following Sub-section 4.4.2 a state of the art definition of fit-for-purpose project management approach is formulated through incorporating these lessons into the findings of the step II of the bibliometric analysis (Section 4.3).

4.4.2 Defining Fit-for-purpose Project Management

As was concluded previously in section 4.2, there is not a interlinked meaning or definition of fit-for-purpose that are widely recognized and accepted across different industries and management fields. However, after revisiting the articles of interest, some interesting patterns (similarities) that are applicable across industries haven been identified among a large number of definitions and interpretations of this term. These patterns are:

- Decision-makers should make good use of previous experiences, case histories, and collaboration among multiple sites to achieve better knowledge and information transfer [Singh et al., 2010; Langlois et al., 2016].

- Estimating and predicting activities should still be considered in the change management process to minimize expected losses [Bhark and Dehghani, 2014; Laskar, 2017].
- Interventions and adaptations are needed to tailor the decision-making to the specific context and needs [Langlois et al., 2016].
- Risks should be assessed and reported using uniformed terminologies among users. And good risk management should be conducted close to stakeholders' values [Dearfield et al., 2014; Devos et al., 2019].
- Mangers should wisely select the appropriate tools, techniques and expertise throughout the life-cycle of a programme [Allen and Fee, 2010].

The main findings gained in the second step of this bibliometric study where this research looked into project management and its adaptations are as follows:

- Projects should be recognized as "social process" where complex reality and human interrelations play dominant roles [Small and Walker, 2011; De Bruijn et al., 2010].
- Projects requires less formality in control in dynamic and complex environment, thus should be defined and shaped by available resources and values over predefined objectives [Nguyen et al., 2018; Jerbrant and Karrbom Gustavsson, 2013; Chin et al., 2012].
- Management of projects should be open to adopting proven methodologies from other disciplines [Nguyen et al., 2018; Li et al., 2018].
- The inclusion of hybrid project management approach can give the teams better chance to improvise and fit certain needs [Gemino et al., 2020; Špundak, 2014].
- From the organizational level, project portfolios or programmes should be managed by complex adaptive systems to align the formulation and implementation of the strategies dynamically [Ritson et al., 2012; Jerbrant and Karrbom Gustavsson, 2013].

Therefore, the link of the two concepts fir-for-purpose and project management is built through incorporating the the lessons from other management areas into various forms of adaptations in project management. This research hereby gives a definition of fit-for-purpose project management to specify this link and answer the sub-question II How are "fit-for-purpose" and "project management" linked in research?.

Fit-for-purpose Project Management is set of wisely selected adaptive methodologies, tools and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes. An unique objective of project management approach as such is the alignment of formulation and implementation of strategies.

4.5 CHAPTER SUMMARY

The main objective of this stage of the research is to build the connection between two concepts: Fit-for-purpose and Project Management, thus answer the sub-question II How are "fit-for-purpose" and "project management" linked in research? with the help of bibliometric analysis tool Citespace. This analysis was conducted in a three step approach, with the Step I looking into the term "fit-for-purpose" in management research in general, step II exploring term "project management" and its various forms of adaptations, and the step III bringing findings from previous steps across to build this link. The look of fit-for-purpose project management in literature is therefore depicted.

Step I was conducted on the basis of searched results retrieved by query: *-(TITLE-ABS-KEY ("fit for purpose") OR TITLE-ABS-KEY("fitness for purpose") OR TITLE-ABS-KEY ("fit-for-purpose")) AND (TITLE-ABS-KEY ("* management") OR SRCTITLE ("* management")).* 1215 documents were found by this search and their distribution over last 35 years took on a strong upward trending look. Because of the weak inter-linkage of different management areas, the result of the co-citation analysis presented a rather loosely synthesized co-citation network with only 6 clusters identified across many management areas. The keyword and term analysis did provide more valuable insights to this body of knowledge. It was found that the term fit-for-purpose has a few important roles to play in the oil & gas industry(also called process in the context of WB3501 Fit-for-purpose Project Management), the most frequently cited of which is the fit-for-purpose management of change system. Fit-for-purpose was defined as a wisely designed process that can avoid future losses generated from present changes. Also, the appearance of fit-for-purpose was also found in risk management and quality management(quality control and assurance) of a few other industries. But a widely accepted role of fit-for-purpose has not yet been developed in the literature. The patterns taken shape in different roles of fit-for-purpose identified in this research are:

- Experiences, case histories, and collaboration among multiple sites are important tools to achieve better knowledge and information transfer.
- Traditional tools such as estimating and predicting activities are considered important in the change management process to minimize expected losses.
- Interventions and adaptations are always needed to tailor the decision-making to the specific context and needs.
- Risks should be assessed and reported using uniformed terminologies among users. And good risk management should be conducted close to stakeholders' values.
- Mangers should wisely select the appropriate tools, techniques and expertise throughout the life-cycle of a programme.

The dataset of step II is delivered by search query: *- (TITLE-ABS-KEY ("project management")) AND (TITLE-ABS-KEY ("adapt*") OR TITLE-ABS-KEY ("contingency") OR TITLE-ABS-KEY ("flex*")),* which consists of 2528 documents from the past 20 years. The co-citation analysis on this data-set did convey more promising patterns. The core statements of 5 articles with citation burst history could well depict

the development of this body of knowledge. The early highly cited articles (early 2000s) focused more on the obstacles encountered in project management such as complexity, social processes, and change, etc. The later highly cited literature (late 2000s and 2010s) logically put more concentration how to cope with these obstacles and how to create more value on top of them. Combined with the results from keyword and term analysis, the findings of this step are concluded as follows:

- Projects have increasing recognition into "social process" where complex reality and human interrelations play dominant roles.
- Formality in control is less expected in dynamic and complex environments. Instead, Projects should rather be defined and shaped by available resources and values over predefined objectives.
- Openness to adopting new methodologies from other disciplines is expected.
- The hybrid project management approach can give the teams better chance to improvise and fit certain needs.
- Project portfolios or programmes should be managed by complex adaptive systems to align the formulation and implementation of the strategies dynamically.

Step III firstly revisited the top cited and citing articles of the first two steps, in order to learn what roles fit-for-purpose play in different management areas in those industries. It turned out that the process industry is a very active user of term fit-for-purpose. This concept of fit-for-purpose has already been identified in many management areas such as operation management, change management, risk management, safety management and interface management. Other involved industries in the articles are the healthcare industry, food industry and the Infra/transport industry with different levels of development in making use of fit-for-purpose. Secondly, through incorporating the fit-for-purpose lessons from other management areas into the ones concluded from project management adaptations, this research tried to define the Fit-for-purpose project management approach, which is formulated as:

A set of wisely selected adaptive methodologies, tools and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes. An unique objective of project management approach as such is the alignment of formulation and implementation of strategies.

5 CONTENT ANALYSIS: 8 YEARS OF FIT-FOR-PURPOSE

Having sketched the look of fit-for-purpose project management in the literature in chapter 4 through a bibliometric analysis, this research looks into this concept from a practical perspective. As was indicated in the literature study in section 2.4.2, the assignments from the course WB3501 Fit-for-purpose Project Management are written with the inspirations brought by project management practitioners from various industries. These articles are therefore of important values from a practical point of view. In this chapter, via the visualization tools provided by Atlas TI, a content analysis on the assignments from the past 8 years is conducted to investigate what could be learned from these essays regarding management of projects during this period and practical implications to the industries that have been touched upon in the course. This chapter is divided into 3 sections: an overview of the presenters in each industry, along with the description of the dataset, are given in Section 5.1. The analysis and discussion over the trends identified in the dataset is in Section 5.2. At last, in Section 5.3, a brief conclusion of the findings the links to the findings of the bibliometric analysis in Chapter 4 are presented.

5.1 OVERVIEW: A DEVELOPING CONCEPT

This section looks into the changes in the context of the production of the essays, namely the lineup of the lecturers and the prescribed list of hypotheses as they shape a large extent of the preference and choice of the students. An overview of the lectures in each industry is presented in subsection 5.1.1 and the prescription of hypothesis and its clustering are introduced in the subsection 5.1.2. The overview of the dataset and the coding logic of this content analysis is explained in subsection 5.1.3.

5.1.1 Overview of the Presenters

Before diving into the essays, This content analysis first looked into the the context of this course in the past 8 years, which includes the composition of the lecturers and prescribed list of hypothesis. In this 8 year period, the course WB3501 Fit-for-purpose Project Managementhas witnessed a number of changes in terms of the composition of the lecturers and industries. In the meanwhile, there are also continuities found in part of the content analysis. These are presented in more detail next. The line-ups of the presenters in this 8 year period are shown in Table 5.1 and Table 5.2.

Table 5.1: The overview of the presenter line-ups in course WB3501 from the academic year 2013-14 to 2016-17.

Academic Year	Industry	Client (Company)	Contractor (Company)
2013-2014	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Maarten de Jong (Max Bogl)
	Process	Rob Kretzers (SHELL)	Wim Berendsen (CB&I)
	ICT	Peter Wijngaard (ATOS)	Ron Vinken (KPN)
	Manufacturing	Willie Wienholts (Siemens)	S. Dekker (Ballast Nedam)
	Small Enterprises	V. Scholten (SUNURU)	J. Kranendonk (SUNURU)
	High-Tech	Joost Smits (ASML)	Pieter Janssen (ProDrive)
2014-2015	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Luke van der Steen (Max Bogl)
	Process	Rob Kretzers (SHELL)	Henk Koese (CB&I)
	ICT	Peter Wijngaard (ATOS)	Martin Grobbe (KLM)
	Manufacturing	Willie Wienholts (Siemens)	S. Dekker (Ballast Nedam)
	Small Enterprises	Victor. Scholten (SUNURU)	Jan. Kranendonk (SUNURU)
	High-Tech	Joost Smits (ASML)	Herman Mooi (ASML)
2015-2016	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Leon Soulier (Siemens)
	Process	Nick Smallwood (SHELL)	Henk Koese (CB&I)
	Construction	Willie Wienholts (Siemens)	Nico Verburg (VBMS)
	Manufacturing	Franois Spoto (ESA)	Heinz Sontag (Airbus)
	Food	Astrid Vasbinder (FrieslandCampina)	Erik DiamondPremier Tech)
	High-Tech	Joost Smits (ASML)	Pieter Janssen (ProDrive)
2016-2017	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Arjen Hartman(Siemens)
	Process	Rob Kretzers (SHELL)	Henk Koese (CB&I)
	Construction	Willie Wienholts (Siemens)	Jeroen Bongers (Dissinct)
	Manufacturing	Franois Spoto (ESA)	Gunn Schweickert (Airbus)
	Food	Mattes Kruize (FrielandCampina)	Robert Leemreize (Tebodin)
	High-Tech	Herman Mooi (ASML)	Martin van Acht (Tegema)

Table 5.2: The overview of presenter line-ups in course WB3501 from the academic year 2017-18 to 2020-21.

Academic Year	Industry	Client (Company)	Contractor (Company)
2017-2018	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Froukje de Haan (Thales)
	Infra/Transport	Gerard Guertjents (Schiphol Airport)	Richard Gammon (AECOM)
	Process	Rob Kretzers (SHELL)	Henk Koese (CB&I)
	ICT	Harmen Hummel (NS)	Erik van Daalen (KWD)
	Food	Mattes Kruize (FrielandCampina)	Robert Leemreize (Tebodin)
	High-Tech	Herman Mooi (ASML)	Martin van Acht (Brainport)
2018-2019	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	Christiaan Verhoeven (Alstom)
	Shipbuilding	Mattes Kruize (Van Lent)	Maarten Bos (Voogt)
	Process	Rob Kretzers (SHELL)	Filippo De Pace (McDermott Intenational)
	ICT	Harmen Hummel (NS)	Patrick HoltHuizen (KWD)
	Food	Jaap de Slegte (FrieslandCampina)	Pieter HollestelleFluor
	High-Tech	Herman Mooi (ASML)	Karin Rosch (VDL)
2019-2020	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	John Marijnissen (Alstom)
	Shipbuilding	Mattes Kruize (Van Lent)	Arnoud van der Sluis (Voogt)
	Process	Rob Kretzers (SHELL)	Filippo De Pace (McDermott Intenational)
	ICT	Harmen Hummel (NS)	Erik van Daalen (KWD)
	Food	Jaap de Slegte (FrieslandCampina)	Pieter HollestelleFluor
	High-Tech	Herman Mooi (ASML)	Karin Rosch (VDL)
2020-2021	Infra/Transport	Gerard Scheffrahn (Noord-zuidlijn)	John Marijnissen (Alstom)
	Shipbuilding	Mattes Kruize (Van Lent)	Maarten Bos (Voogt)
	Process	Rob Kretzers (SHELL)	Marco Eykelenboom (Fluor)
	ICT	Harmen Hummel (NS)	Erik van Daalen (KWD)
	Food	Remko Bakker (FrieslandCampina)	Pieter HollestelleFluor
	High-Tech	Herman Mooi (ASML)	Karin Rosch (VDL)

As is suggested in these two tables, each year during this period the course WB3501 Fit-for-purpose Project Management had 12 presenters to teach the lectures from six industries and the composition of the industries has been slightly changed. For example, as can be seen in Table **??**, the presence of ICT industry and small enterprises was replaced by the construction industry and the food industry in academic year 2015-16 and 2016-17.
The guest lecturers from the infra/transport have not changed greatly in these years, especially for the lineup from client side. Gerald Scheffrahn from the Noord-zuidlijn has been involved in teaching and sharing every year of this course and the project case has not been changed yet. From the contractor side, the lecturers has been changing more often: 7 lecturers had made their appearances in 8 years.
As can be seen, the line-up of the presenters in the process industry has also been rather consistent and stable, with both Rob Kretzers (SHELL) and Henk Koese (CB&I) having attend more than half of the duration.
The ICT industry was involved in the course when it was first launched and the year after (2013-2015). And then in the following two years, this industry-related content was not involved. Its But it has come back into the picture since 2017 and lecturers from NS and KWD have taken the client side and the contractor side respectively.
The food industry started to participate in this course since academic year 2015-16. As is suggested in Table 5.1 and Table 5.2, although FrielandCampina has always been the actor from the client side, the change of the lecturers in both client and the contractor sides is comparably more frequent than other industries.
The shipbuilding industry is the latest targeted industry that came into the picture, making its first appearance in 2018-19, as is suggested in Table 5.1 and Table 5.2. The client side has not witnessed a change in the lecture while there has been one change in the presenter already from the contractor side.
The Hi-tech industry is one of three industries that has had a perfect attendance in this 8-year period (Infra, Process & Hi-tech). The lineup of the client side has been rather stable from the client side and the one of the contractor side have had more changes. The co-appearance of Herman Mooi (ASML) and Karin Rosch (VDL) has been quite stable in the most recent three years.

5.1.2 Prescribed Hypothesis and Its Clustering

Apart from the lecturers who have taught and shared in these years, what provided for students to choose is also an important factor that shapes a certain part of how the essays and their interpretations would look like. Although students were free to choose the aspects and formulate their own hypothesis, it was noticed that still the majority of the hypothesis and sub-questions were directly taken from the prescription, or were made small changes to the prescribed ones. These prescriptions were clustered into 12 aspects through coding based on the topic(s) that it addresses, the result and its number of occurrence is presented in Table 5.3. These aspects are used as the initial codes for the content analysis on the body text of the essays. Also in Table 5.3, the total count of the codes is 62 rather than 50.

Table 5.3: Result of the clustering of the prescribed list.

Aspect	Count
Adaptation	15
Change	2
Complexity	3
Contract	2
Front-end	2
Lessons-learned	1
PM	11
Risk	3
Size	14
Stakeholder	1
Team	5
VIP's	3
Totals	**62**

This over-counting is due to the fact that some of the questions in fact touch upon more than one of the topics and were applied with multiple codes. These aspects (codes) are explained as follows:

Adaptation: This aspect consists of hypothesis or sub-questions that focus on adapting and adjusting project management activities to fit the unique needs of projects. For instance, one of the most often proposed hypothesis investigates whether certain project management activities can be skipped.

Scope Change: This code group is a grouping of hypothesis exploring scope changes in the essays. Typical questions asked of this aspect are attitudes towards scope changes, actions when scope changes occur and contextual factors for a welcoming attitudes towards changes etc.

Complexity: This code is applied on the hypothesis about complexity of projects and how complexities are dealt with in the different industries. Under this category, complexity is also considered as a potential trigger to adapt the project management activities.

Contract: This code is applied on the hypothesis that address different contracting strategies in project management. Early involvement of contractors/suppliers is an important topic discussed in this aspect throughout the 8 years period. Also, questions regarding incentives mechanisms in contracts and extent of subcontracting can also be found in the code group.

Front-end: Front-end engineering, one of most important topics in applying fit-for-purpose methodology in project management, non-surprisingly takes up an aspect in the analysis of essays. Hypothesis and sub-questions exploring how front-end loading/engineering activities are implemented and how they are adapted to project needs are applied with this code.

Lessons-learned: As was concluded in subsection 4.4.2 of the bibliometric analysis conducted in Chapter 4, learnings plays a very important role in applications of fit-for-purpose project management. This aspect is a grouping of explorations into project learnings. Frequently asked questions aims at investigating in which ways and what time the lessons should be collected and applied.

PM (project manager): As the title suggests, this aspect discusses the role of project managers in the field of applying fit-for-purpose project management. The main focus of this aspect is centered on important competences of a project manager who masters project success.

Risk Management: Risk management stood out again in the essays as one of most frequently selected aspects in defining minimum required fit-for-purpose. Questions asked regarding risk management are centered around attitudes towards risks in the targeted industries and discussion over adaptations in risk management depending on complexity, size or other factors.

Size: This aspect is a grouping of hypothesis or sub-questions aiming at drawing comparison of different ways of managing projects when the sizes differ. On one hand, it explores the intensity or necessity of certain activities in small projects. For example, some hypothesis are formulated as "In small projects could certain activities be skipped?". On the other hand, hypothesis about the practice of decomposing large projects into small ones are also applied with this code.

Stakeholder: As was concluded in Chapter 4, the appropriate management and engagement of stakeholders is of increasing importance in order to achieve project success, as stakeholder satisfaction has been widely considered as essential success factor, being of equal or sometimes higher importance to the "Golden Triangle" [1] Stakeholder management is the focus of all hypothesis and sub-questions applied with this code.

Team: This aspect has a predominant focus on the management of project teams, which is another aspect in managing people discovered in the essays, next to Contract and Stakeholder. Typical topics touched upon by hypothesis of this aspect are fit-for-purpose selection and composition of the project teams and management activities to properly manage the team members, in order to maximize the productivity and the chance of project success.

VIP's (Value Improving Practices): This aspect consists of hypotheses and sub-questions defined to find out whether and how VIP's are applied in the targeted industries, and more importantly, whether or not these practices in fact improve value of the projects. Also, the optimal phase and type of projects for the VIP's is explored.

5.1.3 The Dataset & Coding Logic

The dataset is composed of the assignments from the course WB3501 Fit-for-purpose Project Management from last 8 years, in which students,in groups of 6, are asked to define what is the fit-for-purpose approach of managing projects based on the insights given in guest lectures. The detailed information about the setup and core ideas of the course WB3501 can be found in in the literature review in section 2.4.2. Table 5.4 shows the distribution of the articles to be analyzed. In total 117 articles have been found and collected for this stage of this master research (content analysis).
With the help of the coding tool of Atlas TI, this research coded the hypotheses and sub-questions in all these essays according to the aspects/code defined in subsection 5.1.2, in order to obtain the variation in the degree of intensity with which the aspects have been discussed over the years. The results are shown in Figure 5.1.

1 Also known as "Triple Constraints" in traditional project management approach: Scope, Cost, and Time, more commonly with quality as a fourth [Project Management Insititue, 2017].

Table 5.4: Distribution of articles retrieved.

#	Academic year	# of articles retrieved
Group1	2013-2014	20
Group2	2014-2015	13
Group3	2015-2016	14
Group4	2015-2016	14
Group5	2017-2018	14
Group6	2018-2019	13
Group7	2019-2020	14
Group8	2020-2021	15
	Total	117

	13-14 (20, 249)	14-15 (13, 168)	15-16 (14, 174)	16-17 (14, 120)	17-18 (14, 181)	18-19 (13, 145)	19-20 (14, 155)	20-21 (15, 178)
Adaptation: hypothesis 61					12	11	12	11
Change: hypothesis 59	3	5	6	14	8	8	10	3
Complexity: hypothesis 37	5			3	6	9	3	8
Contract: Hypothesis 14		1	7		2		2	
Front-end: hypothesis 25	9	6	5	1		1	1	
Lesson learned: hypothesis 17	1	2	6		1	2	1	3
PM:hypothesis 70	14	8	1	6	4	8	6	12
Risk: hypothesis 29	4	4	2	4	1	4	6	1
Size: hypothesis 54	1	1	1	7	4	9	4	13
Stakeholder: hypothesis 28	4	5	3	2	8	2	3	
Team: hypothesis 67	18	7	9	7	7	4	8	2
VIP's: hypothesis 16		2	1	1	2		2	5

Figure 5.1: The distribution of the aspects appeared in hypothesis of the essays.

In this table, the round icons on the right side of the column #1 indicates the number of quotations, which in this case counts the number of the total hypothesis applied with the codes in all year groups (document groups). In row #1 of this table, the square icon to the left of the box represents the number of documents and the round icon in the right side in counts the number of hypotheses made within this year group.

The corresponding statements to these hypothesis and sub-questions within these aspects across all targeted industries are coded with codes in another code group named POVs (Points of views) as the majority of the statements are made based on interpretations of the guest lectures and interviews of the lecturers. And, the statements made regarding a specific industry over an aspect are applied code following the "Industry-Aspect" format. Therefore, for each aspect of project management, there are two types of links connected to it. An example can be found in Figure 5.2. As is suggested in this figure, in this essay a hypothesis was formulated regarding the management of the scope changes. Points made by guest lecturers from Shipbuilding, Infra/Transport, food, ICT, Process industries are found discussing this topic in this essay. And these points are concluded by the statement coded with "Change: POVs".

The identification of the trends in Fit-for-purpose Project Management is conducted based on the findings from observing the aspects from one year-group to another, which is discussed in the following sections.

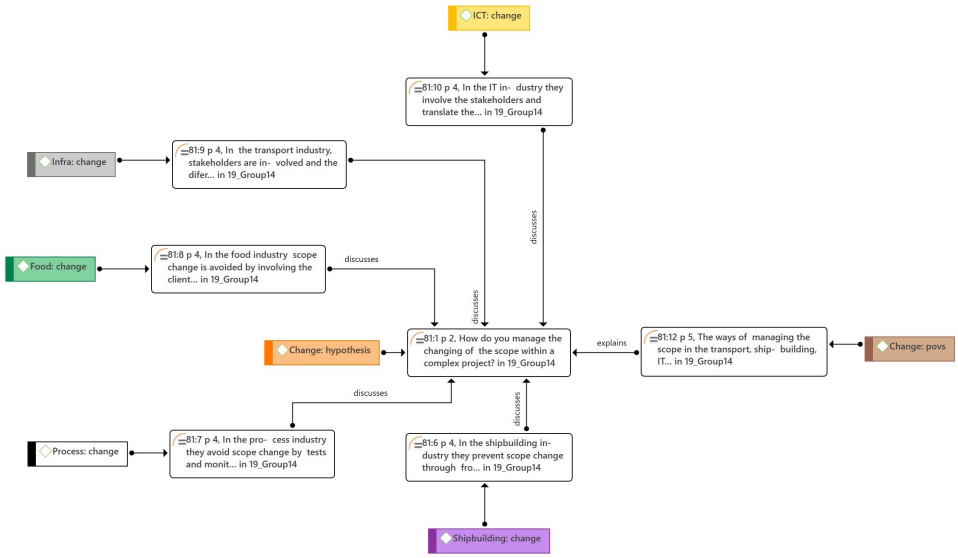

Figure 5.2: An example of the coding logic of the content analysis.

5.2 EVOLVING PROJECT MANAGEMENT TRENDS IN THE INTERESTS OF THE STUDENTS

In this section, the trends in the interests of the students in project management are explored with the input from the content analysis. These trends are most common understanding of certain aspects (explained in Subsection **??**) that have been taking shape or getting more focused in the past 8 years. Based on the intensity of being discussed throughout this 8-year period, aspects are divided into three groups: Upward-trending aspects, downward-trending aspects and returning-trending aspects along with other small aspects, which are to be discussed in Subsection 5.2.1, 5.2.2, and 5.2.3 respectively.

5.2.1 Upward-trending Aspects

This subsection explores the learnings evolved in project management aspects that have been gaining increasing focus of the students during this 8-year period. As suggested in Figure 5.3, these aspects are Adaptation, Scope Change, Complexity, Risk, Size and VIP's and their intensity of being discussed in the essays shows an up-going trend.

Complexity, Size, Risk Adaptation: A Widely Recognized Interplay

It was noticed in the analysis that there's a pattern taking shape from the interpretations of the lectures given by students: the complexity, size and risk of a project has very high influence on the learnings and adaptions of project management. Lager size logically adds up to the overall project complexity and risks and also has direct influence on the application of project management activities. The most favorable strategy to cope with large size and high complexity is to decompose project into smaller parts, which is however not quite a project dependent method.

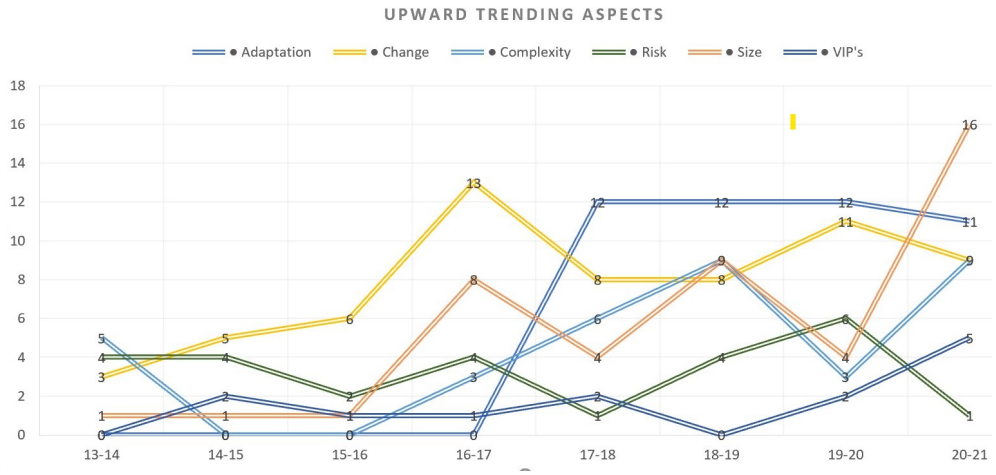

Figure 5.3: Upward-trending aspects found in the essays.

A large project is therefore treated as grouping of mini projects to the ease of managing. However, simply decomposing might bring more trouble to the project as it increases interfaces, uncertainties and the number of stakeholders. Many examples of backfired decomposition of large projects were given in the lectures. The interplay of these three aspects on the adaptation is visualized in a network form in Figure 5.4.

According to the interpretations of students in the essays, the project managers intuitively expect to decompose in the situations where the interplay of size, risk and complexity kicks in. In this way, to avoid any potential backfire arising from this decomposition, the interface management should be treated with extra care and as early as possible in a project so that the project manager and the team would not be easily drawn into the details and lose the overview of the project. The project management activities applied on the decomposed smaller projects should be scaled and sized to the needs and the smooth delivery at the interfaces. What was agreed in the essays is that the evaluation of the complexity and risks of the decomposed projects can never been skipped. There a few tools that have been agreed to be effective in aiding this evaluation by the practitioners across the industries in the front-end. An important example for the evaluation of the project complexity is the "TOE Framework" proposed by Bosch-Rekveldt et al. [2011], which helps the decision-makers identify complexity elements from three categories: technical, organizational and environmental. Also, Multi-criteria Decision Aid (MCDA) and criticality matrix are also considered as helpful by many guest lecturers in providing valuable insights the overview of the large and complex projects.

Interestingly, regarding the management of risks, it is found that the level of adaptations in risk management is negatively correlated to the increase of the project size and complexity. Standard risk management methodologies such as risk register and scenario simulation are more likely to be used instead of investing time and expenses to create project-dependent ones which aim at identifying and mitigating all threats in situations where complexity and the size play key roles as it is almost impossible to create risk-free environments.

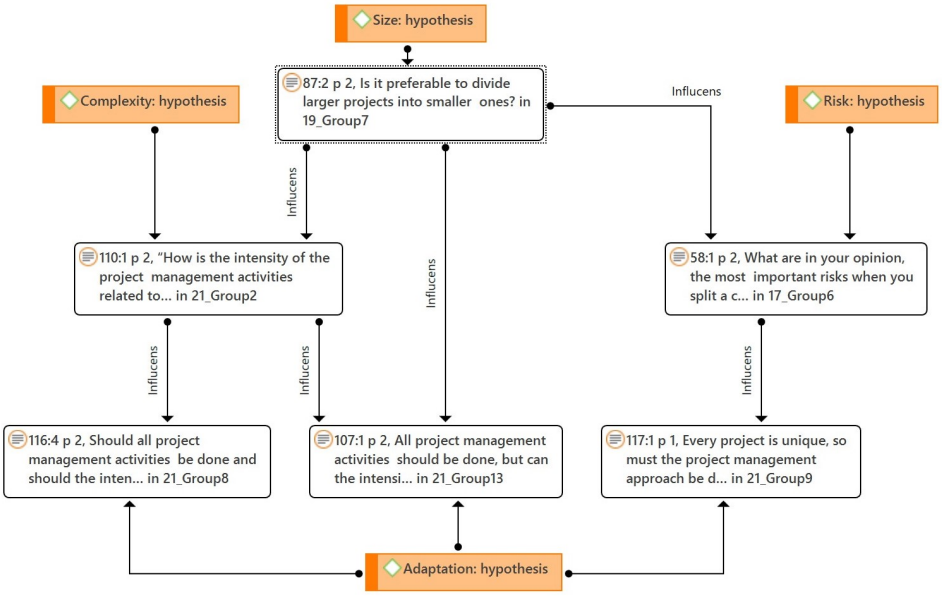

Figure 5.4: The interplay influence of size, complexity and risk on adaptations in project management.

Also, having a risk database that can be shared among the parties could be a very rewarding practice. A prediction made by Group11 in 2014 that risk acceptance would become more welcomed in the future as the overall trend of the complexity and size is up-going. And this was agreed in year 2017 and 2019 by pointing out an important logic of managing risk that mitigation has cost and should not outweigh the cost of acceptance. The process industry makes an exception here as safety is always the dominant driver of the projects in the industry and safety risks should not be compromised to cost considerations.

Scope Change and VIP's: Start to Be Embraced in the Front-end

The intensity of the discussion over scope change and VIP's has also increased noticeably over the years as is suggested in Figure 5.3. According to the contents that explored these two topics, although they are drawing the attention of the students increasingly in these years, the conclusions drawn on these two aspects has not shown many major changes, but a few differences. As for the scope change, almost every essay, in which this topic was touched upon, drew similar conclusions with the following statement: "Scope changes are undesired and should be prevented as much as possible" in the first 4 years(2014-2017). The sentiment of the lecturers towards scope changes is in general rather negative. Many of them, especially the ones working in big organizations, made it quite clear that the scopes should be frozen after the final investment decision is made or the specifications of the projects are agreed upon by the customers. This however does not stop changes from occurring at all. The most preferred strategy to prevent changes by them was to conduct active stakeholder analysis and involve them during the projects. Along with this very strategy, applying stage gates is believed

to be helpful in providing time and space to steer the projects and incorporate changes. This rather negative attitude towards changes is to some extent contradicting with what was concluded in the Chapter 4 that fit-for-purpose project management treat changes and uncertainties with a welcoming attitude. However, in the recent four years, there has been a slight difference evolved in the attitudes towards scope changes. The statement of embracing changes was made for the first time in 2018 and appeared in majority of the conclusions in 2021. Scope changes are only embraced in the earlier phases of the projects such as the front-end. This is because the influences on cost and time are still low. In the front-end, scope changes are welcomed and the companies are willing to invest time and money to incorporate the updated needs and values of the stakeholders into projects in the form of scope changes. As soon as the execution commences, the scope should be frozen and managed carefully. Even in the High-tech industry with fast-changing and developing nature, scope changes are not always welcomed during the execution, although most of the projects put high empathises on the flexibility to incorporate dynamic requirements.

With regard to applications of the VIP's, there was no luck exploring patterns or trends evolved from the content of the database. Based on the understandings of the students, it was found that most of VIP's are still conducted in earlier phases, especially in the front-end and that the client tend to be taking dominance in applying these practices. This is considered logical due to the fact that the client/initiator plays the leading role in the front-end phase in majority of the projects [Newman et al., 2016]. The VIP's that were considered valuable to the project managers are mainly the ones that helps communications both inter and intra different parties. These practices are applied by the project managers mainly in order to build effectively-formed project teams and engage different stakeholders(contractors, suppliers and end-users etc.). A widely recognized contextual factor for the VIP's to in fact improve the value is that they should be applied in the right types of the project instead of doing VIP's just for the sake of doing. The type that stood out in benefiting from VIP's are the projects requiring massive volume of communication in the earlier stages. Also, according to the lecturers, the VIP's that have been actively practiced are limited to team building workshops, Do's and Don'ts, and project learning sessions. These in fact only cover a small portion of all recognizable VIP's [TU Delft, 2020a]. As a fairly new concept to project management originated from the process industry, analyzing its feasibility of application in other industries should be conducted based on larger sample spaces and empirical data.

5.2.2 Downward-trending Aspects

In this subsection, the project management aspects with downward trends in the attention of students in the past 8 years are shown. As suggested in Figure 5.5, these aspects are contract, front-end, lessons learned, stakeholders, success and teams. This subsection looks into the content that touched upon these aspects and gives reasons for their decrease in drawing the attention of students in these years.

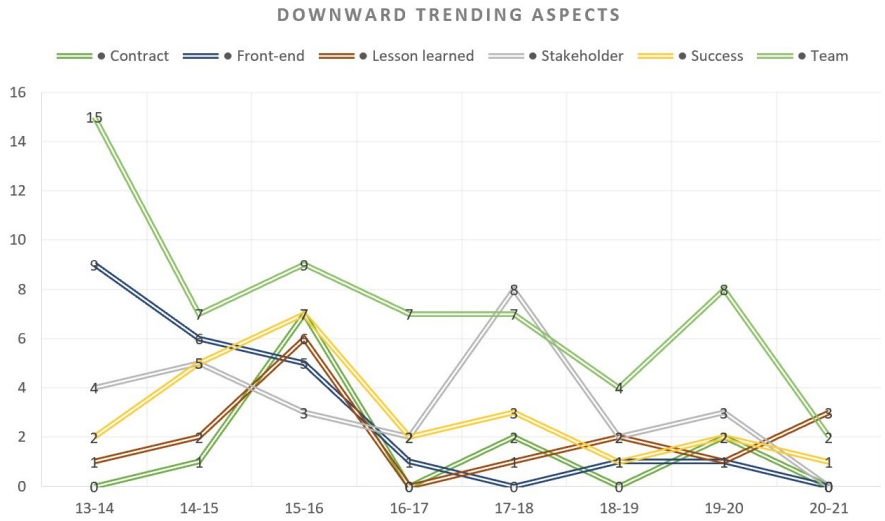

Figure 5.5: Downward-trending aspects found in the essays.

The Front-end: "False Positive" Loss in Attraction

Front-end development is not a new concept in the field of project management. And, several essays in 2020 indicated that almost all the companies involved in this course have established very thorough organizational specific processes to load the front-end of their projects. In the line chart in Figure 5.5, a significant decline can be noticed after academic year 2016-2017, before when it had been one of the most chosen aspects of the students. The content of the essays suggested that in the first four years, the discussion over front-end development was centered around a few topics such as various forms of designing, the early involvement of suppliers and contractors, and team building practices. Along with these focuses considered across all industries, each involved industry would also load their front-end with several industry-specific focuses, which are concluded as follows:

- Infra/Transport: Legal researches and preparations such as conformation with development policies and land-use plans.
- Process: Tailoring and adjusting trials and testings to need of the product to be developed.
- Hi-tech: Subdividing the tasks and responsibilities; Internal and external bench-marking.
- ICT: Iteratively evaluating client's expectations and preferences against the limitations of the software.
- Food: Detailed designing of the products.

In the later years, the explorations on the aspect of front-end became significantly less intense and have not given more insights beyond the above content. In the light of the fact that almost all organizations have established detailed and specific processes and procedures for front-end development, this research may interpret that the front-end development, once a fast-evolving concept in project management, has reached a very mature stage in these

industries. The declining attraction to students however does not indicate that front end development is fully developed. Instead, it is rather a false-positive signal because it has to be complemented by the increasing focus on management of risks, the embracing of scope changes, and the application of the VIP's, which have already become new crucial activities in the front-end phase of the projects across the industries.

Lessons Learned: A Call For Standardization

Lessons-learned turned out to be an important building block of fit-for-purpose project management in the bibliometric analysis in Chapter 4. With regard to the project learning, the majority of the essays that touched upon this aspect have considered implementing lessons learned as a very useful tool to achieve desirable project outcomes judging from relevant statements made in the essays from the past 8 years. But the content also suggested that the intensity and effectiveness of utilizing lessons learned has not witnessed significant improvements in the targeted industries. Two typical barriers the lecturers often encountered to successful implementation were found to be:

- Lacking sufficient support from the senior level of the management, and
- Lacking willingness to constantly monitor the performances in projects.

These aforementioned barriers were first found in 2014, but until 2021 there have not been evidence found that indicates they have been overcome. According to the content, unlike other project management aspects that require more and more project-dependent activities to reach fit-for-purpose, lessons leaned in the projects are expected by the lecturers to be more "formalized", "standardized" and "organized". Similar to what was found in risk management, having a lesson database can be of help to reach this. Such an updatable database would allow the leanings to be passed within projects and between projects across the organization. Also according to the relevant content, Bigger companies turned out to be in comparably more advanced positions onto the higher level of standardization of the learnings than the ones with smaller organizational scale.

5.2.3 Other Aspects

This subsection explores the three aspects with special trending that have not been touched upon yet in this section, which are project manager, process management and agile. The first aspect has presented a returning trend in terms of the intensity of being discussed in the past 8 years. And the latter two have shown very interesting signs of fast development even though it has become a popular topic in fit-for-purpose project management.

Project Manager: What Makes a Good PM

The overall trend of the aspect of project manager in the past 8 years is shown in Figure 5.6. As can be seen, the intensity of being discussed started to increase from academic year 2016-2017 after a steep decline for two straight

Figure 5.6: The overall trend of the aspect "Project Manager".

years. This returning trend brings curiosity: whether does this regaining attraction brings new knowledge to the applications of fit-for-purpose project management?

It was found that, in the fist three-year period, the questions asked in the aspect were mainly trying to discuss what personalities are essential for project managers and whether he/she should be generalist or specialist. These discussions however gave repetitive answers and drew similar conclusions, thus no sign of development could be detected from the related contents. The focus of essays discussing this aspect in later years presented a more diverse distribution, covering many topics such as gender, types of leadership, hard skills vs. soft skills, and influences of project success, etc. The research might interpret here that this shift of focus had made this project management aspect more appealing to the students.

Specialist vs. Generalist

This topic is very popular among the essays written in the first 3-4 year period. The content covering this topic seems to be a debate that continues unabated, with both sides seemingly having a significant number of supporters and being able to give sufficient evidence and experience. In the overall context, it was observed that the PM's being a specialist or generalist is subject to the interplay of the size, complexity and risk of a certain project, which was explained in detail in subsection 5.2.1 (see in Figure 5.7). In large and complex (logically riskier) projects, the project manager tend to be more busy with integrating different disciplines and parties than with giving additional insights to specific technical problems, which makes a generalist more fitting in the role of taking control of the project. However, in situations where the project is less demanding in terms of integrating works and communications, specialists as project manager are believed to perform better managerial works through providing additional technical insights into the projects.

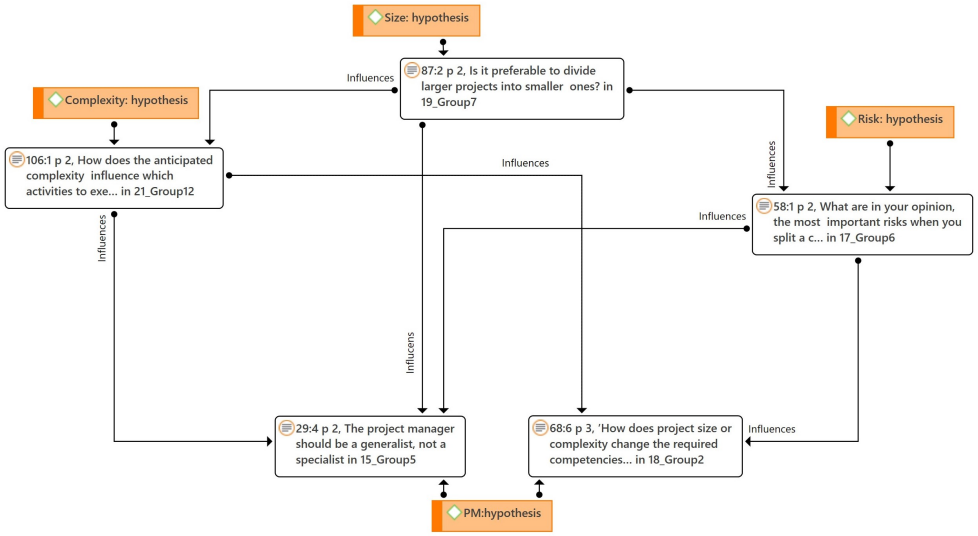

Figure 5.7: The embodiment of the interplay on competencies of project manager.

This is particularly true in technology-driven projects such as the ones in ICT and High-tech sector. Almost all the project managers are experienced specialists.

But this is never a binary selection. It does not mean that technical knowledge is not necessary for the project managers in complex contexts. Although as generalist, a manager may not be able to provide decisive insights into technical problems, especially in the field which he/she is not educated in or familiarized with, the majority of the lectures that a minimally required trait of a generalist project manager is the ability to ask the right questions to the rights experts. This ability is considered very key to managing projects effectively.

Hard Skills vs. Soft Skills

The explorations into the topic of soft and hard skills plays an important role in the increasing intensity of the discussion of project managers in the latter 4 years period (2017/18-2020/2021). This is considered as one step further of the discussion over project manager's being a specialist or generalist. Hard skills in the context of this course refer to professional knowledge and skills that can be acquired from education and studying. For example, technical knowledge of a certain industry and project management discipline such as planning, costing, and estimating are recognized as hard skills of a project manager in the essays. Soft skills, also called social skills in some essays in 2020/21, are mostly recognized as what should be acquired and understood slowly from practice and experience. The answers given to this discussion in the latest four years show a rather skewed distribution in the overall landscape where soft skills are becoming more and more favored as it is agreed that the size and complexity of projects are inevitably increasing across the six targeted industries. Among all the mentioned soft skills, sensitivity, communication skills and trust creating abilities stood out as the most favored and crucial competencies of a project manager. Managers with these competencies are better able to adapt their work in different environments to fit the of the project. In simple terms, these are the enablers of practicing fit-for-purpose philosophy in the management of the projects.

It is also observed from the interpretations of the students that these two are not mutually exclusive: two types of skills are mostly complementary and reinforcing each other. Hard skills, especially solid technical background and project management knowledge are still necessary qualifiers of a competent project manager in any industry. Soft skills are a set of capabilities that allows an effective manager to shine and to excel in increasingly complex project environments.

Process Management: onto Hybrid?

The application of process management in the targeted industries has been explored by many essays in the history of this course, with an active period from 2014/15 till 2018/19. In the earlier explorations, mainly in 2014-15 and 2015/16, the answers given by different lecturers on this topic were very much mixed. Those for, against, and unaware were all about equally represented in the overall. And the extent of applying this approach varies very much across industries. The earlier supporters are mainly found within the lectures from the infra/transport and the ICT industry, with an argument that in order to achieve desirable project outcomes, many other aspects (culture, politics, social) than only the technical aspects should be paid sufficient attention to, and decisions should be made with both problems and actors interrelated in complex networks. In situations as such, process management approach is better able to define and frame the right projects. The objectors to process management, are mainly of the opinion that rounds of negotiations might waste time, efforts and resources although it provides certain level of flexibility.

Among the essays in the later years, it was observed that the attitude of the guests towards this approach has shifted noticeably - it is clear that the process management approach was getting more popular and there had been a significant rise in the percentage of the supporters. The possible reasons for this are twofold, this research presumes. First, process management as a discipline has made its relevance more widely known across industries. Secondly, once again, the interplay of size, complexity and risks motivated the managers to integrate elements of process management such as negotiations and decision-making in networks into the management of their projects (mostly the traditional model), particularly in earlier phases, to define and frame the projects. Projects could only proceed when consensus among actors is built. In such way, the process management in the earlier phases plus the project management in the execution creates a hybridized management model. And it was well accepted that the negotiated results (scope, planning) of process management can better help the projects to be executed sticking to the plan with many potential blocks avoided earlier on.

Whether or not the discovered trends are still true is not very clear as no content has been found discussing this topic since academic year 2018/19. This also needs further discussions in the expert sessions.

Agile Project Management: No More Hesitation

Based on the hypothesis and sub-questions formulated by students in their essays, references to agile project management are significantly infrequent in this course compared to other aspects. Agile approach of managing projects has been touched upon and lecturers from almost all the industries have shared their view points and experience of the application of it. Its first appearance was found in 2015/16, brought by sub-question "Agile management leads to rework and overload of information for the people working on the project?" Among the many opinions then, it could be observed that in the ICT and high-tech industry, agile was already being implemented, and that many managers and project members had formed a good knowledge and experience base of this management style. In other industries, lecturers were more hesitant to implement agile because the highly iterative way of working and fact-based decision-making could largely increase the amount of meetings and communications, particularly in large projects. Extra meetings are seen as a disadvantage of the this approach and a reason behind this hesitation. Another reason came from the fact that agile project management was not a very familiar concept to the team members and workers, which makes the implementation on whole project level very difficult.
But, in the later years (2018 till 2020), discussions over agile project management took on a rather different look, with the aforementioned hesitation hardly noticed again. The lecturers from infra/transport and process industry described agile as "something expected". Also, the application of agile is no longer considered industry-dependent but project manager-dependent, which indicates that whether or not agile is adopted might not be as subject to industry (project type), and that it is more of a choice of the project manager. It was concluded from lecturers of industries other than ICT and High-tech that agile can be implemented in these industries as long as the manager has the knowledge and capabilities for the training of others. This promising shift in attitude is due, firstly, to the booming academic and practical field of agile project management in recent 4-5 years , which has made this knowledge more widespread, which ties in with the literature review [Špundak, 2014; Gemino et al., 2020]. Secondly, the continued proven application in the High-tech and ICT industries also provides a good example for other industries to make changes in this direction. But detailed information such as how and when can agile be applied in other industries was not found in the content, which is also in line with the finding in literature review where no evidence of agile being as successful in industries other than ICT and High-tech were detected.

5.3 CHAPTER SUMMARY

This section concludes the findings from of the third stage of this research, the content analysis.

To better depict the development of fit-for-purpose project management from a practical perspective, this chapter serves as the step further after the bibliometric analysis in Chapter 4 into the exploration of applying fit-for-purpose philosophy in the field of project management. The overall purpose of this stage of the research is to draw and formulate structured insights from plain text, to answer the third sub-question *What are the trends evolved in the interests of students in project management judging from the analysis of the students' viewpoint on fit-for-purpose?*. Rather than looking into the literature, this stage of the research shifted the object to the essays written by students of the course WB3501 Fit-for-purpose Project Management from the past 8 years, which defined minimum required criteria of fit-for-purpose project management based on interpretations of the guest lectures and interviews of the lecturers from 6 different industries. In total 117 essays were collected from the database, which in general were uniformly distributed in past 8 years and converted in to the same document type for ease of processing in the qualitative analysis software Atlas TI.

The result of the content analysis suggested that the past 8 years has witnessed a number of changes in the course WB3501 Fit-for-purpose Project Management, which is reflected in changing discussion intensity of many aspects in project management. There were 12 aspects in project management that have been touched upon in the formulated hypothesis and sub-questions in these essays. Most popular aspects in these years are found to be scope change, complexity, lessons-learned, and risk management. The aspects were divided into two groups, one of which was the ones with upward trending intensity of discussion while the other consists of the aspects that had became less popular in the essays.

Among the upward trending aspects, the content related to scope change, adaptation, size, complexity and risk are showed a number of signs of involvement over these years. Firstly, the interplay of size, complexity and risk was identified to have major influences on the adaptations of project management. This interplay should be properly measured in the earlier phase and dealt with carefully during execution. The effect of this particular interplay was also found in the competences of a project manager. Although solid technical and project management knowledge background are necessary for a project manager to manage the endeavours effectively, the following "soft" competencies of a project manager in complex situations are of crucial importance according to the related contents:

- Sensitivity
- Communication Skills
- Trust-creating abilities

Secondly, two other aspects of upward trending intensity are scope change and VIP's (Value Improving Practices). The result of the analysis showed that the attitudes towards scope change also showed a few promising signs of changing. The overall response has switched from "prevent them any-

where possible" in the earlier years to "embrace them in the front end", which took shape in recent four years. Regarding the VIP's, it was interesting to notice that many lectures had been exercising these practices in addition to regular project management activities without knowing, which partially proves that these activities can indeed add value.These practices are applied by the project managers mainly in order to build effectively-formed project teams and engage different stakeholders.

Among the upward trending aspects identified in these essays, the content concerned with the front-end engineering and lessons-learned stood out to be the aspects of interest. The loss in attraction of front end is not true in fact, although it the intensity of discussion decreased significantly. This is because that this loss in attention of students is complemented by the increasing focus on the discussions over management of risks, scope changes, and VIP's, which are considered to be crucial in the front end phase. The findings retrieved from the aspect of project learning is rather interesting. The results suggested that there are two typical barriers that the lecturers often encountered to successful implementation of project learning, which are the lack of:

- support from senior management
- willingness of constant monitoring

To better practice the fit-for-purpose philosophy, unlike other project management aspects that require project-dependent activities, lessons leaned in the projects are expected to be more "formalized", "standardized" and "organized".

In addition to the evolving trends noticed from aspects mentioned above, the discussion over two other adaptive project management approaches, process management and agile project management, were also found to have gained increasing popularity in project management activities, with many lecturers actively integrating their elements into the management of their projects.

6 RESULTS EVALUATION

This chapter presents the evaluation of the results, which also represents the final stage of this research. The objective of this chapter is to answer the fourth sub-question *Whether and to what extent do these trends reflect the actual trends in project management?*. The findings gained from Chapter 4 and Chapter 5 are first structured in Section 6.1. The design and results of the two interviews with external project management practitioners are in Section 6.2. The discussion of the evaluation results is presented in **??**. .

6.1 PRELIMINARY RESEARCH FINDINGS

Based on what was found in the previous two stages of this research (namely bibliometric and content analysis), the research findings are clustered into 5 themes, which are definition, need, enablers, and characteristics of fit-for-purpose project management, along with the skills and competencies of project managers required by such approach. These are to be discussed in the following subsections.

6.1.1 Definition of Fit-for-purpose Project Management

The definition of fit-for-purpose project management is one of most important output of the bibliometric analysis, the second stage of this research. It was formulated based on the findings from analyzing literature with term "project management" and variant forms of "adaptation" and the literature with term "fit-for-purpose" and "management". In this research, fit-for-purpose project management is defined as:

A set of wisely selected adaptive methodologies, tools and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes. An unique objective of project management approach as such is the alignment of formulation and implementation of strategies with minimized expected loss.

6.1.2 Need Factors for Fit-for-purpose Project Management

Findings under this subsection are focused on what create the needs for a project management approach as such. In this research this need is identified to be the dynamic interplay of size, risk and complexity as size of the projects has direct influence on the complexity and risks involved. There

is positive correlation between the size and the complexity and risks in the projects, which indicates that large projects logically are more complex and contain more risks. Also, it was also found that the complexity and risks tend to be mutually reinforcing. A dynamic interplay as such has made the management of projects require a different model that is adaptive in nature and tailored to fit the needs. Therefore, the dynamic interplay of these three factor has created the need for fit-for-purpose project management.

6.1.3 Enablers for Fit-for-purpose Project Management

This subsection is the grouping of enabler factors of fit-for-purpose project management approach. These factors are complexity evaluation and organizational strategieswhich were identified from both the bibliometric analysis and the content analysis. These factors are clustered into the enablers of fit-for-purpose project management approach due to the fact that these two factors create sufficient preconditions for the implementation of this approach. Both of these factors/practices sees projects as a system of interacting components and aims at identifying and evaluating these complex interactions and prepare to navigate them.

Complexity Evaluation:

Complexity evaluation in the earlier stages of the projects has become a favored practice in many industries. Complexity evaluation tools such as TOE framework helps the project managers to better understand the context and potential difficulties of the projects, in order to prescribe what the activities are to be executed. Therefore, it can be seen as a antecedent of adopting fit-for-purpose philosophy in project management as it enables the project managers to act differently and conducting activities selectively.

Organizational Factors:

The first organizational factor is the dynamic alignment of formulation and execution of strategies. The organizational strategies may also be uncertain and constantly changing due to the dynamic nature of the market. It can be a fitting practice to manage projects by keeping aligning the formulation and implementation of organizational strategies dynamically.
The second organizational factor is shaping and defining projects with available resources and stakeholder's values. This enables fit-for-purpose project management because projects require less formality in control in dynamic and complex environment, available resources and values of the stakeholders are becoming more preferable over predefined goals to define and shape projects.

6.1.4 Characteristics of Fit-for-purpose Project Management

As was defined in earlier in this research, fit-for-purpose project management is a rather broad concept that manifests its ways in many aspects

of project management. By combining what was found in the bibliometric and content analysis, the practices under the following themes in the management palette of fit-for-purpose project management are identified to be adaptations, risk management, scope changes, lessons-learned, and hybrid approaches. These practices and tools in some ways set fit-for-purpose project management apart from other approaches, thus the characteristics of fit-for-purpose Project Management.

Adaptations:

Decomposing, sizing and scaling of PM activities
A large project is treated as grouping of mini projects that are managed separately. The project management activities applied on the mini projects should be scaled and sized (seldom skipped) to the needs.

Careful interface management
The interfaces brought by interdependencies of mini-projects should be managed with appropriate interface protocols.

Active & iterative stakeholder management
Stakeholder management should not be a one-off or tick-in-box activity as the stakeholders are often the source of the unexpected changes. Activities such as stakeholder identifying, mapping and engaging should be conducted iteratively at the stage gates.

Risk Management:

According to the research result, risk management is one activity that should never be skipped in any type of the projects. Also it should not be conducted with a tick-the-box mindset. In order to effectively manage the risks evolved in the projects, risk management activities should be conducted close to stakeholders' values as it helps avoid potential blocking forces in the execution phase. It is also important that the risks are assessed and reported using uniformed terminologies among different parties.

Scope changes:

More welcomed and embraced
Scope changes in general has become more welcomed and the companies are willing to invest time and money to incorporate the updated needs and values of the stakeholders into projects in the form of scope changes. But the exact extent of this positive attitude is rather industry-dependent.

Management of Change: scope flexibility
Designing and applying an organization-specific change management system to cope with change has become a popular practice. Such systems prescribe a set of tools and responding actions to be executed to be able to manage the changes and provide certain level of flexibility to the scope.

Lessons-learned:

"formalized", "standardized" and "organized"
The result from both the bibliometric analysis suggested that project learning is a very important part of the fit-for-purpose project management. It was conclude that Lessons-learned in projects are expected to be rather more "formalized", "standardized" and "organized".

Updatable Lesson database
Having updatable lesson database helps to reach higher level of standardization. It allows the leanings to be passed within projects and among multiple projects across the organization. Managers should make use of previous experiences, case histories, and collaboration among multiple sites to achieve better knowledge and information transfer.

Hybrid Approaches:

Active integration of methodologies from other adaptive PM approaches
The methodologies prescribed in adaptive project management approaches such as process management and agile project management has become more popular and practitioners actively integrate these into the traditional model.

Adaptive and iterative working style in the front-end
The adaptive and iterative way of working has become more popular. The negotiated results (i.e. scope, plan and budget, etc.) generated front-end engineering as such may better help the projects to be executed sticking to the plan with many potential blocks avoided earlier on.

6.1.5 Skills and Competencies of Project Managers Required by Fit-for-purpose Project Management

The findings in the subsection are focused on the crucial skills and competencies of project mangers required in fit-for-purpose project management.

Solid technical and PM knowledge as background

Hard skills, especially solid technical background and project management knowledge are necessary for a competent project manager in any industry. A minimally required trait is the ability to ask the right questions to the rights experts.

Soft/social skills needed: Sensitivity, Communication Skills, Trust-creating abilities

Soft skills are a set of capabilities that allows an effective manager to shine and to excel in increasingly complex project environments. In complex situations, three soft skills of a project manager stood out and are considered to be of crucial importance: Sensitivity, Communication Skills, and Trust-creating abilities.

6.2 EXPERT INTERVIEWS

This section presents the design and result of the expert session. These two interviews are conducted to test the findings with external project management practitioners, in order to evaluate to what extent these findings reflect how fit-for-purpose philosophy is practiced in the real world. Subsection 6.2.1 introduces the design of the two interviews and the results are presented in subsection 6.2.2.

6.2.1 Interview Design

Credibility is a very important concept when it comes to evaluating the results qualitative analysis [Buchbinder, 2011; Chen, 2017]. One of the most frequently used tool/means to achieve credibility of the qualitative findings is conducting checking/validation interviews [Buchbinder, 2011]. Also according to Buchbinder [2011], the main purpose of a validation interview is two-fold. Firstly, it aims to confirm the qualitative results are authentic and accurate. Secondly, it also reconstructs inappropriate and biased views caused by the subjective power of qualitative researchers. This research also adopts validation interviews as means to evaluate the credibility of the qualitative findings. This expert session consists of two independent interview with two experienced external project management practitioners. These two interviews are conducted to test the findings with them, in order to evaluate the generalizability of the them and gain additional insights to better build up a theoretical framework for fit-for-purpose project management and depict its development. Both of the Interviewees are among the most active guest lecturers of the course WB3501 Fit-for-purpose Project Managementin the past 8 years. Interviewing them to test the findings is therefore a good option as the lecturers' input to the essays are the source of the findings.

Interviewees

Interview i
Interviewee: Rob Kretzers
Time: 10:00 05/07/2021
Duration: 100 min
Location: Skype video call

Interview ii
Interviewee: Herman Mooi
Time: 16:00 08/07/2021
Duration: 60 min
Location: Microsoft Teams video call

Interview Protocol

Before the interview:
There are a few actions needed before the actual starting of the interviews,

which include firstly the interview invitation by email, sending out findings in an excel sheet, which includes (evolved practices and recognitions) under each theme. Last two columns are left for the interviewee to give their remarks. (Survey-like), and preparation of the interview questions.
For a better preparation of both the interviewer and the interviewees. The findings of this research were sent to the interviewees after they accepted the interview invitation. This survey-like approach helps the interviewees be sufficiently informed with the content of the interview. The findings presented in 6.1 were structured into in excel sheet with last two columns left empty, the first of which is for the interviewee to decide whether it is a recognizable practice and the second is for them to leave additional insights. The evaluation form can be found in Table 6.1.

During the interview:
The discussion during the interviews covered all the 5 themes in the suggested in Section 6.1, which are the definition, need, enablers, characteristics, and the project manager's competencies of the fit-for-purpose project management.
The detailed planning of a interview consists of 3 sections. The interview started with an Introduction of the research and researchers, in the form of a short presentation of the research methods and purposes. This section aims at eliminating doubts of the interviewees about the research context and setup before diving into discussing research findings. The introduction is followed by the body part of the interview, the discussions over the main research findings. This part of the discussion covers all 5 clusters defined in Section 6.1: the definition of FFP-PM(Fit-for-purpose Project Management), the need for FFP-PM, the enablers of FFP-PM, the activities in the management palette of FFP-PM, Skills and competences of project manager required by FFP-PM. The interview is closed with a free QA for additional insights.

After the interview:
The actions following the end of the interviews include: Analyzing and discussing the results, preparing Transcripts of the interviews, Creating the theoretical framework with the interview results incorporated,and checking for constructive recommendations for the constant improvement of the WB3501 course.

Table 6.1: Result Evaluation Form

Definition of Fit-for-purpose Project Management				
			Recognizable?	**Remark**
A set of wisely selected adaptive methodologies, tools, and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders values, and a welcoming attitude towards uncertainties and changes.				
Need for Fit-for-purpose Project Management				
Theme	**Evolved Recognition /Practice**	**Explanation**	**Recognizable?**	**Remark**
Size, Risk & Complexity	The dynamic interplay of size, risk and complexity calls for fit-for-purpose	The size of the projects has a direct influence on the complexity and risks. The latter two tend to be mutually reinforcing. An interplay as such requires a different approach than the traditional model(s).		
Enablers for Fit-for-purpose Project Management				
Theme	**Evolved Recognition /Practice**	**Explanation**	**Recognizable?**	**Remark**
Complexity	Complexity evaluation in early stages	Applying evaluation tools (e.g. TOE framework.) helps the managers to better understand the context and potential difficulties, to decide on the activities to be executed.		
Organization	Dynamic alignment of formulation and execution of strategies	The organizational strategies may also be uncertain and constantly changing due to the dynamic nature of the market. It can be a strategy to manage programs/portfolios by keeping aligning the formulation and implementation of organizational strategies dynamically.		
	Shaping and defining projects with available resources and stakeholder's values	Projects require less formality in control in dynamic and complex environments, available resources and values of the stakeholders are becoming more preferable over pre-defined goals to define and shape projects.		
Activities in the management palette of Fit-for-purpose Project Management Project Management				
Theme	**Evolved Recognition /Practice**	**Explanation**	**Recognizable?**	**Remark**
Adaptations	Decomposing, sizing and scaling of PM activities	A large project is treated as the grouping of mini-projects that are managed separately. The PM activities applied to the mini-projects are scaled and sized to the needs.		
	Careful interface management	Interfaces brought by interdependencies of mini-projects should be managed with appropriate interface protocols.		
	Active & iterative stakeholder management	Stakeholder management should not be a one-off activity, as the stakeholders are often the source of changes. Activities should be conducted iteratively at the stage gates.		
Risk Management	Close to stakeholders' values	Risk management should be conducted close to stakeholders' values as it helps avoid potential blocking forces in the execution.		
Scope change	More welcomed and embraced	Scope changes, in general, have become more welcomed and the companies are willing to invest time and money to incorporate the updated needs and values of the stakeholders into projects in the form of scope changes.		
	Management of Change: scope flexibility	Designing and applying an organization-specific. MoC system to cope with change has become a popular practice. Such systems prescribe a set of tools and responding actions to be executed to manage the changes and provide a certain level of flexibility to the scope.		
Lessons-learned	"formalized", "standardized", and "organized"	Lessons-learned in projects are expected to be rather more "formalized", "standardized" and "organized".		
	Updatable Lesson database	Having an updatable lesson database helps to reach a higher level of standardization. It allows the leanings to be passed within projects and among multiple projects across organizations. Managers should make use of previous experiences, case histories, and collaboration among multiple sites for better knowledge and information transfer.		
Hybrid Approaches	Active integration of methodologies from other adaptive PM approaches	The methodologies prescribed in adaptive approaches such as process management and agile project management has become more popular and partitioners actively integrate these into the traditional model.		
	Adaptive and iterative working style in the front-end	The adaptive and iterative way of working has become more popular. The negotiated results (i.e. scope, plan, and budget.) generated in the front-end may better help the projects be executed by sticking to the plan with many potential blocks avoided earlier on.		
Skills and Competencies of project mangers required in Project Management Project Management				
Theme	**Evolved Recognition /Practice**	**Explanation**	**Recognizable?**	**Remark**
Project Manager	Solid technical and PM knowledge as background	Hard skills, especially solid technical background and project management knowledge are necessary for a competent project manager. A minimally required trait is the ability to ask the right questions to the rights experts.		
	Soft/social skills needed: Sensitivity, Communication Skills, & Trust-creating abilities	Soft skills are a set of capabilities that allows an effective manager to shine and to excel in complex project environments. In complex situations, three soft skills of a project manager stood out : Sensitivity, Communication Skills, Trust-creating abilities.		

Table 6.2: Interview results on the definition of Fit-for-purpose Project Management.

Definition of Fit-for-purpose Project Management	Rob Kretzers		Herman Mooi	
	Recognizable?	Remark	Recognizable?	Remark
A set of wisely selected adaptive methodologies, tools and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes.	Recognizable	It is all in there	Recognizable	Practical definition should stop at "activities."

6.2.2 Interview Results

This subsection goes through the results of the two interviews conducted with external practitioners.

The Definition

Both of the interviewee were asked to give a definition of fit-for-purpose project management based on their own experiences. The one given by Rob Kretzers (interview i) is: *"What is important is to deliver the purpose of this project. It is not dogmatically following books, procedures and standards. Instead it is a big toolkit, where you should pull stuff out. So it's, so it's fit for purpose."* And the one given by Herman Mooi (interview ii) is formulated as: *"Fit for purpose project management is that you apply a set of tools and mechanisms. and project management, that is necessary and enough. But not more than that. Oh, yeah. And I would almost also add that I will I always advise all the project leads to do as little as possible."* The transcripts of the two interviews can be found in Appendix F.
A Similarity between these two definitions can be noticed that they both bear a selective mindset towards the tools and activities to be executed, which is in line with the first sentence of the definition formulated in this research: "A set of wisely selected adaptive methodologies, tools and expertise to manage project activities." Also the remaining part of this definition was confirmed by both of the interviewees during the interview. The interview results on the definition of Fit-for-purpose Project Management can be found in Table 6.2. Therefore the validity of this definition of Fit-for-purpose Project Management is confirmed.

The Needs

As suggested in Table 6.3, the research findings regarding the needs for fit-for-purpose project management was fully confirmed by Rob Kretzers and partially confirmed by Herman Mooi. Herman Mooi indicated in the interview ii that the interrelation among these three factor is not mutually exclusive because he believes that the concept complexity lies on a higher level of abstraction that includes the size and risks. This arguments is based on the TOE framework proposed in Bosch-Rekveldt et al. [2011].
Rob Kretzers added in the interview that the context of the projects should be also considered as one of the reasons for applying fit-for-purpose project management, arguing that two projects with similar size and complexity level but in different context should sometimes be approached with different strategies.

Table 6.3: Interview results on the needs for Fit-for-purpose Project Management.

Need for Fit-for-purpose Project Management		Rob Kretzers		Herman Mooi	
Theme	Evolved fit-for-purpose Recognition /Practice	Recognizable?	Remark	Recognizable?	Remark
Size, Risk & Complexity	The dynamic interplay of size, risk and complexity as the driver for fit-for-purpose adjustments	Recognizable	Fully agree; Should also include context: similar size and complexity, but totally different environments can drive different selection of tools	Partially	For me, it is complexity in general sense, size and risk are part of complexity in TOE framework

Table 6.4: Interview results on the enablers for Fit-for-purpose Project Management.

Enablers for Fit-for-purpose Project Management		Rob Kretzers		Herman Mooi	
Theme	Evolved fit-for-purpose Recognition /Practice	Recognizable?	Remark	Recognizable?	Remark
Complexity	Complexity evaluation in early stages	Recognizable	Very important practice	Recognizable	Very important practice
Organization	Dynamic alignment of formulation and execution of strategies	Recognizable	The market can be very unstable. Law changes, stakeholders, even wars. These can all easily derail a project	Partially	Depends on the situation; you don't always have to make changes or kill projects when there is a change in the market.
	Shaping and defining projects with available resources and stakeholder's values	Recognizable	It is always important to have a clear picture of the available resources and values of the stakeholders	Recognizable	It is true

The Enablers

The interview result of discussions over the enablers of fit-for-purpose project management is shown in Table 6.4. As suggested in the table, the interviewee agreed with the findings of complexity evaluation as a enabler. The only deviation was found in first factor under theme organization: dynamic alignment of formulating and executing strategies, which was partially confirmed by Herman Mooi, arguing that companies don't have to always kill or make major changes to the projects when the market situation changes.

The Characteristics

As for the the characteristics of Fit-for-purpose project management, all the factors identified preciously in the research were confirmed by both of the interviewees by marking them as recognizable. The result is presented in Table 6.5. As is suggested in the table, both Rob Kretzers and Herman Mooi considered that decomposing, sizing and scaling are the crucial in such project management approach and interfaces should be managed with appropriate escalation model. Their viewpoints on decomposing are very similar: Rob Kretzers indicated that sub-projects should be logical and manageable and then Herman Mooi confirmed this point by arguing these sub-projects should be as independent as possible.

Another theme in which both of the interviewees made similar points is the lessons-learned. Both of them thought that organizations should create an open and safe environments for the sharing of failures otherwise there would be a huge loss in valuable lessons. In addition, Rob Kretzers suggested that connecting people to people should also be included as another factor in lessons-learned as it is a very rewarding practice according his experience.

Skills and competencies of project managers

As is shown in Table 6.6, the finding of the skills and competencies of project managers require by Fit-for-purpose Project Management are all confirmed by both of the interviewees.

Table 6.5: Interview results on the characteristics of Fit-for-purpose Project Management.

Activities in the management palette		Rob Kretzers		Herman Mooi	
Theme	Evolved fit-for-purpose Recognition /Practice	Recognizable?	Remark	Recognizable?	Remark
Adaptations	Decomposing, sizing and scaling of PM activities	Recognizable	Subprojects should be l ogical and manageable	Recognizable	Most crucial thing of PM
	Careful interface management	Recognizable	Interfaces should be managed locally and timely, and with proper escalation model	Recognizable	Sub-projects should be as independent as possible. Escalation model
	Active & iterative stakeholder management	Recognizable	very similar to risk management, should be review after each "toll gate"	Recognizable	should pay continuous attentions
Risk Management	Close to stakeholders' values	Recognizable	Fully agree;	Recognizable	Always standard methodologies; Risk management only matters when they are related to stakeholders' values
Scope change	More welcomed and embraced	Recognizable	Fully agree;	Recognizable	It is related to agile. Under agile framework, change is our daily work
	Management of Change: scope flexibility	Recognizable	For big ones: bring along the right stakeholders and review the changes together. Always room for small and manageable ones	Recognizable	Implement changes laws.
Lessons-learned	"formalized", "standardized" and "organized"	Recognizable	Fully agree;	Recognizable	Agree
	Updatable Lesson database	Recognizable	One of the purposes is the training of junior managers; Create an open and safe atmosphere to share failures; Should also include: connecting people to people	Recognizable	Should be open to failures; Make use of lessons-learned communities
Hybrid Approaches	Active integration of methodologies from other adaptive PM approaches	Recognizable	Fully agree;	Recognizable	Never turn into one extreme framework. Should be an adaptive system
	Adaptive and iterative working style in the front-end	Recognizable	Fully agree;	Recognizable	Pretty much agile way in the front end.

Table 6.6: Interview results on the skills and competencies of project managers required by Fit-for-purpose Project Management.

Skills and Competencies of project mangers required		Rob Kretzers		Herman Mooi	
Theme	Evolved fit-for-purpose Recognition /Practice	Recognizable?	Remark	Recognizable?	Remark
Project Manager	Solid technical and PM knowledge as background	Recognizable	Ask the right questions to the rights experts. That's the key	Recognizable	PM's mission is to order and structure, but not pay too much attention to the content of the project.
	Soft/social skills needed: Sensitivity, Communication Skills, & Trust-creating abilities	Recognizable	Should be respected as well	Recognizable	agree

6.3 CHAPTER SUMMARY

This chapter presents the evaluation of the results, which also represents the final stage of this research. The objective of this chapter is to answer the fourth sub-question *Whether and to what extent do these trends reflect the actual trends in project management?*. The findings gained from the bibliometric analysis and content analysis are first structured and clustered into the following aspects: definition of fit-for-purpose project management, need factors, enabler factors, activities on the management palette, and required competencies of project managers.

Then this research explains the design and results of the two interviews with external project management practitioners. This expert session consists of two independent interview with two experienced external project management practitioners. These two interviews are conducted to test the findings with them, in order to evaluate the generalizability of the them and gain additional insights to better build up a theoretical framework for fit-for-purpose project management. Both of the Interviewees are among the most active guest lecturers of the course WB3501 Fit-for-purpose Project Management in the past 8 years. Actions needed before the interviews include firstly the interview invitation by email, sending out findings in an excel sheet, which includes (evolved practices and recognitions) under each theme. This survey-like approach helps the interviewees be sufficiently informed with the content of the interview.

The result of the interviews suggested that validity of the majority of findings were considered recognizable by both of the interviewees. There are also factors that were not fully recognized by both of the external practitioners and some factors and practices that are missing in the research findings. These factors are to be discussed in the discussion part of this research through revisiting the literature and gaining evidences from new literature.

7 DISCUSSION

This chapter presents the discussion of the this research.

7.1 LINKS BETWEEN BIBLIOMETRIC & CONTENT ANALYSIS

In the section, the links between the findings from the bibliometric analysis and the content analysis,namely the literature and practice, are presented. The common grounds found in these two stages of the research are in Subsection 7.1.1. And the conflicting views can be found in Subsection 7.1.2.

7.1.1 The Common Grounds

This subsection discusses the common grounds of the two stages of this research.

Larger, riskier and more complex: Calling for Fit-for-purpose

The literature study and bibliometric analysis found that the level of risk and complexity of projects have been increasing indifferently in all industries, and this growing complexity has forced practitioners to make changes in their traditional way of working. This is tied in with the interplay of size, complexity and risk identified in the content analysis, in which the three factors are interactive and mutually reinforcing, and this is believed to be the root cause of majority of the adaptations, thus the antecedents of the fit-for-purpose approach of managing projects.

Predominance of the process industry

In the bibliometric analysis, it was found out that the process industry has been playing a very important role in applying fit-for-purpose philosophy in the management activities of their projects, covering many aspects including risk management, operation management, safety management etc. This predominance has provided many inputs in the process of defining fit-for-purpose project management in the Step III of the bibliometric analysis. In the content analysis, the process industry has also made considerable amount of contributions over these years. Several findings of this stage of the research are formulated in the light of the insights brought by the lecturers from the process industry. Thus from both theoretical and practical perspectives, the process industry has been indeed an influential actor in the field of fit-for-purpose project management.

Significant importance of lessons learned

According to what was found form the literature in the bibliometric analysis, project learning turned out to be attached with significant importance in conducting fit-for-purpose project management in many industries. It was concluded that to effectively conduct the project management in a fit-for-purpose manner, decision-making activities should be conducted close to the previous experience and project histories. This was confirmed in the content analysis where lessons learned was extensively discussed as an indispensable aspect of fit-for-purpose project management in the period form 2013 to 2017, although little new knowledge was retrieved from the essays of the later years.

Development of agile and process management

The results of the bibliometric analysis suggested that a fit-for-purpose approach of project management ought to "draw" proven theories from other disciplines to establish theoretical foundation to adapt to its complex context. In the content analysis, this feature found in literature is also reflected in the changing attitude of the practitioners towards the two adaptive models of project management, agile and process management. It was very noticeable that certain methodologies and tools of these two approaches have become more popular among the later years, while their attitudes towards them were rather negative and hesitant in the beginning according to interpretations of the students.

7.1.2 The Conflicting Views

Scope changes: embraced anywhere possible?

The bibliometric analysis suggested that scope changes should be managed with a welcoming attitude and thorough preparation anywhere possible, which was confirmed by literature from almost all the industries identified. In the content analysis this mindset towards scope changes was not sufficiently confirmed. The overall attitude towards scope changes in the essays are still recognized to be negative or cautious even though evidence were found that they started to be embraced in the earlier phases such as the front-end where the marginal effect is comparably low. The expert interviews suggested that zero-change mentality still exist in many industries, and that the attitude towards scope changes is rather industry-dependent and partially subject to the shared mindset of the project teams.

Healthcare industry: a flagship killer?

The role of healthcare industry in the bibliometric analysis is almost equally weighed as the process industry in defining fit-for-purpose in project management. The retrieved Insights into the many project management aspects turned out to be quite valuable. The healthcare industry also has made certain amount of contributions in defining fit-for-purpose project management

by providing many fit-for-purpose lessons in the research field of policy-making. However, because of the fact that the healthcare industry has not yet been involved in the course WB3501 Fit-for-purpose Project Management, these findings and inputs from the literature could hardly be tested from a practical perspective in the context of this research. According to what was found in the bibliometric analysis, this research believes that processes in the healthcare industry such as vaccination can be treated as projects to be manged in a fit-for-purpose manner. This brings curiosity: would it be a beneficial practice for the development of this course to involve guest lecturers from the healthcare industry?

Underestimated effect of project managers in literature

The competencies of project manager has been intensively discussed in the essays written by students in the past 8 years and many valuable insights were retrieved as core findings of the this stage of the research. It is recognized that the role of project managers in the effective application of the fit-for-purpose is indispensable and decisive. However, little evidence addressing this topic was found in the bibliometric analysis, indicating that there might have not been a linkage between the fit-for-purpose project management and competencies of project manages.

Risk Acceptance: is "Prepare & Commit" sufficient?

In the content analysis, it is mentioned more than once that acceptance would be more favored in the future because the size and complexity are inevitably increasing. The supporters of this strategy argued that mitigation has cost and should not outweigh the cost of acceptance, which was also confirmed in the expert interviews. Risk responses should be cost-effective and realistic in the context of the projects. Instead of identifying and mitigating every potential threat, managers should just be prepared for the uncertainties and commit to them. However evidence supporting risk acceptance strategies were not found in the bibliometric analysis. Instead, the majority of literature of interest indicted that risks should be managed actively and iteratively but did not indicate if there is any conditions for accepting risks.

7.2 THE EXPERT INTERVIEWS

This section discusses the results of the expert interviews.

7.2.1 Complexity & TOE Framework

As was mentioned in the Section 6.2, Herman Mooi raised a doubt about the finding of the dynamic interplay of size, risk and complexity as the need for fit-for-purpose project management. He argued that according to the TOE framework proposed by Bosch-Rekveldt et al., size and risks should be components of the complexity of the projects, rather than on the same level. Detail arguments can be found in Appendix F.

This interplay was identified in the content analysis in Chapter 5, in the context to which complexity, size and risk are considered as separate factors in parallel that influences the application the project management activities. These three factors are also listed separately in the prescribed list of sub-questions. Complexity therefore more refers to a characteristic of a project that makes it hard to manage due to behaviors of human and system components, ambiguity and uncertainties. So, in the context of WB3501 Fit-for-purpose Project Management, the term complexity is not reciprocal to the project complexities in TOE Framework, which identified complexity factors in a broader sense and size and risks are part of these factors [Bosch-Rekveldt et al., 2011]. As a result, to stay consistent with the course WB3501 Fit-for-purpose Project Management, this research continues to see size, risk and complexity as separate influencing factors in the final theoretical framework due to the fact that this research is partially based on the course.

This research also suggested that TOE framework be adopted as complexity evaluator in the earlier stages as an enabler of fit-for-purpose project management. Size and risks involved in the projects are also part of factors to be assessed.

7.2.2 Project Context as a Need Factor

AS was mentioned in Section 6.2, Rob Kretzers suggested the context of projects be added as a need factor for fit-for-purpose project management. As a distinction between the two different interpretations of the term complexity was already made in subsection 7.2.1 and this research continues with the narrower one, the context of a project is therefore also considered as a separate influencing factor to complexity. Evidence shows that similar projects conducted in different contexts might be approached with significantly different strategies or project management activities. Therefore it is reasonable to include project context as a need factor in the theoretical framework, along with the interplay of size, risk and complexity.

7.2.3 Dynamic Strategical Alignment

As was mentioned in Section 6.2, Herman Mooi raised his doubt about the first organizational enabler for fit-for-purpose project management through example: His company did not make major changes or kill any of the projects during the economic crisis in 2008 and this turned out to be a very rewarding decision when looking back.

"I would also advise to make it not too strict, because then you end up with a very fertile and you could also say unstable, or super nervous to project environment. If you look outside constantly. There needs to be a filter, an easing filter in between." (Herman Mooi)

This research considered that the decision of going on as if nothing is happening outside is more of a choice of a company when there is major changes in the need in the market. Therefore it could also be considered as a form of dynamic strategical alignment in a broader sense. As one of the intentions of this statement is to advise companies to make conscious decisions

on their portfolios depending on situation [Ritson et al., 2012; Jerbrant and Karrbom Gustavsson, 2013], which ties in line with Herman Mooi's point on this finding.

7.2.4 Escalation Model for Interfaces

It can be noted that the two interviewees are highly consistent in their comments on findings of decomposing, sizing and scaling and careful interface management that it is crucial in project management and that a reasonable escalation model should be applied in the interfaces. An escalation model is, according to Lin [2013], in system where "interface or changed events can be identified and traced in such that participants can improve construction processes, minimize rework, and reduce total duration". Also, it makes sure that these events are not likely to go out of control before the information reaches the higher level of organization or the right experts [Lin, 2013]. Therefore, it is also a very important fit-for-purpose practice that should be included in the theoretical framework of this research.

7.2.5 Lessons-learned: Connecting People to People

Both of the interviewees pointed out that it is very important for the companies to make sure that there is an open and safe atmosphere for the sharing of failure experiences and Can-do mentality. Also both of them confirmed the importance of various forms of lessons-learned in the training of the junior project managers.
Apart from that, Rob Kretzers suggested that the factor connecting people to people should be included in the final outcomes as he believes this is the most effective form of making lessons-learned produce influence, which was also confirmed by Herman Mooi in the second interview conducted later (see details in Appendix F).

"if you are going to execute a certain project in one location, it's not a poor thing that you should be open the database and type the location, for example South Iraq, looking for the ones there has been there conducting projects before. And then a list of names comes out. What happened in the past is that people just talk to one another. Didn't talk to that right guy." (Rob Kretzers)

This point can be confirmed by Liu's latest research output where this mechanism of project-based learning both within and between can indeed create values to project performance [Liu, 2021].

7.3 LINKS WITH PMBOK 7TH EDITION

The latest edition of PMBoK (7th) published in 2021 has made a number of major changes compared with the 6th edition and there are several points into tailoring project management that could be interesting to be discussed in this research [PMI (Project Management Institute), 2021].
One of the most significant and crucial changes is the appearance of the project management principles in parallel to the processes, which has not

touched upon in the previous editions. This change to some extent indicates that the PMI (Project Management Institute) are contributing to this transition from the previous process-based to principle-based guidance to the project management practitioners. These principles are codes-of-conduct-like guidelines for strategy, decision making, and problem solving in project management. It was found that that the principles closely match many of the viewpoints in this research. The discussions addressing these principles are presented next in this section.

"Effectively engage with the stakeholders"

PMI (Project Management Institute) [2021] suggests that the stakeholders should be engaged "proactively and to the degree needed to contribute to success." This principle advises practitioners to actively identify, analyze and engage the stakeholders throughout the course of projects. This tied in highly highly with the one of findings under the theme adaptations, which argues that Stakeholder management should not be a one-off activity and should be conducted iteratively from the start to end.

"Focus on value"

This principle suggests to "evaluate and adjust project alignment to business objectives and indented benefits and value" [PMI (Project Management Institute), 2021]. This principle is reflected in the argument in this research made in the definition of fit-for-purpose project management that projects are defined and shaped by specific values and one of the objectives is the alignment of the formulation and execution of the strategies.

"Recognize, evaluate, and respond to system interactions"

This principle suggests that project management practitioners see project as a system of interacting and independent components with clear boundaries. Practitioners should holistically recognize, evaluate, and respond to dynamics within and outside the system to create positive influence on project success [PMI (Project Management Institute), 2021]. The system interactions of projects are mainstream source of project complexities, thus the core of this principle precisely expresses the purpose of the necessity of complexity evaluation, which was identified as an enabler of fit-for-purpose project management.

"Tailor based on context"

This idea was brought in by the 6th edition of PMBoK published in 2017 and it was elaborated in latest edition. This principle focuses on adapting to the "unique objectives, stakeholders, and complexity of the environment" to contribute to project success [PMI (Project Management Institute), 2021]. The term tailoring includes adaptations of approaches, processes, and procedures to make them the more fitting options/alternatives given the available resources, environment, and the work at hand. This is perfectly in line with core idea of fit-for-purpose project management that the management of the

a project should be tailored to its context in order to fit its needs and realize values.

"Navigate complexity"

PMI (Project Management Institute) [2021] suggests that practitioners should continuously evaluate and navigate complexity in order for the approaches and plans to contribute to project success. This is in line with findings under theme size, risks, and complexity, which was identified by this research as the need for fit-for-purpose project management.

"Enable change to achieve the envisioned future state"

In this principle, PMI (Project Management Institute) [2021] advises practitioners, rather than avoiding scope change, to adopt a structured methodology to scope change to help project transition from current state to a desired future state and create desirable project outcomes. This principle is in line with one of findings under the theme scope change, which argues that practitioners should design and apply an organization-specific change management system to cope with change. And this principle addressing change is also partially reflected in the following argument in the definition of the fit-for-purpose project management that projects should be managed with a welcoming attitude towards uncertainties and changes.

According to these principles given by PMI (Project Management Institute) [2021], it can be noticed that the PMI (Project Management Institute) has already aimed at changing the prescriptive process-based guidelines into broadly-based principles, through bringing in considerations into tailoring. They create more space for interpretations so that the individuals and organizations are able to maintain alignment with the principles in different forms. Also these changes and transitions are closely in line with the core characteristics of fit-for-purpose project management investigated in this research. These principles agree with and are reflected in many of the findings of this research, which also proves the validity of the research results of this research from another respect.

7.4 CONTRIBUTIONS & LIMITATIONS

This section presents the contributions and limitations of this research.

7.4.1 Contributions

Tightened Link Between the Literature and Reality

One of the most important contributions to literature is that this research, via in-depth bibliometric analysis and a content analysis, thoroughly explored concept of fit-for-purpose project management from both theoretical and

practical perspectives and tightened the link between theories and the real world of project management. In the existing literature, the form of the concept fit-for-purpose project management was rather fragmented and the use of this term was frequently interchanged with adaptive project management, process management, and agile project management etc. This research has clearly differentiated fit-for-purpose project management from other project management approaches that adopted different philosophies form the traditional project management. Further studies interested in this concept can be based on the related findings of this research.

A Systematic View of Fit-for-purpose Project Management

This research was able to present fit-for-purpose project management as a complete project management approach with its manifestations and applications identified in many aspects in project management. The scattered fit-for-purpose practices in the literature and practices were identified and clustered systematically into definition, need factors, enabler factors, characteristics and requirement competencies of project managers. Therefore, this research has strengthened the existence of fit-for-purpose project management in the literature and has provided practitioners with a guidance of making fit-for-purpose adjustments to aspects that were touched upon in this research.

7.4.2 Limitations & Implications

Bibliometric Analysis: Dig Deeper

For the bibliometric part of the research, this research selected a very small portion of articles for revisiting based on its needs. This may result in many parts of the valuable articles' ideas not being uncovered, leaving the framework built through the bibliometric part of the bibliometric incomplete. This study suggests that a more in-depth literature-based study can be conducted in this regard.

Also, this bibliometric analysis did not reference any literature from the year 2021 of publication. This research found that this topic is rapidly evolving and the number of publications in various journals has been increasing in recent years. The current research was not able to reference potentially valuable insights from the literature from the year 2021. In subsequent studies.

Content Analysis: More First-hand Data

Since the subject of this content analysis was student assignments, these assignments were based on their interpretations of fit-for-purpose project management in interviews and lectures. This research is in part examining these interpretations, and it is likely that students may misinterpret some of the interviewees' ideas and make less-than-correct or unsupported statements. In fact, in the interviews conducted for this study, these statements were found to be contrary to the interviewees' intentions on more than one occa-

sion. Therefore, this study suggests that subsequent studies based on this topic may try to obtain primary data through direct interviews, for example.

Fit-for-purpose Assessment: Quantifying and Mastering fitness

Based on the findings of this research, subsequent studies can attempt to build a model that can quantify the fitness of project management approaches, thus providing project management practitioners with more ways to understand whether or how well their project management activities are fitting their purposes.

8 CONCLUSIONS

This chapters is the last chapter of the body part of this report, which presents the conclusions and recommendations of this master's research. The answers to each sub-questions and the main research question are presented in this chapter.
The main objective of this research is to look into the concept of fit-for-purpose project management and depict its development over the years. The main researcher question is formulated as:

How can the term Fit-for-purpose and its development be defined in the field of project management?

And four sub-questions were formulated to better answer this research question from for different aspects. Through investigating the links between the two between concepts "fit-for-purpose" and "project management" in a bibliometric analysis, identifying evolved best practices in student essays in a content analysis, and evaluating the results with external practitioners in a expert session, the concept of fit-for-purpose project management was thoroughly explored in this master's research. The answers to the sub-questions are presented next in this chapter.

i. What are recognizable methodologies and practices of traditional and Fit-for-purpose project management approaches?

The flow of the traditional project management model is organized linearly as

- **Initiating Processes**: a grouping of processes to define a project.
- **Planning Processes**: a grouping of processes to build up the scope, actions, objectives of a project.
- **Executing Processes**: a grouping of processes to perform and execute what has been defined in previous groups.
- **Monitoring and Controlling Progresses**: a grouping of processes,normally in parallel to executing group, to track, review, and regulate the progress and performance of the project.
- **Closing Processes**: a grouping of processes to complete and close a project.

Process management put high emphasis on the decision-making in a network of interdenpencies and using negotiation as the to reach the substantial results. Compared with the traditional hierarchical way of decision-making, the network way is characterized with pluriformity in interests, openness in communication, and dynamic and unpredictable organization. The process management approach of managing projects uses rounds instead of phases

(process groups) to define the life cycles without specific starting and ending points. Actors involved in projects are rather unstable and may behave strategically during the negotiations. The orientation of workflow mostly is characterized as ”from solution to problem”.
The agile project management are characterized with the use of ”product vision” concept, simplified communication tools, and iterative planning. Therefore the effective application of agile project management requires well-trained developed project teams with self-managing and self-directing mentalities. Also, it requires more frequently applied project plan monitoring and updating processes to make sure the project plans are revised at end of each iteration.

ii. How are “fit-for-purpose” and “project management” linked in research?

To investigate the links, a bibliometric analysis was conducted in a three step approach, with the Step I looking into the term ”fit-for-purpose” in management research in general, step II exploring term ”project management” and its various forms of adaptations, and the step III bringing findings from previous steps across to build this link. The look of fit-for-purpose project management in literature is therefore depicted.

The important findings of step I taken shape in different roles of fit-for-purpose identified in are:

- Experiences, case histories, and collaboration among multiple sites are important tools to achieve better knowledge and information transfer.
- Traditional tools such as estimating and predicting activities are considered important in the change management process to minimize expected losses.
- Interventions and adaptations are always needed to tailor the decision-making to the specific context and needs.
- Risks should be assessed and reported using uniformed terminologies among users. And good risk management should be conducted close to stakeholders’ values.
- Mangers should wisely select the appropriate tools, techniques and expertise throughout the life-cycle of a programme.

Key findings of step II are concluded as follows:

- Projects have increasing recognition into ”social process” where complex reality and human interrelations play dominant roles.
- Formality in control is less expected in dynamic and complex environments. Instead, Projects should rather be defined and shaped by available resources and values over predefined objectives.
- Openness to adopting new methodologies from other disciplines is expected.
- The hybrid project management approach can give the teams better chance to improvise and fit certain needs.
- Project portfolios or programmes should be managed by complex adaptive systems to align the formulation and implementation of the strategies dynamically.

By connecting the findings from the former two steps, the links between the two concepts were found. Fit-for-purpose project management is defined by this research as:

An adaptive system of wisely selected methodologies, tools and expertise to manage project activities.

Projects under this framework are defined and shaped by specific values and strategies and managed with conscious decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes. An unique objective of project management approach as such is the alignment of formulation and implementation of strategies.

iii. What are the trends evolved in the interests of students in project management judging from the analysis of the students' viewpoint on fit-for-purpose?

This stage of the research shifted the object to the essays written by students of the course WB3501 Fit-for-purpose Project Managementfrom the past 8 years, which defined minimum required criteria of fit-for-purpose project management based on interpretations of the guest lectures and interviews of the lecturers from 6 different industries.

The result of the content analysis suggested that the past 8 years has witnessed a number of changes in the course WB3501 Fit-for-purpose Project Management, which is reflected on changing discussion intensity of many aspects in project management. There were 12 aspects in project management that have been touched upon in the formulated hypothesis and subquestions in these essays. Most popular aspects in these years are found to be scope change, complexity, lessons-learned, and risk management.

Firstly, the interplay of size, complexity and risk was identified to have major influences on the adaptations of project management. This interplay should be properly measured in the earlier phase and dealt with carefully during execution. The effect of this particular interplay was also found on the competences of project manager. Although solid technical and project management knowledge background are necessary for a project manager to manage the endeavours effectively, the following "soft" competencies of a project manager in complex situations are of crucial importance according to the related contents:

- Sensitivity
- Communication Skills
- Trust-creating abilities

Secondly, the result of the analysis showed that the attitudes towards scope change also showed a few promising signs of changing. The overall response has switched from "prevent them anywhere possible" in the earlier years to "embrace them in the front end", which took shape in recent four years.

Thirdly, the content concerned with the front-end engineering and lessons-learned stood out to be the aspects of interest. The loss in attraction of front end is not true in fact, although it the intensity of discussion decreased significantly. This is because that the temporary stasis is complemented by the increasing focus on management of risks, scope changes, and VIP's,

which have already considered to be crucial in the front end phases. The findings retrieved from the aspect of project learning is rather interesting. The results suggested that there are two typical barriers that the lecturers often encountered to successful implementation of project learning, which are the lack of:

- support from senior management
- willingness of constant monitoring

To better practice the fit-for-purpose philosophy, unlike other project management aspects that require project-dependent activities, lessons leaned in the projects are expected to be more ”formalized”, ”standardized” and ”organized”.

iv. Whether and to what extent do these trends reflect the actual trends in project management?

The research findings from the former two stages were tested through two interviews with external practitioners, the result of which suggested that validity and generalizability of the majority of findings were considered recognizable by both of the interviewees. It was therefore concluded that these findings reflect, to a relatively large extent, what has been being practiced in the application of fit-for-purpose project management. Some of interesting comments were then discussed by revisiting the literature.

After bringing the answers to the sub-questions across, the main research question was therefore answered by a theoretical framework of fit-for-purpose project management. The components of it cover the need factors, enabler factors, characteristics and the skills and competences of the project managers under the framework of fit-for-purpose management approach with the following adjustments incorporated:

- The context to the projects is added as a need factor for Fit-for-purpose Project Management.
- Size, risks, context are also factors within the scope of the complexity evaluation (TOE Framework).
- The enabler factor ”complexity evaluation” is changed into ”recognition and evaluation of system interactions” for disambiguation reasons.
- Dynamic strategical alignment does not preach to kill projects when market changes. Instead it advises companies to make conscious decision on projects based on situations.
- Escalation model is added as one of the fit-for-purpose practice in managing interfaces
- Implementing change laws/protocols is added to the management of changes to make sure that right stakeholder are brought in to review when major changes occur.
- Open and safe atmosphere for failure lessons-learned is included in the theme lessons-learned.

- Connecting people to people is included in the theme lessons-learned.

After bringing all the adjustments into the findings of the bibliometric analysis and content analysis, the theoretical framework is created to depict the look and development of fit-for-purpose project management.
Under this framework, fit-for-purpose project management is defined as:

An set of wisely selected adaptive methodologies, tools and expertise to manage project activities.

Projects under the framework of fit-for-purpose project management are defined and shaped by specific values and available resources, and managed with conscious decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertain-ties and changes. An unique objective of project management approach as such is the dynamic alignment of formulation and implementation of organizational strategies.
The dynamic and adaptive nature of project management approach as such can manifest its ways in many different aspects during the life-cycle of the projects. The conceptual diagram of fit-for-purpose project management is presented in Figure 8.1. The detailed explanation for this framework can be found in Appendix G.

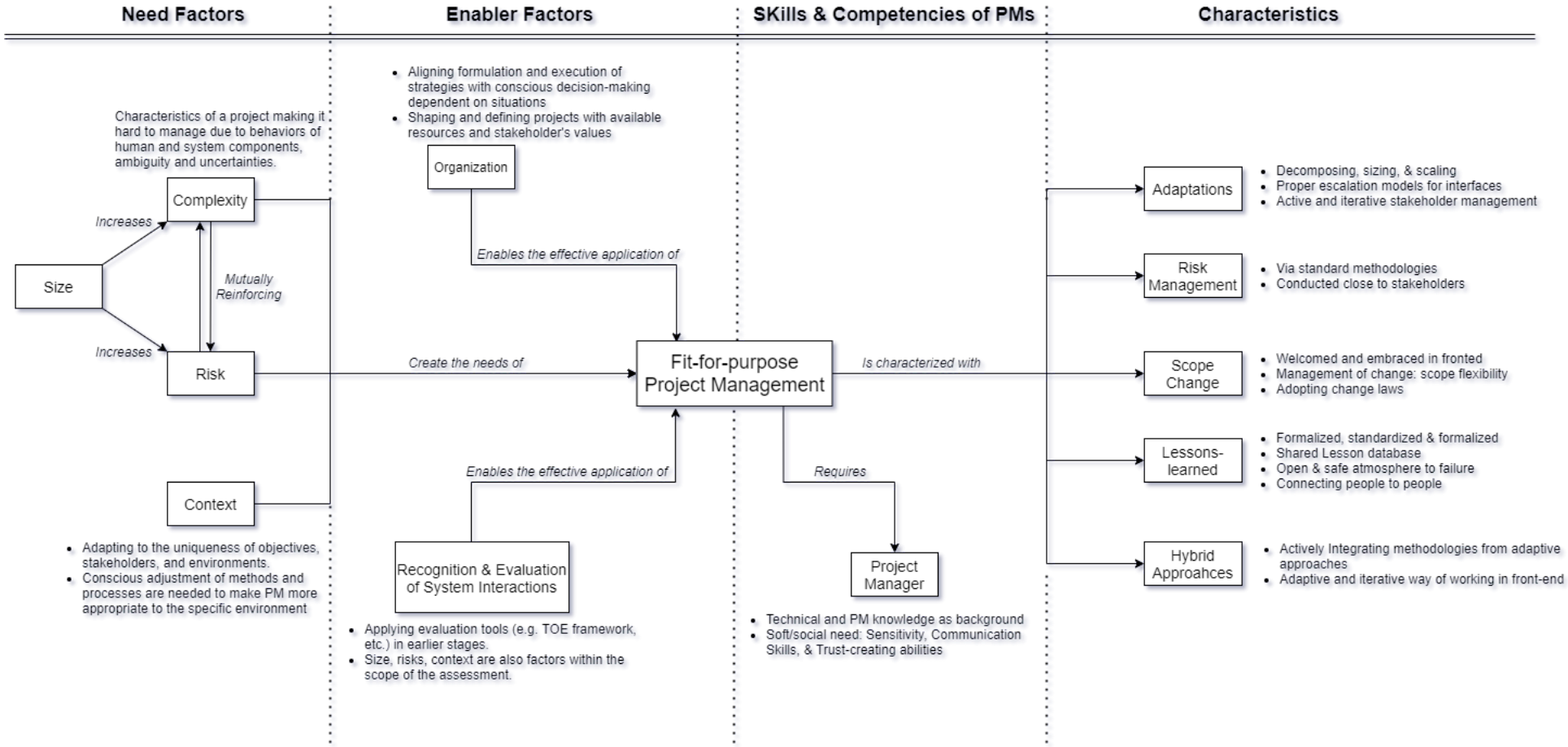

Figure 8.1: Theoretical Framework of Fit-for-purpose Project Management.

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A TOP KEYWORDS OF BIBLIOMETRIC ANALYSIS STEP I

With regard to the use of the keyword, the top relevant ones with occurrence of at least 30 times are listed in table A.1. As it suggests, the most dominant keyword in this topic is *Human* (row #1) with an occurrence of 190 times out of the 1215 documents in total. Its standing out with massive lead brought curiosity. The question here can be : Does the management of humans and human resource play an important role in defining the fit-for-purpose in management research? However, the majority of the articles that listed *Human* as keyword are published in sources such as Journal of Child Health Care and International Journal of Workplace Health Management, which mainly focus on healthcare fields. In this case, *Human* falls into the context of "human intervention" and "human behaviour", which are of little relevance to the focus of this study.

Rank	Keyword	#	# in FFP-PM	Rank in FFP-PM
1	Human	190		
2	Risk Assessment	103	8	3
3	Decision Making	98	4	6
4	Risk Management	93	7	3
5	Organization And Management	91		
6	Project Management	73		
7	Offshore Oil Well Production	71		
8	Gas Industry	62		
9	Quality Control	58	6	4
10	Information Management	49		
11	Water Management	43		
13	Quality Assurance	40		

Table A.1: Top keywords in FFP and M research

B CITATION BURST DETECTION OF BIBLIOMETRIC ANALYSIS STEP I

From a bibliometric point of view, the burstness in citations and clustering are two important indicators of milestone in the development of certain scientific area [Chen, 2017]. The co-citation analysis was conducted to gain a grasp of the development of the topic *Fit for Purpose and Management* over time. As is suggested in figure B.1 where the blue line is the time scale and the length of red bars represents the duration of the citation burst, 20 references were found to have bursts for at least one year. These references tend to be of great value to this research and providers of "High-level Concepts" [Chen, 2017]. The scores on Strength column in figure B.1 reflect the significance of the milestones and normally in bibliomertirc studies using Citespace, a strength value of more than 15 can be considered as significant. However, none of the listed references in fact satisfied this "15-point" criterion to be recognized as a milestone. There is little evidence that can help to narrow down the targeted group of literature.

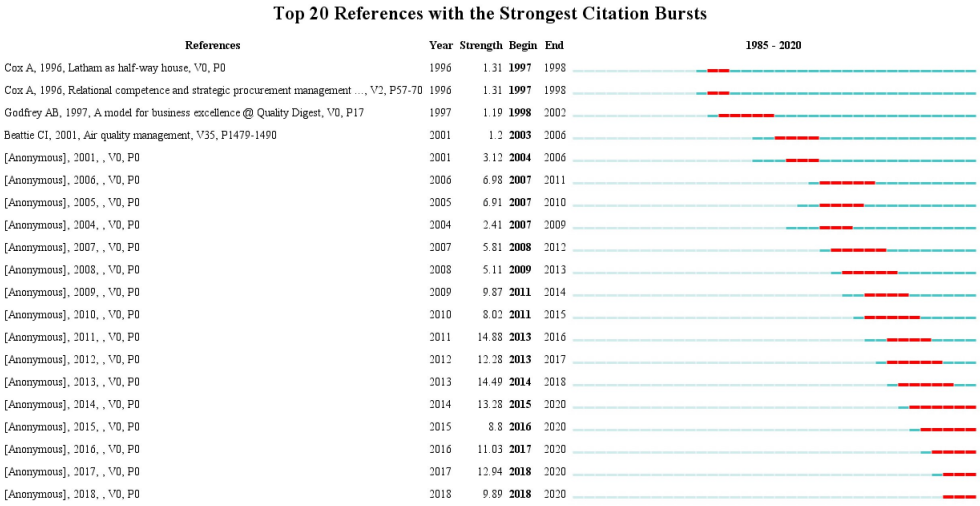

Figure B.1: 20 references with bursts in citation for more than 1 year

C TREND OF BIBLIOMETRIC ANALYSIS STEP II DOCUMENTS BY SOURCE

With regard to the sources of the found documents, as figure C.1 shows, the journal International Journal of Project Management (indicated by the curve painted in orange) has been playing a predominant role in producing articles that touch upon adaptations in project management in the last 20 years. Two major bursts can be found in year 2013-2015 and 2016-2017, during which the production of this journal outweighed the summation of other journals with 18 and 17 articles published respectively. The productivity of other journals in this topic tend to be rather steady compared with International Journal of Project Management. For example,the production of Construction Management and Economics (painted in purple) and Journal Of Construction Engineering And Management (painted in blue) have been fluctuating around 5 articles per year. The appearance of the journal Sustainability Switzerland (painted in green) is also noteworthy as it came into the picture in the year 2014 with 1 article and became the most dominant journal in the topic since 2019 surpassing International Journal of Project Management. This can be seen as a reflection of the fast growing importance of sustainability when defining objectives of projects. The need for adaptations was created since the success factors of project management can take on different looks when incorporating concepts such as Industry 4.0 and sustainability [Vrchota et al., 2021].

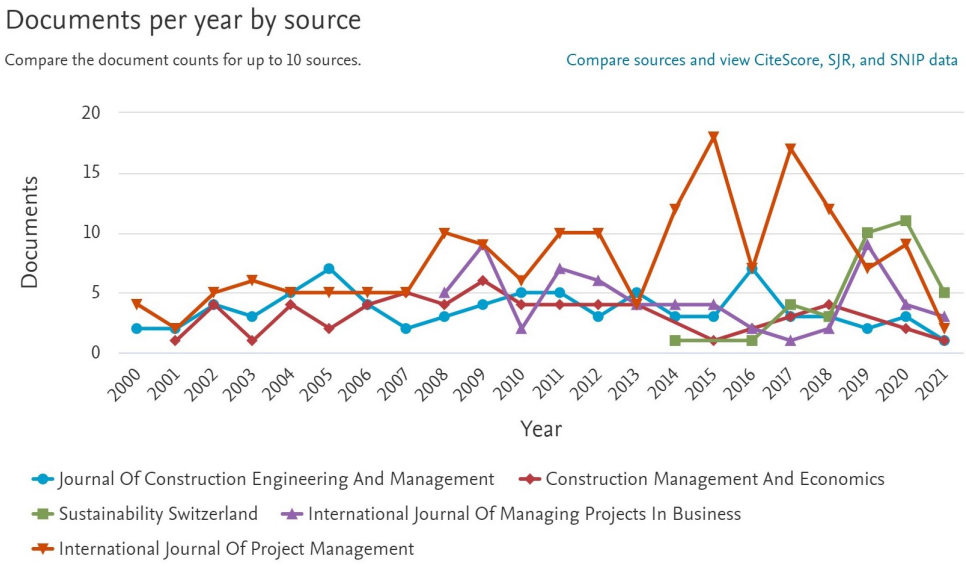

Figure C.1: Trend of 2528 found documents by source.

D CO-AUTHOR ANALYSIS OF BIBLIOMETRIC ANALYSIS STEP II

As was explained in section 4.2, the purpose of co-author analysis is to visualize who the most active and interactive authors are under this topic and how often they interact with another, which help form a clear view of the key contributors and their co-operations [Chen, 2017]. The co-author network of the selected data-set is conducted and the results are suggested by figure D.1. As can be seen from the upper part of the figure, some of the authors found to be active under this topic in subsection 4.3.1 also appeared in this network but the interactions among the authors are rather weak. The process report of this network suggests that this network is composed of 688 nodes representing authors with only 409 links, which indicates that only 688 authors of the total amount have cooperation history with other authors in this dataset and most of the cooperation are not consistent (409 links). So further actions like clustering a loose network as such would not deliver any useful insight to this research since majority of the co-operations of authors are one-time. The only region that might draw attention is in the center of the figure where a sub-network is composed of many names of authors overlapping one another. This region seems to be showing an opposite trend of the whole loose network as it was zoomed in (the lower part of figure D.1). However, the node detail shows that this mini network is synthesized from one article that has been published in three different journals and the grouping of authors were slightly different in three journals. The article is written by Teede et al. [2018] and titled *Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome* as suggested in figure D.2. Thus this mini-network turned out to be a false-positive caused by input duplicates rather than a region of interest in this loose co-author network.

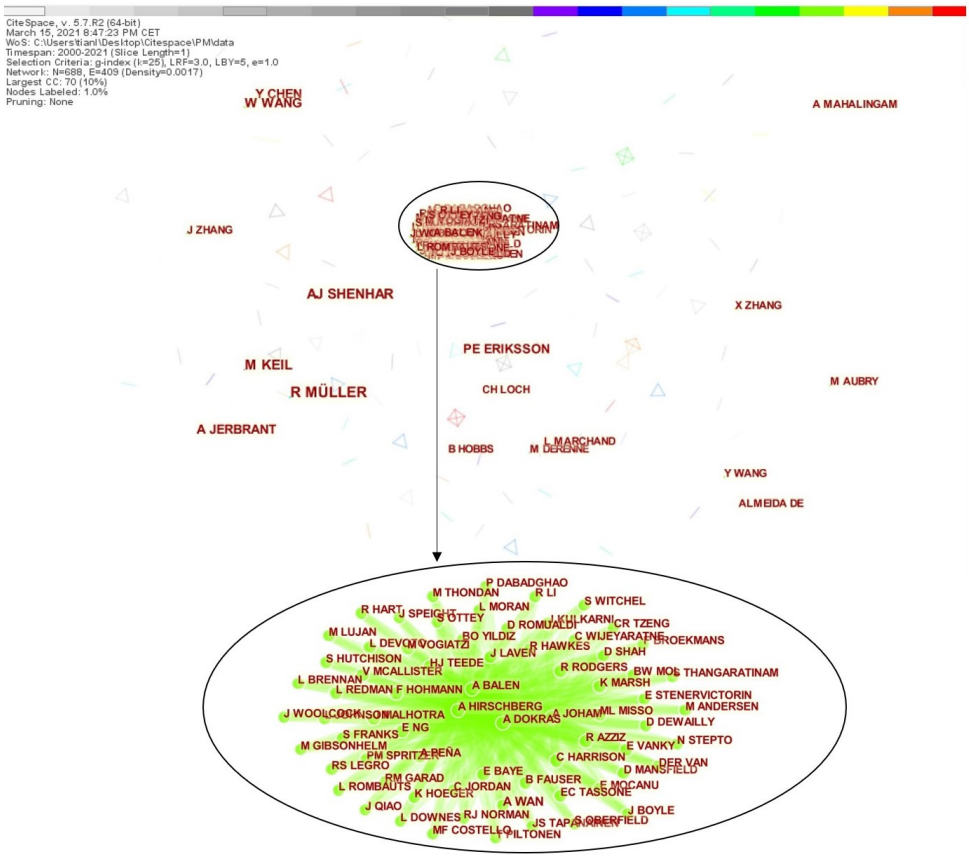

Figure D.1: Co-author network of the data-set.

Teede, H. J., Misso, M. L., Costello, M. F., Dokras, A., Laven, J., Moran, L., Piltonen, T., Norman, R. J., Andersen, M., Azziz, R., Balen, A., Baye, E., Boyle, J., Brennan, L., Broekmans, F., Dabadghao, P., Devoto, L., Dewailly, D., Downes, L., Fauser, B., Franks, S., Garad, R. M., Gibson-Helm, M., Harrison, C., Hart, R., Hawkes, R., Hirschberg, A., Hoeger, K., Hohmann, F., Hutchison, S., Joham, A., Johnson, L., Jordan, C., Kulkarni, J., Legro, R. S., Li, R., Lujan, M., Malhotra, J., Mansfield, D., Marsh, K., McAllister, V., Mocanu, E., Mol, B. W., Ng, E., Oberfield, S., Ottey, S., Peña, A., Qiao, J., Redman, L., Rodgers, R., Rombauts, L., Romualdi, D., Shah, D., Speight, J., Spritzer, P. M., Stener-Victorin, E., Stepto, N., Tapanainen, J. S., Tassone, E. C., Thangaratinam, S., Thondan, M., Tzeng, C. R., Van Der Spuy, Z., Vanky, E., Vogiatzi, M., Wan, A., Wijeyaratne, C., Witchel, S., Woolcock, J., and Yildiz, B. O. (2018). Recommendations from the international evidence-based guideline for the assessment and management of polycystic ovary syndrome. *Human Reproduction*, 33(9):1602–1618.

Figure D.2: List of authors of [Teede et al., 2018] in APA citation style.

E PRESCRIBED LIST: EXAMPLE SUB-QUESTIONS

1. Small projects benefit from sticking to the same procedures as big projects, regardless the industry you are working in

2.In a small project you would rather have a technical expert as project manager

3. Early involvement of contractors and suppliers is for small projects more important than for large projects

4. A stage gated process should be adhered to for all types of projects

5. In project management no phases nor activities can be skipped

6. A small project can better be done by combining various project phases into one

7. Risk management is only necessary for large projects

8. Risk identification is the most important part of risk management

9. A complex and large project can be better managed by splitting it up in a number of smaller projects

10. Small projects will be most successful if they are done by a stable project team that goes from project to project

11. The perceived or expected complexity prescribes which activities to execute in the project

12. All PMI PMBok ® prescribed project management activities should always be done

13. All project management activities should be done but the intensity can be adapted to the project size, complexity or context

14. In small projects you should skip certain activities, for example stakeholder management

15. Small projects do not require an integrated approach

16. The more interfaces in a project, the more managers you need

17. Project management activities should not be adapted, they are all mandatory: one size fits all

18. All project management activities are equally applicable to both large and small projects

19. The most important success factor is compliance with the project management standards

20. Change of scope should be prevented at all times

21. Change of scope should be embraced

22. Front end development is only finished when all designs, drawings, estimates, schedules are 100% completed with an accuracy of 10% or less

23. Concurrent engineering is the best way to be adaptable and guarantee improved project performance

24. Concurrent engineering is the best way to ruin your project

25. Value improvement practices can really add value to large projects only

26. Value improvement practices only add value when facilitated by a party external to the project team

27. Value improvement practices should be the standard approach for smaller projects

28. A more accurate estimate at the end of front end development will improve project success

29. Projects following a non- standard management approach deliver better performance

30. The coherence of the integral project team is the best factor for success

31. Homogeneous teams are the key to project success

32. Projects that capture the learnings at the end of every phase deliver better results

33. Comparing your project with external projects in the industry is the best stimulus for success

34. Regular management of the project risks is the single most important tool to guarantee project success

35. The bigger the project the more important are the social skills of a project manager

36. Female project managers create more successful projects

37. The bigger the project, the more broadly educated the project manager should be

38. Prior working experience between owner and contractor teams is a pre-condition for successful projects

39. Large projects cannot be successful

40. Only small projects can be successful

41. A successful project manager has a background in estimating and scheduling

42. The project manager should be involved from the inception of the idea till the very end of the project (handover)

43. Smaller teams are more coherent and therefor more successful than large teams

44. Multi-skilling of project staff is a necessary condition for success 45. A project manager should be broadly educated and be able to manage the skills but lead the staff

46. The project management approach is highly dependent on the experience of the project manager, since the project manager is the one to decide on the approach

47. Every project is unique so the project management approach is decided at the start of the project

48. Empathic project leaders always deliver better project performance

49. To be successful, you have to keep the external stakeholders at arm's length

50. Incentives for delivering faster and/or cheaper are not effective in projects

F INTERVIEW TRANSCRIPTS

F.1 INTEVIEW I WITH ROB KRETZERS:

Tianlin Ma: My name is Tianlin, and I'm currently a graduating student at CME construction management and engineering and one of my supervisors is Hans Bakker. And he direct me to this to have this interview with with you. And, this, this master thesis is all about the course is partially about the course and fit for purpose project management says you were , almost like involve. They have been involved in that processes, since its beginning, And you say this fairy, you're a good fit to be the one who tests these findings.
Rob Kretzers: Okay. What is the show is really the course is the course. I haven't looked back at the course, the name of the course it's fit for purpose project management.
Tianlin Ma: So, I will start. I prepared two slides about like some information about my research and I can see how I've come to these results. Okay. Yep. First problem and the problem I found is the existing literature the concept of fit for purpose does not have a widely accepted definition in the research field of project management, and the link between the two terms or have not been conceptualized, so the objective of this research is to investigate if there's a link, and try to build this link. So the research question is how can a term fit for purpose and its development be defined in project management. I use the a coupling of bibliometric analysis and content analysis to find these results, and for the bibliometric part I investigate how these two terms are linked in many many literature in the past 20 years. And first, the first step, I looked up, and fit for purpose and management, which gave me, like, more than 800 papers, and the second step I looked into adaptations and project management, which gave me more than 2000 papers. After filtering and like with, with a certain direction so I found a definition of fit for purpose project management as lessons from other management areas. And the second one is conducted on this cult analysis conducted on the 120 final assignments of the course. So I just, I use the qualitative, use the qualitative analysis to all the analyze all these all these essays into and fight to generate something, to see if there's any trends in the, in the interest of students, and also how these project management activities are conducted or practiced differently in different sectors and an in the end i will try to build up some theoretical framework of the term fit for purpose project management. Now, to my finding I clustered my findings into the following six themes. The first is the definition of the fit for purpose project management, and a need enablers and characteristics of fit for purpose project management skills and competencies of project managers, required by for purpose project management and there is some conflicting views I want to discuss with you, that they're kind of different in nature and this content analysis,

because in, because in the the essays the student wrote for me their second data. , for me, they're secondhand data they, they're they're built on the input of your lectures and classes, so this wise, I think it's kind of important to test these findings with the sort of these things. Okay, so, let's begin with the definition of the for purpose project manager says you are, you have been involved in this course for almost all eight, all these eight years so. And can you maybe

Rob Kretzers: I can't recall when I started, was it 14 or 15 Yeah, I think is 14 or, Yeah, I think. Yeah, because I think 14 to 15. Probably should look back, as probably 14 guys because I presume that he caught me at that Professor Barker, call me at the start of it. When he was, when I was still in my role in in shell.Okay, good back back to you.

Tianlin Ma: Can you Maybe give a definition of how you define the role of different project management?

Rob Kretzers: So, also, around, project management fit for purpose. So I think it's the word. The door evolves around to the work the word purpose out. And if you would, ethically follow. Take management by the books, and by the by, by given processes and standards. And I've seen that before the people just follow those, , they follow the theory, they follow the standard this processes that are given to them and the standards, and they don't reflect what is fit for purpose in this, and what do you really need. What is important to, to deliver the purpose of this project. And then you've got a big toolkit, where you should pull stuff out, that you, that you use. So it's, so it's fit for purpose. And one of the things that I've seen, just tell you a little bit story about it, is that what we tend to, if we don't, we tend to over Process Engineer and K in a lot of procedures and standards. Because every time that we have, we will click on to the lessons learned, we embed them into spouses of standards and procedures. And what I've seen in, in, in my career that we sometimes overdo it. People are overwhelmed by by all, all the procedure standards and documentation, you have to read it to that they forget to use the brakes and say, Okay, what is the purpose or what is this project about what is the purpose. How should I go about it, what is really important here and pick out of the toolkit, what is needed to support that instance, automatically, following the process, which is also forceful them because they're getting reviews at audits, and what protect hey you're not following the procedure. And I think, and finish it what we had to do to reset it really reset it is put aside all knowledge, and start again and say, Alright what is really important. And generally, keep it simple. What is really important, and, and then have a number of simple set of overalls or go by things that if you do something at least do these five or 10 things, and then start from there, because it's it's it's a cycle where first you let people just go experience get lost, mistakes are being made, you set up a lot of procedure process standards, etc. And then the grows and grows and grows and grows, people are overwhelmed, and they don't use their brains anymore, particular station to really say what is fit for purpose here. So I think there's a lot of power. Just understanding that basic there. Then when you do product management, it needs to be, it needs to be fitted to the purpose that you're going after, not all, not just for following the books, strict standards, anyhow, so that will be it so bushel that understand the purpose,

and then do your project manager which is fitted to their purpose, and not dogmatically following the books, all the learning from any error and each project because you will just be overwhelmed, and you lose track and lose, lose the view on what is really important. So it's a, it's a delicate balance, particularly when people experience they will, they will tend to move it off, a lot of policies and procedures and standards, which is a goal, but that still they should be pulled back again to a what is really what is what is really fit for purpose here. What is the use to make this particularly project a success, I forget about the obvious. Yes. Bit of a long story but that is also, , a bit a bit, that the waste that I've seen over, 10 or 20 years. In my, , all old role in the last 30 years or so. It's very tricky. But again, again I can, I can tell, big stories about it but let's take a bit to your program, otherwise you won't get through. By the way, I have more time so I've not looked at the end. So, not spresso time.

Tianlin Ma: Yep. So, I will share you with my definition that I came up with. It's a system have wisely selected methodologies to use in expertise to manage public management activities, define and shaped a specific value strategies with sound decision making means history experiences, Risk Management conducted close to the stakeholder values and welcoming attitude towards all certainties and changes.

Rob Kretzers: I think it's all in there, in a lot of words so let me just go through it again. It's like what I said though, the adaptive system of ways to , looking at toolbox and also it's key that you apart from tools, the other words is people widgets and expertise. so that you, one of the most simple ways of getting access to knowledge from the pastor is connecting people with people. It's the easiest course you can connect with knowledge, etc. With the data and information but but what they often do and always be fantasies about I think the first step is that well that's what we learned also in Shell is connecting people to people so that when to ask questions, and who did this before. Apart from the, the expertise at both high F that already have a civil engineer or electrical engineer or whatever, but also who was in the project which is like this, more or less. So it's the expertise is the people part as connecting people to people. Now of course specific values uncertainties Yes, some decision making a lot of natural history, experiences, or risk management closer sake also yes, and welcome. I think, so what is important here also is that the decision making. Yeah, and I think I told people that also in those lectures is that we as engineers tend to, to, to analyze a lot. Before we take a decision. And sometimes, , this kind of information and data you have available yourself. And at a certain point you have to take a particularly impressive project management to move on. And sometimes it goes well, often, that it goes wrong, and , regroup, itself, decision making, but also not over analyzing it, because sometimes you have to go also to files decision making. And I think that the learnings are so key. cause that's what I wrote in one of the, one of the things you said, it's people see learnings from history experience they often see more as I need to do a tick in the box instead that they really are believing it, passionate about it and saying, you really take time to, to learn from others and don't think that you have. Yeah, they have the average. Better than than others. A lot, a lot what I've seen over the years a lot of do they miss the mistakes or incidents that we had

before. Somehow we've been missed out on them. It's good to bring the learning to click into standards I believe also in the standards and technical cetera, that's where this will be embedded. But then they're also just how you deal with stakeholders how you deal with all the risks which are out there, and project teams at the end, they have to, first of all they have to have the discipline is discipline to write them down properly so they are be accessible. And that project teams who start an obligation to really look for them, but it's, it's, it's one of the most difficult fields I feel good in capturing later on this evening them into, into a new into the next projects, and they will practice, practitioners, and shopping and stuff like that but somehow we we missed. We have a tendency not to do. As people as humans do. That is still true there is a welcoming attitude of uncertainties and changes that are well you have defined it anyhow you, you're unable to every project is unique. So even if you embed everything in there, what you've done there what the procedures and standards, etc. I your stakeholders or your property management they still stuff, Your, your project journey at that moment in time,

which can happen to you. And what I always say to be yeah it's a, it's an attitude towards, but also that you have to have enough capacity which is linked to the attitude and say to deal with the uncertainties and the changes which will come, so that you have, , spent availably self, not to get, , too nervous too overexcited to stress. When you facing those uncertainties because they will come. And those new risks, which you didn't think about, even if you're taking good lessons learned for mothers. They still will be there, the journey, tedious. So you have your project and then the world around you see the stakeholders are changing, and even the value of the share stakeholders might be changing. And scope changes we get to that later, but they will happen also. There might be governments which impose it on other communities where you can't go past and it didn't recognize them when you were defining your project, and if you are just fighting them, that's, that's the welcoming attitude as you describe it if you find it just loose, so you need to have an open mind to them, and have the capacity to deal with it. So, in the context of your project and managed to mean managing the performance of the project and going forward towards the delivering it. Well you should not be dogmatic. This can't happen because it didn't write it down, that was notified. Three years ago, you have to have a sense for what was happening here, why is it happening at and deal with it. So I have this a lot in there.

Tianlin Ma: I do have a question about this. the scope changes. I mean, like, you usually manage those, like so.

Rob Kretzers: So the thing is, as you have been learning, it's it's essential that you do as good as possible. Your full band development, so that you're well prepared to go into the next phases, and that speaks for every project, but also that is a balance that you don't go too far, because then you will kill every project. Now, I think, first of all, those, those changes, and that's what you've learned also which anyhow I have to do, because it's not safe. It will not work, the stakeholder governments are scared that they are laws are being changed. Incidents perception of of communities changes so you cannot use it. Typically what we say is project no scope changes, But when they are there. You should have a when you need them to when they come

across your or your journey, your older journey, they come across. Yeah, you have to review them together with the relevant stakeholders in the room, to just don't take it decision by showing the corner say yes or no, no, you have to have people around the table, or give you arguments for it, and counter arguments against it, and the After After After the courage to have them all in the room so not just be with one party and exclude the other ones. So I'll tell you the past what happened a long time ago, at least. Typically they kept the operators just out of the door. I remember stories in the past, just even internal into companies that are building a new land to process plant that they will keep most the gates around the project and keep the operators out the future operators. We don't want to see you. We only want to see you when we complete. just because you were afraid that they will come up with scope changes, but they also come up with code changes because practitioners are they see the details, they see that some things are wrong. When you bring them along all the time and you have them all, they're always at the table, and giving you timely things so small things hopefully that need to be changed with all will work the way it's intended. It's troublesome, but in the end that leads to bad results, bringing the stakeholders along with you and having them on a regular basis, around the table when you also have to discuss certain changes that are being proposed and not do that. Because if you do that. It will bite later on it will bite you, heavily, people will take the project, people will process the project people, and, and you have to, and it's, it's hard work, because there will be people are very negative about certain things, and you just have to spend the time with them to listen to them, understand the point of view. Take that with you a decision by the COVID to do why. But after everything after Asia, and also keep it out on the distance, which happened typically in the past, what I've seen it say 20 years ago, and where we did that, and that didn't lead to good results but it takes a project manager who is somewhere in your story is also capable of doing that, it has to courage. Also to, and then stand firm. Yeah. But it's because it's it's just, it's just not, it's just hard when you have to talk to many people with different point of views, go through a lot of energy, but it's needed. Yeah,

Tianlin Ma: I can I can recognize some of the practices in the some of the stories you're already told told the students in the past eight years. Yeah, yeah. And I think I don't know how much do about process management, because I do recognize some of the and methodologies because you, you, you did include like rounds of negotiations with stakeholders to, to reach a negotiated result, as starting point of the project. Yeah. So, this is more, more likely Process Management way manageing projects. So, yeah, we'll we'll get back, Go back to this later in the hybrid approaches. Okay, so I think the definition part is more than enough.

Okay, Let's start with the need for fit for purpose project made. I think they're way more factors that are like actually putting the need to management, manage your projects with a fit for purpose purpose philosophy for the thing that the thing that I that I found to play the most important role is the interplay of size risk and complexity. So they're normally dynamic, and mutually reinforcing. So, this interplays kind of make already made the the traditional model of managing projects, less effective and inappropriate. To some extent, so can you recognize this in, in practice, yeah,

Rob Kretzers: yeah I can recognize it then I wrote down from last remarks, we talked already about that.

, so I could like make up projects that they need to relatively more capacity and capability to deal with the unexpected, , the changing landscape as I said during the journey. The other they have a far bigger diversity of stakeholders here, so it's the whole thing used exploiting all nations. And what I said to you earlier also. Yeah, to everybody, but the speaker speak complex project. The stakeholders are far more far wider geographically far wider you're selling big complex projects you're influenced more and more by what is happening in the global market. While developments that are shorter, that moment in time, we will develop a small project get a small look at the world a smaller argue, doesn't get bigger, everything gets bigger, not only the size of the board, the quota is which are the number of people know but also the stakeholders, and what you're impacted by, because you will be far more globally, for example, sort of sourcing your materials, and equipment, they will be far more globally sourcing your, your contractors and the people who have to work. Now when you're small, you've got local people etc which is. So it's it's just, it's, it doesn't bilinear it goes, It just goes it's not a hockey stick goes up. So now I fully agree. And they are. If one grows the other schools also also syscalls risks and complexity or. Yeah, and then apart from factor key. Maybe.

Tianlin Ma: Is there any other like factors that they'll say, okay, when this happened, we definitely need a for purpose way.

Rob Kretzers: : I think it's it's spread the risk and complexity. The most to the environment, but you have to report back so people are equally project. And you can ever, you can have a safe site. Technically, set the same site as technical complexity of a project. If you put it in a location where relatively easy going, well it's related. stakeholders availability, etc. With a seed project in an environment, and that's not where it's lacking. Yeah, find where you are, the location where you do project, whether it can be security risk you're doing it and we look at the area or the rock where we don't projects that the same size of port project certainly gets a completely different challenge, which, but it's embedded in the risks. In a way, the landscape where the location where you do the local stable, which are around it so that the nation local stakeholders say. Right. They can make, they certainly wouldn't fit for purpose for that but, so, so if you have the same technical project, and you have a certain approach which were in at one individual purpose easy I can do the same thing. This look innocent. Yeah, so the image location has a big impact on a watershed for the same, same size the same technical complexity. Okay,

Tianlin Ma: so maybe the context or cultural context.

Rob Kretzers: Yes, yes. Yeah, it's definitely the context to it, whereas the one that has a big impact on on watershed given project division, the way

Tianlin Ma: to look about the enablers. So , What drives what enabled for purpose project manager, I don't, I don't think this. What I wrote is enough. I think there are way more than that, due to the availability of data in the future so I cannot generalize a whole picture of this part, I think first is complexity. So what what I think. If the project is like under circumstances where the complexity. And like the sizes are small, there's no need to create

a favorite way. Because just like if you manage them by traditional model. Sometimes it's just enough. So yeah, that's what I'm thinking. And, and the other is the other is organization so. And the first one is the dynamic alignment and formulation of execution of strategies, because the market is, is constantly changing, so you cannot allow your formulation and execution strategies, mean is, in a stable environment. Yeah, so it's kind of a dynamic control of these. Yeah, so that, yeah,

Rob Kretzers: I agree with that, I think that well yeah I fully agree with that. Well, and this goes back to what you said earlier I wrote down that you're wanting to do and be open one approach and shoot the ball in the changing, so it comes back to fit for purpose again you signed up for what you think is fit for purpose. But then, , of course, , bigger complex in the difficult context. You, you, what you thought about what your what you saw will be the best way to go, but it may not always might not be fit for purpose for what, how the whole thing, how everything has changed around you on everything. It's, it's the the word adaptation which you were, which is important to don't get, racing in in text ended up in this way with these pillars of the organization, the structure might well be that unique, also the people bought the organization's won't bother but are in the organization, they make it happen. And you have to be open to, how should I adapt your game, and how should. How should I organize my resources, which is different than I thought. Two years before, but they're all defined is very well and we have big workshops to show that mediation and we love that purpose, and then you go on a journey. This is not working. What should I new adapter here, to be able to manage all this purpose, as we see that the length of the project now. And, and it's about adaptation, and I think you said, the worst thing is coming back a couple of times.

It's so important that, so there people have to change it, that sometimes you have to take hard decisions in letting go of people, or taking a risk. they have to set a weight because it's more fruitful for what you see. Be rich it is. It is a recipe for failure, it, when, when things get more complex, and the risks are brighter and more predictable. If you don't reach it in your car by multiple people. It's a way to do it, And know that you have to adapt. Yeah, I have a project that I meant to sync several several times and also we got myself several times to,

to just, , do laps around me and the lab, what is coming. And you just can't see, I think, five, six years out because, look, with COVID, no one no one expected that. So you've started three years ago, and your execution habits. You have to adapt. And you have to have the capacity and the courage and capability to do so, because you're not you don't have lessons from experience, you don't have you don't have to do to do. You have to add they add that in there. One of the things that we did in China, let's say, years ago 2010 They had to think through it but they had it. So, it can capability adapter. Really nice sir.

Yeah. I think this lifting is pretty much in line with waht we said about the context. Because just mentioned like the size of conflict complexity, the same but context. Available resources and stakeholder will be totally different. So you, you have to shape and based on these, not just based on the complexity or size of project,

because they, because that that policy is complex where the project is changing government there might be war going on my life the whole protest, even if people have done a lot of engagement, then certainly, we're not able to be pretty good them and then they see it, because is happening. And then, , good reaction, negative reaction

Tianlin Ma: is also written. Yes. Okay. And now let's talk about the characteristics of this fit for purpose project management, and the first, I wrote down the first one is decomposing, sizing and scaling.

Rob Kretzers: Yeah, yeah. I don't know. I fully agree. Yeah, yeah, it's, it's like you wrote it down I mean, it's, it's what experience is that secret is big, you need to make sure people to, to be able to leave management and and have a fruitful purpose management for that part of the project. And also I also used to dip our toe outdoors. The in the guest lectures but also the size of the project as an excuse to trouble, get into. So it's also say, given your opportunity to, to, to play the same project, because things are not going, because in yet. Every project is built out a lot of. So make sure the project will have 1000 jobs, another one will have 1,000,001 or more to split, where you split up into when you go into politics, projects, which are logical and manageable. That's nice to do so. That, of course you create. So you make manageable logical sub projects. But at the same time you should recognize the need an inverse then in interface management, because you creating interfaces. Yes. And you have to be clever about how the interface management. Because you should watch them, don't create some kind of monster who strikes you all the interfaces, the 1000s and 1000s of interfaces, and I think we'll get to interface management later on also. It's an again mentioned that now quickly it's, It's important that the bias, it's an echo on the list. The way that I think we watch out, so when you speak over all kinds of media projects, you have to do proper clever, what I would say smart ID management. You have to again there.

Rob Kretzers: he in his face with you guys. You have to agree. Okay, well it has to be. Is it the face is timely managed that you come together at the right moment in time that issue, you solve them in between you don't go into a big organization to seek solutions for that. But if the things are not working out between two parties, then it has to be elevated. That's how we run it, your towers except we have been running it, and then the interface resolution happened at a higher level in your organization, and the most difficult ones I would take myself at the top, but it's, it's that you it's like it you have a pyramid of a lot of work, said are 1000s of interfaces, 9980 or something they go very well. And so they get elevated, and we, we try to avoid that all interfaces are managed someday. Some way or centrally. Now, the ascent will manage locally, working out locally, set up a system, so that people have identified them, that they are capable of solving them. And if, and if they are not capable, and you help them resolve and resolve it. And in the end, the hell does it lead to a local resolution that was from the top, said, this is the way we're going to do it. And that's how we, , we managed 1000s of interfaces, less than 100 are shocking to the level to be resolved. But it's, , the, the, , the thing is, you have of course also interfaces at the smallest level, where little jobs are being done between two disciplines, but they also have to manage their interfaces. GIS is built up of many many many little

jobs. And now it is, it needs to be smart, should be managed to resolution so of interfaces should happen at the lowest level in your organization, and if not, there is an escalation model escalation model. Yeah, as an escalation. Model escalation model.

Tianlin Ma: So, I want to say stakeholder management. Do you do it, act iteratively? So do you update your stakeholder mapping after certain phases?

Rob Kretzers: It's the same as. So typically, stakeholder management is the same also risk management if you don't watch it. People do. Did you live in a, in a bubble there which is different. All that who are the stakeholders we've mapped them all the set up but you are sitting in a nice bubble there, you're not on the project, the context where you deal where you, you feel that the stakeholders, see and feel that, yeah, you're still attending a litigation which is , honeymoon period, in a, in an office environment, and you're not in the sense it or feel it because you're not there, then when you go into the project that's all thing, you then to meet Meaningful development also some of the stakeholders but many of them don't meet, that get me biggest F because you have not selected for example the contractor that you deal with and so you don't have the management of those people, or you have met the local community, get going to execute your work or you haven't acted nice that there are certain stakeholders because you didn't come across them. When you weren't doing the identity come up with any idea when you go there, and they see you there. Hey. Suddenly there's someone standing there and say, but what about this, what about that. Oh, I didn't know y'all but my stakeholder map I'll deal with you. Now, so, so you, you, the thing is that you, and then the stakeholders will change over time. Some will go some new rules come along, supposedly, some that you didn't think about. So if you don't keep your eyes open for ask them Okay, who are. It's like when you're, when you're going on this, I always call it a project journey when you go on the journey, or aren't you stakeholders come up the risks are changing, you want to come in, the good thing didn't think about it that despite all your folders and your lessons learned can add entity depth to them and say, and then you get what you call, certificates, okay. So, it's, it's, it's, it's, it's there to dogmatically to say mapping and live it Live it, they don't, they don't, they don't Okay. Okay, let's just, let's know you're in location. We are in the context of the project really in the midst of it again, That you are an execution bank okay why would people forget the past. But what are the people who read fail or make it. And it's true that mistake or bad habits, as a tick in the box. Before the investment decision is taken and then it just sits there, instead of, like with risk management step back every year or every half year and say okay, what's happening here. Well, our stakeholders, argue was, how should we, our, how are we engaging with what I, what are the issues with us. What did we see. So, it's, it, like, so I've got 40 with you. Good. Let's go to management. Yeah, I think we have

Tianlin Ma: For the scope change. It's found in the literature's. What I found the content analysis of these essays is that they are, I can see a trend that is getting more welcomed, or embraced, but mostly in front end. This is kind of confusing to me, is the literature says he braced all the time.

Rob Kretzers: But how the hell do they meet, well do they typically say hello to why, why, brace him and why is it because they happen because she took out no anything, or what is,

Tianlin Ma: what is yeah. Management of changes, like, some like system with lot of roadmaps or and protocols that you agreed, you agreed upon that earlier on when changes happen this that said, so yeah. Yep. So that's how we integrate this, like, embrace this embrace. Yeah. So yeah, they're fully committed to them. And just, yeah, there's what ledger says, but the general. Yeah, yeah, yeah, go ahead. Yeah, the general understanding of the the essays is that risk should be, and before, it's kind of like the pre, 13 or 13 or 14 was like very negative like surely has to be frozen. Yeah, it has to be after investment or the specifications work read. And now it's like in recent years, it's okay. It's fully flexible in front end. And we do have, like, projects can, we can incorporate these changes in the front end and we, as soon as the, the project commences the room to inform changes, is, is his little

Rob Kretzers: thing is that when you go into the implementation phase. There will be some that you have overseen my V stuff, no substitute for SR say hey it's simply work or it's not safe for

will say around you. And do you have to have. So, sculpting. No changes I guess they will come across. And you will have to, like I said earlier the right stakeholders around the table to make a decision on what to do. So we say, put your head in the sand. This is, Like we say this, it's not that that's that's that's good for purpose voice calls and beta etc and do the right people on the capability, capacity to deal with. If you do lousy for the developer, make it, it means. I've seen it, they'll see it. Yeah, and some of the non executive board roles, FC and all of that major infrastructure projects around 10 to 30 50%, said making big scope change this the second and third order of the scope changes our message. So just having cupcakes, is the wrong thing to do, but having enough. It's realistic. So, that important that you avoid the big ones, because the big ones build the real project that will lead to enormous breeders and you're better off stopping them, then caught and that's sort of seen also I've seen objects that had to be stopped. So big and the impacts are so big that they will not. they will not attract the right amount of people. It puts me into opposing say no, no, no, that's an older because, yeah, yeah, and, and if people say, oh I can do. Let's do some short coastal development, I will deal with that, like,

that's all. Also, feel balanced to say yes it will be there, but small, manageable, with the right stakeholders. Small labeled decisions. Avoid maximum any the big ones. Yes, doing portfolio development. And all this shall be cool. But if people want to go to the port development, because they can't talk to the execution of the project because it's fiscal work to be done. Let's make that small not like this but good. , shorter period faster and make mistakes, and this thing goes wrong. Or they say I standardize and I didn't put before that you can scope chains are killing changes and they are killers of projects. It's literally been written if you notice, there's so much he says that, and it's still happening as we speak, that experience, that Rails project. One of the things that he might even have been sculpted back to the stakeholders. That's all. Powerful stakeholders who can use the alien. Do your front end. Yeah,

Tianlin Ma: yeah. And those, make sure there's room for small, manageable changes that we actually occurs you just a bear, with the right stakeholders.Yeah. Okay. Okay but lesson learned. The first thing I wrote down is priviliged standarized and their work nice. What's your take on this.

Rob Kretzers: I fully agree. Yeah, project management. It starts with. Of course it starts with people, winning because it takes. Failure should I rather hide and then I want to show it to the world kind of mistakes that make it very visible Bartek, people really really come down and, and they don't see it as, Oh, my God. Here he goes my future, etc. All right, what excited me instead of what lessons I've learned. Okay. Welcome to share the show is presented its people with what they could have done better, because it's failure, that they are communicate failure to warn us about what a failure, keeping out people. Yeah, often also see that, , I know better, so I don't look arrogant about it, why, why should I read about the failures. Instead of well they can take it can look and they'll say oh let's read read about, because I will not fail. And no need to be to renal failure. Instead of these are lessons. Learn the lessons and. And it's, it all has to go in the end it's all knowledge, the easiest ones, or you can use a better way to make change have a technical standard. People know if they have to do the next topic the technical standard of the lesson is embedded into the safest way, but it's also that there are many lessons, which are more around soft skills, more with your stakeholders, hard technical well embedded in an easily standardized and organized. But it's the soft stuff. The way that you whether it's how you dealt with people what you look when you were managing your workload will be better. Because strategy. It's no secret there's also less, is it, do it alone. Do it at the end of the workshop to reflect about the five years, people have forgotten how they felt. Five years ago, moment in time coupled to failures where that moment in time. So it's, it's, it's the regular basis captured or lessons learned during the journey and not at the end of the journey. Yeah, this is the early days of the getting out of the message loop is very important, because if people are not willing to learn and to really look at them. We can put a lot of stuff that they write it all down and it'll do many things. We have tried to make videos, interviews, people telling war stories, etc. Because they also have stigma, so I think the double messenger database. I think one of the things which from what already mentioned and, , many standards and procedures and

worked out for us people that they interview people, They cannot people tell the story. So I set the sub country in India. Works big workshops or that it was recorded, and then people could look. Also that you're more powerful when it's telling you that people tell a five minute story about something quite powerful, and it could be elite, it could be used not only when people will prepare for projects, but also we had a, we still have a Project Academy channel where people will train managers in there. Also, this was being used. The CD of words. Words is our powerful way of also being the lessons learned across. But I think that they had been mentioned also in the bottles that they chose. So is it sort of a database. It's a database unit structure your your knowledge management and certainly, you don't have a better than it specs but you still might be able to write in a database file is something that I mentioned at the start is connecting people to people that if you are going to

execute a certain portion, location, he said okay, it's not a poor thing and you should be open to the debate into South Iraq, building there has been there before, and then a list of names. What happened in the past is that people just talk to one another. Don't talk to that guy. But we try to improve and to make people to people. People to People with. It's an element experience. And I think, get used to that we now have a lot of YouTube's a rich database of stuff where you have to link it to.

Tianlin Ma: Hybrid approaches. Yeah. Do you recognize them.

Rob Kretzers: Yeah. And the second one. Oh, yeah, I can actually. Well, the adaptive and iterative workstyle performed and struggling what it meant for here I agree with, yeah, yeah, I can see it. Yeah.

Tianlin Ma: So but the first one, the very beginning of research two was very appealing to me because you is is very participative and you you do so many other approaches, but, but now actually what I see in in practice, like people were still kind of dead tours, because managing your projects on the basis of either the books or organizational specific guidebooks. So, I'm interested in seeing other methodologies like people are hesitant.

Rob Kretzers: Yeah, yeah, I think, I think you should be. Because they, they lack the experience or they tend to be tend to go through to say, , more safe place of this what I've been taught. And, and they have to. They have to trust also their own brains. Say hey be until golden hour conversation that balance as people start to follow too much. Instead of begging to know what is fit for purpose here. No no no notice. There's couple of awful things that I really, , to think about. And then be adaptive. One is fit for purpose for that project to find problem and properly manage it. And that's about the words with purpose, that you truly live that. But, of course you have to. At the start, , it could be in a project management, you're lacking the experience, and you need to compensate that balance that with something else that you're lacking experience. You, uh that the powerful thing in why I believe very strongly, is people should have the courage to get up. So they should not be should not use go to the book to find help, but also go to other people to find help other people go to the book to find out but you stick to the procedures and the pauses and even go more deeper into literature for those for that need to do. But seeking help, is not only the book to a person's. And then people don't tend to do that they feel that there's a failure, and an elder is not a failure as what I've been beating also HST, it's fairly powerful when you go and seek help. And that's a. So, so, so, actiive integration of methodology. Yes, but gold, people say Oh, should I go about this. I'd be open minded about it.

In, what you have learned from the books that again other words, purpose, yes. Think this is good project manager. My job was there. And so the technical part of it, I think what's important is that put me in a project manager, Is that he had different experiences of self which at this point, so that someone has, , don't call stuff, or has knowledge of content you get to qubit, as though sort of planning and estimating and some engineering at the lower level. So, if you go if you go straight into. So we come out of bringing that straight into project management. It's better than to go with such an engineer on the building side, we will build something. Also, which I did also. And then you go into a hole in a formal development. Even you

go into the outside of projects where you say okay I have to help maintain an existing thing which was built by someone who you see also that they made when they were building it so it's a, you build up your skills. A bit broader than straight only doing management, because you need to have some scars and experience all the different disciplines and activities that you typically have in the project, and understand them. And it's, then, , that you don't you get your own little project. And the small scale that you go in, in your capabilities. So, they get to hear what you say that is amenable to acquire the ability to ask the right to the right experts. It's like going back to seeking help, I don't have all knowledge, he just, but we should go outside of the team we should go to that person to ask him or what to do about this. And then the other part which the next box is around to the soft skills. Now, one of the things which I find very important, which is perfectly valid, probably. Now, is that you are only successful. In my view, as a project manager, the respect, the trust and the loyalty of your team to the respect, trust and loyalty on your team and the team is being used your project team and it's also, the stakeholders, internally or externally that people say okay this is, which I can respect the trust. Yes. And that leads that you have to have a good relationship skills are good, , you'll be able to go to ships with stakeholders, still you can be good relationships, still they can be stakeholders or adversity, but at least you don't avoid them and have, , have a conversation. Don't hide from them. So it's, it's a word sensitive will be that you mean that by it. And the communication skills and also the related, and address capabilities, that's probably a better respect, like the other people. Yeah, they won't do it. Because you say he, he, he or she takes care of us, we take care of him or people. It's IT support your manager. He's a donor for more than, for lobbying I love to do it. But I'd say it's a very broad spectrum of have capabilities, but one more on the project management pointing at the tech, but also children get bigger and bigger, soft skills, social skills are becoming more and more important, more and more portable, more, more determining also whether you're successful, is.

Tianlin Ma: And also like question about the project managers, future, like the role of project managers was seldom mentioned, take them mostly by him so like to conduct your activities fit for purpose in a peripheral purpose way you should do this this this that the never mentioned project managers. So

Rob Kretzers: Yeah, it's, it goes, yeah. You would expect that. Because if you would look at what is a good manager, but a good manager, , you've heard that also often is a different difference. A manager is not equal to a leader. So we haven't used the word leader yet but it also needs to be a very good leader which was a bit better than what I said earlier, because the leader is not in a hierarchy, but is being seen as people, we will follow him or her. And, and then your soft skills, your technical skills because you should also be capable of managing your project but in your soft skills, that's where people would actually nicely, communicate what allows you take care of us got to communicate to stakeholders. So that's where the, the leader parties. Is there. Sometimes calls call coming in for myself that my wife will kick. Sue, so, yes.

Tianlin Ma: And one more question with respect to acceptance. My question about this like, Oh, I like to know when would you accept the

Rob Kretzers: accept it. Let it be. Yeah. Except the reason to me, vigorous care is a risk, because it because if it's, if there is a risk that you have to do it whenever you need it mitigated. Yeah, recognizing that it's a risk, so it's a, it's, it's, yeah, accepting that or seeing that.Yeah, and not be dismissive. So it's, it's, again, there it's how open to bottle Steagall must be the risk where you say on a sole risk. Why are they bringing it. Let's really be open and listen, stakeholder and understand why does he perceive it as a risk. What what are you afraid of what happened and why would I would, and how likely is it going to be that it will happen. And then you could take decision yourself to, I'm going to manage that risk. But it's the openness and the arguments or the yield. And the openness of listening. Yes. Why is the person saying, alright. What what is he running. He's worried about other things and you are, he or she. So, that's the openness and willingness to listen. Understanding of person.

F.2 INTERVIEW II WITH HERMAN MOOI

Tianlin Ma Okay, so can you please first, and maybe give me your definition of fit for purpose project management?

Herman Mooi I use it a lot in ASML to start with. And for me fit for purpose project management is that you apply a set of tools and mechanisms. and project management, that is enough, as necessary and enough, but not more than that. Oh, yeah. And I would almost also add that I will I always advise all the project leads at ASML to do as little as possible.

Do bare minimum.

So maybe only the necessary the real, the truly necessary stuff. That means that template structures, that kind of thing. Yeah. So a bit lengthy, but you can you I hope you can make something out of it.

Tianlin Ma Yeah. Yes. So this is the definition I came up with after visiting all the literature, like after those are working 3000 dead Sure. 3000 papers. This is what actually I came up with. Yeah, that's very complete. Yeah, I don't know, like,

Herman Mooi I would, I would, I would already stop as an addict, this system of yz selected methodologies, tools and expertise to manage the project activities. And I will stop. Yeah. Because it's defined by a lot of things. But I mean, for me, the practical definition is the first part of the sentence. Oh, yeah. Yeah.

Tianlin Ma We'll try to incorporate this point. Oh, but also, like, there's in quite unique objective that I found in literature just like, is the alignment of formulation and implementation of strategies that minimize the expected loss? I don't know. Kind of recognize this

Herman Mooi unique objective for project management approach, assess is the alignment of formulation. immunization of strategies was for me very difficult. I don't I don't think I really understand what you mean by that. project management approach a search is that is the alignment or formula-

tion of strategies. The alignment of implementation strategies. Now I really don't understand what it means. Sorry.
Tianlin Ma Yeah, we'll get back to this. next couple slides. So yeah, okay, let's start with a they actually the starting point of this whole research, it's why we need fit for purpose project. I think I do think there are way like lot more factors that are like how do you say, make this approach needed, but the thing that I've found to play the most important role is the interplay of size, risk and complexity. So he's kind of a dynamic interplay of size risk and complexity. And because like the for instance, the size increases the risks and also the complexity and the latter to also kind of mutually mutually reinforcing each other. Do you agree with it?
Herman Mooi So what you say is the need for fit for purpose project management is the is the so the reason for doing fit for purpose is the size risk and complexity of a project.
Tianlin Ma One of
Herman Mooi one of the one of the reasons that it's fine,
Tianlin Ma yeah. So maybe do you have like any other needs, which is why do we need fit for purpose?
Herman Mooi Yeah, basically, I would mention all the factors that determine that determine the approach in the project. Yeah. There is an incomplete if so do you include in complexity, the whole TOE framework of Marian, for example? So technical complexity economic reflect organizational complexity.
Tianlin Ma Yeah. But the thing is like the size is already part of the TOE framework, right? Yes, this part I think complexities more refer to technical and organizational,
Herman Mooi a should be careful, because if that's then if that's the case, so that's why I say for me, complexity is this to a framework of Marian. That's how so it's very general, as sorcery is very broad. And then it also encapsulates, basically everything, because you have kind of complexity is reading things. And then based on the complexity of certain things, you will adapt your project approach accordingly. And then I'm fine. But I have to be sure, for example, that technical complexity issue is in tech in complexity. And I have to be sure that organizational complexity is in complexity. So that's why I say it,
Tianlin Ma because the theory framework is more broad is broader. So yes,
Herman Mooi yeah, and including, like you say, size and risk. So you could even maybe only see a say, the need for a fit for purpose is driven by complexity in a general sense, but then including everything of the TOE, or human size or risk. Okay.
Tianlin Ma And then is the enablers of this approach. And the thing to deal with the complexities and evaluation, the complexity evaluation the earlier stages. So actually applying these evaluation tools can help the managers to better understand the context and the potential difficulties to decide what activities to be executed. So I see this as kind of a enabler. Yeah. And from the organization, point of view, and first days did the dynamic alignment and formulation execution strategy. So this is this like, because the market is constantly changing? And you like the organizations have to to come up with strategies that are fit to the needs of the market where they want to

maintain their market of comparable advant advantages of those strategies? So it's not quite stable. So it's kind of a dynamic alignment of these two. So maybe so. So you have to shape or define projects in this way.

Herman Mooi So do you mean here that the market, the market situation could deep good determine the way that you organize the project? Also? disrupt mine?

Tianlin Ma Yeah. Like, we'll determine how you define a project. Yeah, but

Herman Mooi let's assume you have a project that runs for three years. Yeah. And then in year two, the market situate in your in year one, you organize it, you structure the projects, according to them, then current market, and then the market changes in the in the second year, then because of this, you would propose to change the way you're organized the project.

Tianlin Ma Not so sure. But, and this is kind of, but I say this a bit more. The question is like, what would you do if like the market kind of changes? This is gonna keep going, or?

Herman Mooi Ah, that's silly as it depends. Yeah, it's really bad. It's because you don't want to end up that volatile that you whatever happens in the market, you always keep on reconsidering your the existence of all your projects. But if there is a huge change, like with the oil price, for example, e shell, if the drops below a certain amount of dollars per barrel, then you need to do so. So that that really depends. But in, in ASML, you know what ASML is, right? Yeah. So if in ASML in 2008, the quarter there was an economic crisis. And then we did not stop the development of our machines. Not at all. We just went on if it's as if nothing was happening in the market. And that was a good choice because I went it turned When the market turns in positive direction again in 2009, and 10, then it was great that we had invested in further developing machines. And we could we caught a good sell our machines even better. Oh, yeah. So it really depends.

Tianlin Ma So, yeah. So this it kind of depends on depends on industry or depends on?

Herman Mooi Yes. Yeah, it really depends on the situation. Yeah. And I would also advise to make it not too strict, because then you end up with a very fertile and you could also say unstable, or super nervous project environment. If you look outside constantly. There needs to be a filter, an easing filtering in between. Okay.

Tianlin Ma Yes. And then it's the adaptations. And the first, the first practice in adaptation of this management approach is decomposing sizing, scaling of PMF tivities. So, can you recognize this one?

Herman Mooi Yes, absolutely. You've got posing sizing and scaling is, for me, one of the crucial things of project management in the first place, when you have the total scope of a project and you break that down into pieces. And if you didn't need sub sub projects, or you needed a higher level program, and are abused, etc, you absolutely do that. That's absolutely crucial. Yeah.

Tianlin Ma Yeah. But then is that then it's like how, how to like, do you have how to manage those those interfaces?

Herman Mooi That's the second topic, right? Yep. Yeah, that's true. What's your right there? I mean, the more you break it down into pieces, then you then you introduce in the lead, like you say, interfaces. And those have to

be managed through the like you say, with your pro appropriate interface tooling, like dependency, dependency locks, or the schedules in which you were in were in which you depict the dependencies. Yeah. But if you break them down into pieces, you want to break them down into pieces that are as independent as possible from each other. Yeah, and but if you can give a piece to project lead number, or sorry, Team Lead number, Timmy a, and a team lead a can do his or her work independent from Team Lead? B. Yeah. That is the that's the positive, the most positive situation? Yeah. So and if there's like, if something happened, where something didn't work out in the interfaces?

Tianlin Ma And so what's the what's the normal action? Typical action? Is not the first Yeah,

Herman Mooi the typical plan, do check act. First, you have to plan for it, and you do it. And then you check for it. So that you check basically, it's about checking and and taking actions if if needed. Yeah. And then you take the action, and then you check again, whether there was sufficient yes or no.

Tianlin Ma Okay.

Herman Mooi And so it needs to be some kind of constant monitoring. But in practice, you see that programs struggle a lot with that it's really far from trivial to manage dependencies. Because the dependency by definition is out of your scope. And isn't enough. So it's always difficult because you cannot control it. And now you are dependent on other people. And it's typically people don't like it.

Tianlin Ma Yeah, then that is another question. So as a project manager, do you, actually and I say like, do you actually monitor or just keep your eyes on all the interfaces where you have like sort of escalation model,

Herman Mooi Both also, you have an escalation model, and then typically, Project Lead start or team leads start to yell and then oh, that doesn't work and I didn't get your input, blah, blah. But you also have an active list in which you have a list. Very simple. You have a new date, and you have a date, and if there is a tension between it, then you can start. Again, that's the monitoring part. Then you can add managing so It's both.

Tianlin Ma Yeah. Okay. It's good. And the second topic is the active at iterative stakeholder management. So, do you actually change the mapping of stakeholders? Were the evaluation stakeholders after certain like stage case, where milestones

Herman Mooi also depends a bit a bit, it is really a bit because why do I say this at certain important old days? For example, if you if you go into the execution phase, and depends on the method, of course, how does call but if you go into executing, so, you started with the initiating and defining phase or planning phase, and then you start executing, and at that the ready to edit executing, execution is start. You look at it deliberately, like, was it done well enough. But a stakeholder management is, of course, the work of a project lead, so that needs to needs to have also continuous attention. So, you, but you also do look at it very carefully at state gate at the state gate passages.

Tianlin Ma So, yeah, it's not, it's not a action like tick in the box. It's

Herman Mooi like, No, not at all. No contrary. If I do also reviews of projects, if you see that it's just ticking the box, and they get an insufficient grade for that topic. Okay.

Tianlin Ma That's actually very nice input.

risk management. And whenever I was close to stakeholders values. And so basically, for the risk manager, I like to note like how you do the risk management activities? Do you stand there use, like standardized methodologies or kind of project dependent?

Herman Mooi No, we use standardized methods. Absolutely. There's, we have an s no rocket science, but we have just a risk law risk register, and that's center thing. And we forget to use that for all the projects. And programs.

Tianlin Ma Yeah, but then do you incorporate value stakeholders during the risk management?

Herman Mooi Oh, of course, of course, risks only matter if they are related to some stakeholder value. And if they are not related to stakeholder value, then you're not none. You don't care?

Tianlin Ma Yeah. Okay. But when it comes to sub sourcing, sorry, outsourcing. Yeah. So is it? Do you actually have a score for each maybe? huge project, big project? Do you actually share those risk database or?

Herman Mooi No, no, no, no, we don't. That's also the only if necessary. If there is risk related to the outsourcing part of a project, then yes, you you share that? Because that is that is crucial communication information between us as owner organization and the service supplier. Yeah, but we don't share the risk register in general. Absolutely. Not. Neither am I interested in the risk registers of the suppliers, as long as they can they show that they are well enough on top of things. Oh, yeah. its own work. If they do it properly, you have the feeling that they do it properly, then certainly fine with me, I don't want to know if they screw up for some reason, if they cannot make it work or whatever, they they are behind the schedulers things like that, come on over and over again. And then you might do it.

Tianlin Ma So it depends on the situation where the performance of the projects Yeah. And then is the scope change. And basically, from the content analysis from after reviewing all the essays, I have kind of feeling a trend that is like the changes are becoming more welcomed and embraced. And basically, at the beginning of 2013 14, like the the general attitude was kind of fair, inactive, saying, Yeah, there has to be frozen after a certain point. And now it's like it's especially in the front end, especially in the front end like and the flexibility the flexibility of scope is I'll rephrase like, in the front end, the scope is kind of more flexible than before. So can you recognize this one?

Herman Mooi Yeah,

I can. That is this is, but for me, this is 100%. related to the trend of agile. Yeah, you're aware of that, right? Yeah. So what we get what we always realize was that doing a project, you have to do with uncertainties in any environment, or in the, in old triple constraints, basically, of a project. So that's, that was always the case. Or always you were kind of flex, you needed to be flexible, because otherwise you were not capable of dealing with the uncertainties in projects that are they're infringing. But there was a

tendency, and it's also if you think you're also talked to a shell guy. In shell, there was also always kind of oo scope change mindset. So that the moment that there was a decision, and then they started to do the feats that the front end and engineering design, then they kind of froze it, because if you don't, then you keep on changing. And that does not help the big things as you do on the oil and gas industry. Yeah. But looking in my industry with the machines that are not ready anyway, for a long time. And so an already sold, but we keep on improving them, then change is kind of the the world that we're living in. Oh, yeah. So so you're absolutely right, this the scope changes are more and more welcomed, and absolutely does also certainly holds in the virtual world of it. And it not in the hardware so much, but in the in the programs and in the tools there. That is 100

Tianlin Ma Okay, so Okay, I think this is , the management management of changes through I would like to know, like, what are the typical actions towards scope changes,

Herman Mooi scope change, you need to do with this case, just change law. So that you that you request the change, then you by deliberately on what change to do and what not to do, day to do it, you. You manage it according to the specifications and the needs. So if you need to go back to the drawing table, then you do that, if you can do it within the current design that you do also do it. So as we have a kind of PCC strain methodology for that how we look at a problem, we look at the cause and the root causes, and we come up with either a containment or a solution, and then we start testing the solution. And then we start to implement it, but you have a delivered the decision, that's the the major thing on it, do we take this on board? Yes or no? In order to do so you need to know a bit of the problem behind it and the root cause you need to have a bit of analysis. And if it's only small changes, then don't do it of course, because then then you waste money for nothing. You can either just due to change or not, whether you have a quick quick guess of it. But if you're larger changes with larger consequences, then you that cost you already quite some effort to to to do that event and to do sorry to do that inventory.

Tianlin Ma In this the lesson learned and the firt the first thing I wrote down is a formalized send arise to an organized so and I like to know how you you've been practicing project learning.

Yeah, we we are already proud that we are doing it in the first place because there was this bit of a tricky thing. organization and dancing cowboy like environment like Asian village and it's sometimes difficult to kind of stand still and look in the mirror and say what did we learn? So I'm already glad that we have that we have some best practice for it. We have some framework where we can start lessons learned, and we do it. But that is not very not not 100

Herman Mooi So okay for the update the lesson, lesson database. So do you have something like for, especially for the training of the like a junior project managers?

So we know we have it, we have it.

Tianlin Ma So what are the forms of these lessons thing?

Herman Mooi That is sure that is really ripe and green, as we say in Dutch. That's, that's all a very diverse lessons, of course, are about the technicalities

of value structure. Some are about the people, some are about stakeholder engagement, some are about governance, engagement, some are about etc. So it's all over the place. And most of the time, it's, I was you could even say always, it's related to some kind of project management, best practice that we already knew. That was important, but we didn't stick to stick to well enough.

Tianlin Ma Yeah, no. So I also noticed that in the literature, that there's lack of willingness to share, to share the failure experiences.

Herman Mooi Yeah, there's always a bit of a tricky thing, but I must say that in ASML , we are quite, quite open in that. Yeah. That is quite okay. We have really a can do and, and kind of very practical motors like, Well, yeah, first, we screwed up. And next time, we need to do it better, but here it is. So it is kind of okay.

Tianlin Ma Yeah. So and if, if one needs help, like he needs help from someone else, or some more experienced people, so how do you connect people to people? For further lessons?

Herman Mooi Yeah, we have communities for that, for example. We have bodies like quality assurance for that. I'm a project management expert, and people approached me. So then they asked me for lessons learned. You go to peer colleagues, Project Lead share the we discuss about projects, peer to peer. We have community events. Yeah, that kind of things. Yeah. Okay.

Tianlin Ma And then is the hybrid approaches. And a, the firt. The first, the first factor is active integration methodologies from other adaptive pm approaches. So from the interview of shell can see in front end, they're quite, they're using quite a lot process management . Yeah, under industries. they're kind of, but the thing is about agile, about agile is that like, there's no I say widespread application in other industries. So I don't know how much of where to what extent he already developed in your industry or

Herman Mooi we are very busy with implementing death, I mean, even in the development of the machines, and in the continuous improvement projects that are not related to machines, we use agile techniques. And we are, we realized that that is that can add add value. So we are absolutely busy with doing it. And does it all go well. No. Are we sure that we will completely turn agile? No, absolutely not. So so for me there's always mix it like you say it's an integration of methodologies rather than choosing for. So, very blindly go into the direction of only agile which I don't think is wise as the SRM looking for

Tianlin Ma and also and Can you maybe like describe your work style in the front end engineering or in a different league?

Herman Mooi Do you mean that in the development of the machines, yeah. Yeah. So basically, what we do is also in the development of our machines, we work kind of Agile already. Because when we ship machines that is that is machines that are sometimes not completely up to par with all the specs already. So that's then called a minimum viable product. And then we start iteratively improve the machines towards the spec. That are our That should have should be in place for certain machine.

Tianlin Ma Okay, let's keep it rolling is the front end I didn't catch that the part of your like machine developing

Herman Mooi Yeah, and so, basically, the question was how do we do so, basically, we we are kind of iterative, anyway, we, because we are because we are inventing machines, we never sure whether a certain path will work. So, we cannot go all the way because we are just not experienced in how we should develop a shared machine because we that was never done before is really kind of a kind of research. So, we we always do it in smaller steps as small as smaller concept studies and the feasibility of things and that kind of things, and then also waltz in the product and product developments or machine development, but also in the development of applications and tooling on processes that are needed for developing machines. So, that's the non productive Related development. Some both ways, we typically work adaptive and enter iteratively

Tianlin Ma that is the first depart I found that this kind of a conflicting view between the literature and the cost analysis, the first Firstly, the role of project managers was, like, seldom mentioned in the literature in in, like, conducting a favored purpose, philosophy, project management. So, the youth and but actually, on the other hand, the in the, in the content analysis in the, in the essays is, is one of the most important part topic, I would say, worse, so, I don't know, do you have any insights into the insights and what in this conflict is why there's why there isn't like anything about project the skills or competencies, competencies of project manager in literature about this in this topic.

Herman Mooi Yeah. So what I always told in literature in lectures, because I also used to teach any university is basically, project lead is a sheep with 35 legs. So as with a huge and broad set of skills and competencies that are necessary, because they need to be stakeholder, good stakeholder managers, good risk managers, good technical involved. Good, they should be good in structuring, about problem solving about issue solving about, etc, etc, benefits management, financial management planning. So there's a lot that is on the desk on the responsibility of a project lead, but they have to realize that the what they what their task is, is to manage the project. So they should not invent the content, but they should manage the projects, or they should structure the projects, they should organize the project, they should organize the people in the project. So that's that's basically their task. And then it's, and then related to this technical backgrounds, it is a an advantage sometimes to have it, because then you understand better what the people in your project are running against, or running into. But sometimes it's also a disadvantage, because then you are inclined to also start helping the content is solvent, which is not the aim of doing project management. So So basically, I'm in favor of a project that is a generalist rather than a specialist.

Tianlin Ma Yeah. So and so forth for a pretty generalist or a specialist. And, like the, like, how much say, like, to what extent Should I like what I wrote down here, like a minimum only required creatives, the ability to ask the right questions to the right experts. So can you recognize this? So you don't have to like, gotcha, that's true. You know, you don't you kind of don't have to have very solid technical knowledge is, you know, kind of you to dive into like technical problems just kind of lat lose the over overview of the whole project is

Herman Mooi that's what I said your your task is to structure and organize the projects and not to solve the technical problem.

G EXPLANATION OF THEORETICAL FRAMEWORK FACTORS

Figure G.1 presents the detailed explanation of factors under the theoretical framework of fit-for-purpose project management.

Definition of Fit-for-purpose Project Management		
An set of wisely selected adaptive methodologies, tools and expertise to manage project activities defined and shaped by specific values and strategies, with sound decision-making in light of learnings from history experiences, risk management conducted close to the stakeholders' values, and a welcoming attitude towards uncertainties and changes.		
Need for Fit-for-purpose Project Management		
Theme	**Evolved fit-for-purpose Recognition /Practice**	**Explanation**
Size, Risk & Complexity	The dynamic interplay of size, risk and complexity as the driver for fit-for-purpose adjustments	Size of the projects has direct influence on the complexity and risks involved. The latter two tend to be mutually reinforcing. An interplay as such requires a different approach than the traditional model(s).
Context	The context determines how a project is approached	Similar projects conducted in different contexts (cultural, legal, geographical, etc.) might be approached with significantly different strategies or project management activities.
Enablers for Fit-for-purpose Project Management		
Theme	**Evolved fit-for-purpose Recognition /Practice**	**Explanation**
Evaluation of System Interactions	Recognition, evaluation & reponse to system interactions in early stages	Applying evaluation tools (e.g. TOE framework, etc.) helps the managers to better understand the context and potential difficulties, to decide on the activities to be executed. Size, risks, context are also factors within the scope of the assessment.
Organization	Dynamic alignment of formulation and execution of strategies with conscious decision-making based on situations	The organizational strategies may also be uncertain and constantly changing due to the dynamic nature of the market. A fitting alternative strategy to manage programs/portfolios by keeping aligning the formulation and implementation of organizational strategies dynamically. Decisions should be conscious and dependent on situations.
	Shaping and defining projects with available resources and stakeholder's values	Projects require less formality in control in dynamic and complex environment, available resources and values of the stakeholders are becoming more preferable over pre-defined goals to define and shape projects.
Activities in the management palette of Fit-for-purpose Project Management		
Theme	**Evolved fit-for-purpose Recognition /Practice**	**Explanation**
Adaptations	Decomposing, sizing and scaling of PM activities	A large project is treated as grouping of mini projects that are managed separately, which in principle are logical, manageable, as indipendent as possible . The PM activities applied on the mini projects should be scaled and sized (seldom skipped) to the needs.
	Proper escalation model for careful interfaces	the interfaces brought by interdependencies of mini-projects should be managed with appropriate interface protocols and escalation model.
	Active & iterative stakeholder management	Stakeholder management should not be a one-off activity as the stakeholders are often the source of the unexpected changes . Activities such as stakeholder identifying, mapping and engaging should be conducted iteratively at the stage gates.
Risk Management	Close to stakeholders' values	Risk management should be conducted close to stakeholders' values as it helps avoid potential blocking forces in the execution phase.
Scope change	More welcomed and embraced	Scope changes in general has become more welcomed and the companies are willing to invest time and money to incorporate the updated needs and values of the stakeholders into projects in the form of scope changes. But the exact extent of this positive attitude is rather industry-dependent.
	Management of Change: scope flexibility	Designing and applying an organization-specific MoC system to cope with change has become a popular practice. Such systems prescribe a set of tools and responding actions to be executed to be able to manage the changes and provide certain level of flexibility to the scope. Implement change laws/protocals to make sure that right stakeholder are brought in to review when major changes occur. And always leave room for small and manageable changes.
Lessons-learned	"formalized", "standardized" and "organized"	Lessons-learned in projects are expected to be rather more "formalized", "standardized" and "organized".
	Updatable Lesson database	Having updatable lesson database helps to reach higher level of standardization. It allows the leanings to be passed within projects and among multiple projects across the organization. Managers should make use of previous experiences, case histories, and collaboration among multiple sites to achieve better knowledge and information transfer.
	Open and safe atmosphere for failure lessons-learned	It is very important for the companies to make sure that there is an open and safe atmosphere for the sharing of failure experiences and Can-do mentality, as it can ensure a complete a value-creating database.
	Connecting people to people	When one looks for lessons-leanred for a upcoming project, he/she should be directed to a approachable list of names who have been inolved in similar proejcts.
Hybrid Approaches	Active integration of methodologies from other adaptive PM approaches	The methodologies prescribed in adaptive PM approaches such as process management and agile project management has become more popular and partitioners actively integrate these into the traditional model.
	Adaptive and iterative working style in the front end	The adaptive and iterative way of working has become more popular. The negotiated results (i.e. scope, plan and budget, etc.) generated front-end engineering as such may better help the projects to be executed sticking to the plan with many potential blocks avoided earlier on.
Skills and Competencies of project mangers required in Fit-for-Purpose Project Management		
Theme	**Evolved fit-for-purpose Recognition /Practice**	**Explanation**
Project Manager	Solid technical and PM knowledge as background	Hard skills, especially solid technical background and project management knowledge are necessary for a competent project manager in any industry. A minimally required trait is the ability to ask the right questions to the rights experts.
	Soft/social skills needed: Sensitivity, Communication Skills, & Trust-creating abilities	Soft skills are a set of capabilities that allows an effective manager to shine and to excel in increasingly complex project environments. In complex situations, three soft skills of a project manager stood out and are considered to be of crucial importance: Sensitivity, Communication Skills, and Trust-creating abilities.

Figure G.1: Theoretical Framework of Fit-for-purpose Project Management.

COLOPHON

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