University of Stavanger

Faculty of Science and Technology

MASTER'S THESIS

Study program/Specialization: Industrial Economics	Spring semester, 2019 Restricted
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Title of thesis: Improving Project Management practices in XT-Tools Department at BHGE.	
Credits (ECTS): 30	
Keywords: - Project Management - Practices - PM success - PMIIs - Standardisation - Communication	Pages: 61 Stavanger, 15.06. 2019

Title: Improving project management practices in XT-Tools department at BHGE.

Acknowledgements

I am grateful for the collaboration with Baker Huges- a GE company. I would like to thank my supervisor Dina Kayrbekova for support.

I would like to express my great appreciation to interviewees.

My grateful thanks are also extended to my fellow students at University of Stavanger. Finally, I would like to thank my family, colleagues and friends for the support throughout my study years.

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Abstract

In a fast and altering environment, effective project management is key for survival for many organisations (Ebert and Man, 2008). This thesis was engendered upon the delays and cost overruns for many subsea projects at BHGE Dusavik. The purpose of this paper is to analyse and improve the project management practices in XT & Tools Department at BHGE, with emphasizing on standardisation. The main issues with current project management practices that contribute to underperformance were examined, and suggestions for improvement of project performance is provided. The thesis represents a qualitative research method with an abductive research approach, acquired by semi-structured interviews and literature review. It provides a broad overview of the project management approaches, tools and techniques, project success and main challenges with standardisation. The results show four main project issues areas: 1) Communication; 2) Project Management; 3) Resources allocation; and 4) Project structure and processes. Implementation of standardization has potential for improving the project overview and processes, communication and learning in the organisation. Finally, four key project management improvement initiatives (PMIIs) were identified. The PMIIs give indication on which practices that should gain more attention before an implementation can be initiated.

1. Introduction

This chapter provides the background for this thesis. The objective of thesis and the research questions are presented.

1.1 Background

Given emerging globalization and technology evolution, companies and leaders encountering challenges involving complexity and uncertain environments (Baumard, 1999; Regner 1999). Higher demands with regard to delivery time, quality and need for continuously improvement are characteristics that today's organisations stand in front of (Heerwagen, 2010). In the petroleum industry, there is a common objective to deliver safe, reliable and economical viable deliverables. Delays and cost overruns are a common trend in the industry and a solution for better performance is required. Numerous empirical researches have claimed that organisational effectiveness is partially dependent on project's performance in the organisation (e.g. Kerzner, 2000; Cooper, 2001). Thus, several researchers examined factors that have influence on project success, in which commonly encompass project definition, quality of execution, client satisfactory objectives and project management (e.g. Pinto and Selvin, 1987; Mir and Pinninton, 2014).

Organisations have attempt to implement standardised project management (Standardised Project Management) based on the trends in business and for the control of projects (Cleland, 1994; Pells, 1999). Increased standardisation of project management process in an organisation can potentially improve project performance (e.g. Milosevic and Patanakul, 2005), and enhance project capabilities, which is the ability to deliver successful projects per initial schedule, cost, quality, and client satisfaction objectives. The Project Management Institute (PMI, 2013) propose SPM as a key strategy.

In much of the project management literature there is a premise that all projects have the same set of principles and tools, and therefore should be managed into a "one-size-fits all" form of project management , regardless of sizes and types of projects. However, recent research claim that project with different properties and characteristics give growth for different types of project management issues and strategies (Pinto and Govin 1989; Shenhar 1998; Shenhar 2001; Eisenhardt and Tabrizi 1995; Brown and Eisenhardt 1997). This is related to contingency approach, and many project managers agree with this practice

Baker Hughes- a GE company is a worldwide company that delivers full stream solutions for integrated oilfield products, services and IT solutions. Oilfield Equipment (OFE) Norway is a service site located in Dusavik, providing portfolio of reliable technology, including subsea trees, manifolds, risers and production control systems, with over 120 employees. There have been several efforts for enhance the way of working in (BH)GE over the last years. The improvements were associated to the organisational structure and delivery performance. However, there is still a large spread in the performance efficiency, with cost overruns and not achieving on-time delivery. The current management practices is on a satisfactory level that is not acceptable, having different ways of working and a project management procedure model that is not communicated out. The thesis aim to make some contribution in the identification of priorities that can lead to improved project management performance for BHGE.

1.2 Aim of thesis

This research paper focus on evaluate and suggest improvements for the project management practices at the XT-Tools department, BHGE. The thesis draw emphasis on finding the benefits from standardization of PM processes, on a divisional level. Identification of the balance between flexibility and standardization of processes is a major objective in this study. In addition, implementation of lean practices is briefly discussed, as it has associations with best practices for project management processes.

1.3 Research questions

RQ1. What are the major issues with current PM processes practices at BHGE that contribute to delays and cost overrun?

RQ2. How will implementation of standardized project management affect BHGE?

RQ3. How to balance between standardization and flexibility?

2. Theory

2.1 Organizational structure:

Organisational structure is according to PMI (2013) a systematic setup for a company or organisation. Hierarchy charts is often used to display how entities (persons or departments/functions) report within the organization. The organizational structure type will affect the resource allocation in the project and the level of impact to the project responsible (PMI, 2013).

Davies & Hobday, (2005) claim that projects can be implemented to improve the company's strategic business objectives, operational effectiveness, and competitive position. Capabilities are described as a unique source of competitive advantage and fundamental success factor (Davies & Hobday, 2005). Organisational capabilities are usually described as the building blocks or resources used for growth of competitive benefit for the firm (Chandler, 1990; Gant, 2002), and are divided into three subcategories: strategic-, functional- and project capabilities (Davies & Hobday, 2005). Strategic capabilities are the company's ability to dynamically and quickly enter new technologies and markets, as well as leaving declining ones more effective than the competitors (Davies & Hobday, 2005).

A project-based organization has a problem-solving approach with commitment to encourage innovation, whereas a functional organization is performance driven, usually with standardized tasks (Mintzberg, 1983). Companies in high-volume industries within a stable market with predictable technological change are highly dependent on functionality capabilities (Hamel and Prahalad, 1994; Hobday & Davies, 2005). On the other hand, companies in low-volume industries and Complex Products and Services are (CoPS) are dependent on project-based capabilities (Hobday & Davies, 2005).

Matrix organizations is a merge between project-based and functional organizational structures (Wyosocki, 2014; PMI, 2013). Figure 1. present the differences between project- and functional capabilities and show how a matrix organisation is used when the needs between those two are equally strong.

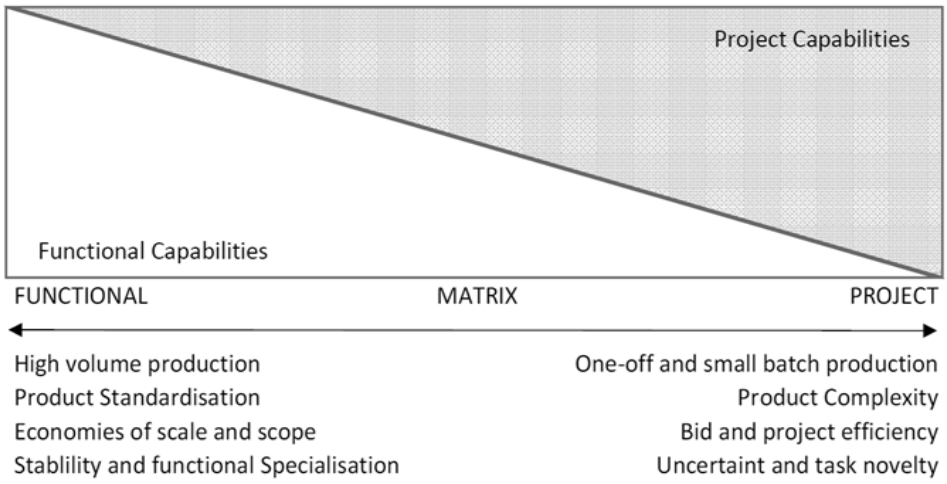


Fig. 1: Characteristics of the functional capabilities vs. the project capabilities (Galbraith, 1973).

2.2 Project Management

PMI (2013) define Project Management as the practice of skills, knowledge, experience, tools and techniques to project tasks in order to achieve the project objectives. Ten project management knowledge areas are recognised by PMI's A Guide to the Project Management Body of Knowledge (PMBOK®) as common for almost all project. The ten project management knowledge areas is listed in table 1. Five basic process groups are identified in projects as follows: Initiation, Planning, Executing, Monitoring and Controlling, and Closing (PMI, 2013).

Table 1. Display of the ten project management knowledge areas and the process groups from PMI (PMBOK, 2008)

Areas of knowledge	**Process groups**
1. Integration	1. Initiation
2. Scope	2. Planning
3. Time	3. Executing
4. Cost	4. Monitoring and Controlling
5. Quality	5. Closing
6. Procurement	
7. Human resources	
8. Communications	
9. Risk management	
10. Stakeholder management	

PM tools and techniques are the instruments that project management (PM) processes are built upon in an organisation. Examples of PM techniques are work breakdown (WBS) structures, Gantt charts and earned value management (EAV). The PM tools and techniques also includes the procedure documents, guidelines to processes, checklists, templates and useful databases and software applications. Identification of appropriate PM tools and techniques are important for an easier implementation of PM principles (Raymond and Bergeron, 2008). According to White and Fortune (2002), the most used PM tool and technique are the Project management information system (PMIS). Stewart and Mohamed (2003) explains the importance of using information technology to facilitate the process of information management to all accountable in project(s). There are various PM software tools in the market, with different user applications.

Besner and Hobbs (2006) conducted a survey review of 70 PM tools and techniques, with 753 respondents. The result is listed in table 2, with decreasing order of levels of use. The highlighted (bold) in this table are the most used tools recognised by White and Fortune (2002). Besner and Hobbs (2006) also examined the perceived potential contribution to project performance, where the intrinsic values are the variable. Intrinsic is defined as the present extent of use combined with potential improvement, hence, or are the most useful PM practices according to Fernandes et al (2013). Fernandes et al, (2013) compared the "intrinsic" values from Besner and Hobbs (2006) with the top 20th most useful PM practices from their study, see table 3.

Table 2. Display of the 70 tools identified by Besner and Hobbs (2006), with decreasing order of level of usage.

1. Progress Report	27. Critical path method analysis	50. Database for cost estimating
2. Kick-off meeting	28. Bottom-up estimating	51. Database for lessons learned
3. PM Software to task Scheduling	29. Team member performance appraisal	52. Product breakdown structure
4. Gantt chart	30. Team building event	53. Bidders conferences
5. Scope Statement	31. Work authorisation	54. Learning Curve
6. Milestone Planning	32. Self-directed work teams	55. Parametric Estimating
7. Change Request	33. Ranking of risks	56. Graphic presentation of risk information
8. Requirements analysis	34. Financial measurement tools	57. Life cycle cost (LCC)
9. WBS	35. Quality plan	58. Database of contractual commitment data
10. Statement of Work	36. Bid documents	59. Probabilistic duration estimate (PERT)
11. Activity list	37. Feasibility study	60. Quality function deployment
12. PM software to monitoring schedule	38. Configuration review	61. Value analysis
13. Lessons Learned/Post-mortem	39. Stakeholder analysis	62. Database of risks
14. Baseline plan	40. PM software for resources levelling	63. Trend chart or S-curve
15. Client acceptance form	41. PM software to monitoring of cost	64. Control charts
16. Quality inspection	42. Network diagram	65. Decision tree
17. PM software for resources scheduling	43. Project communication room (war room)	66. Cause-and-effect diagram
18. Project charter	44. Project Web site	67. Critical chain method and analysis
19. Responsibility assignment matrix	45. Bid/seller evaluation	68. Pareto Diagram
20. Customer satisfaction surveys	46. Database of historical data	69. PM software for simulation
21. Communication plan	47. PM software multi-project scheduling/levelling	70. Monte-Carlo analysis
22. Top-down estimating		
23. Risk management documents	48. Earned value	
24. Contingent plans	49. PM software Cost estimating	
25. Re-baselining		
26. **Cost/benefit analysis**		

Table 3. Comparison between the most useful PM practices from Fernandes et al (2013) with the highest intrinsic values from Besner and Hobbs (2006)

PM Practices	Fernandes et al, 2013	Besner & Hobbs, 2006
Progress report	1st	2nd
Requirements analysis	2nd	4th
Progress meetings	3rd	Not included
Risk identification	4th	14th
Project scope statement	5th	3rd
Kick-off meeting	6th	5th
Milestone planning	7th	11th
Work breakdown structure	8th	10th
Change request	9th	8th
Project issue log	10th	Not included
Gantt chart	11st	6th
Activity list	12nd	15th
Client acceptance form	13rd	20th
Risk response plan/Contingent plans	14th	18th
Project statement of work	15th	12nd
Communication plan	16th	-
Responsibility assignment matrix	17th	-
Baseline plan	18th	17th
Qualitative risk analysis	19th	19th
Project charter	20th	-

2.3 PM model

The selection of best-fit Project Management Life Cycle (PMLC) model is based on the project landscape and its fuzziness profile. The fuzziness profile is dependent on both the project goal and the solution (Wysocki, 2014). Four PMLC models are categorised by the project landscape: traditional, agile-, extreme- and emertxe project management (Figure 2, Wysocki, 2014). The traditional model applies to projects that have well-defined goal, solution and requirements/functions, see table 4. On the contrary, extreme- and agile PM models are usually applied in NPD projects due to their high degree of fuzziness (Wysocki, 2014).

The traditional approach is categorised by projects with a distinct plan and activities, and have few request for scope-changes (Špundak, 2014; Wysocki, 2014). This model is utilized for repetitive projects that have established routines, tools and templates (Špundak, 2014; Wysocki, 2014).

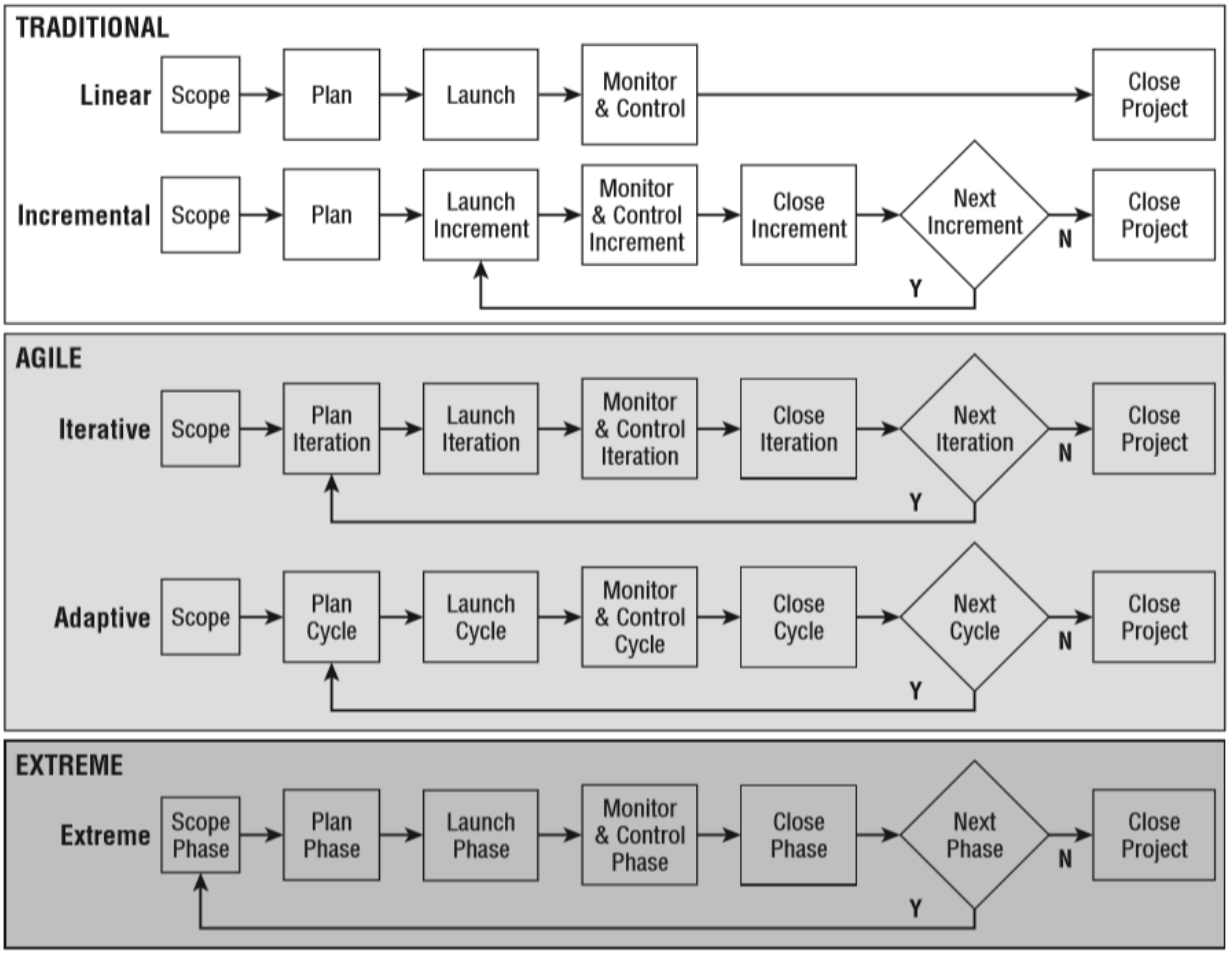


Fig. 2. The five project management life cycles (Wysocki, 2014)

Implementation of agile project management is used to manage projects with a well- defined goal and an unidentified solution at the outset of the project. The agile project approach can be divided into two main subcategories: the adaptive and the iterative project models. The adaptive agile project model typical uses "just in time planning" and the iterative is a cyclical structure with change adjustment through discovery and learning (Špundak, 2014; Wysocki, 2014).

Table 4. Differences between traditional PM and agile PM approach (Špundak, 2014)

Characteristic	Traditional approach	Agile approach
Requirements	clear initial requirements; low change rate	creative, innovative; requirements unclear
Users	not involved	close and frequent collaboration
Documentation	formal documentation required	tacit knowledge
Project size	bigger projects	smaller projects
Organizational support	use existing processes; bigger organizations	prepared to embrace agile approach
Team members	not accentuated; fluctuation expected; distributed team	collocated team; smaller team
System criticality	system failure consequences serious	less critical systems
Project plan	Linear	complex; iterative

2.4 Fuzziness

Fuzziness is a term that is characterized by the lack of exact knowledge in projects (Brun, 2011; Galbraith, 1977). The fuzziness term can be divided in subcategories: ambiguity, uncertainty and complexity. Ambiguity describe the different interpretations of the same information, whereas uncertainty capture the absence of information (Galbraith, 1977). The uncertainty can be related to the absence of predictability and is divided in three subgroups: variation, foreseeable events and unknown unknowns (”unk unks”; Lock et al., 2006). Complexity depict the number of interactions between different fragments of the project, which usually make the project challenging to manage (Lock et al., 2001).

The earliest phase in NPD projects is termed “the front end”. The information at this stage is considered more valuable as uncertainty has its peak here. Obtaining information at an early stage is important and is demonstrated in figure 3.

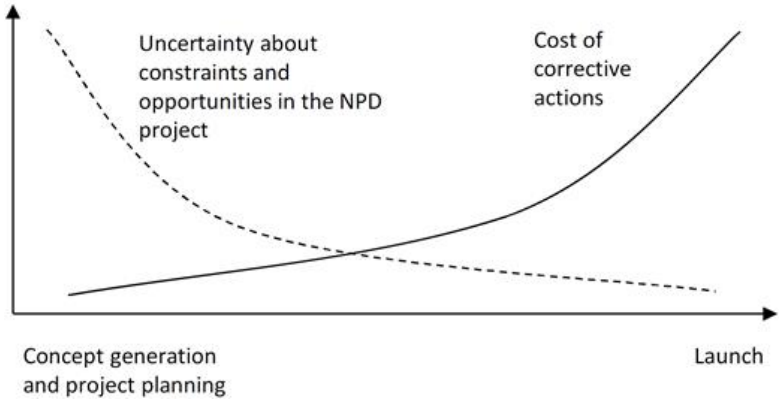


Fig. 3. The relation between uncertainty and cost of corrections in NPD projects (adapted from Verganti, 1997).

2.5 Project Success

Historically, project success is one of the most focused research field in project management. However, the implication of the term “project success” and what factors that contribute for it varies considerably (Judgev and Müller, 2005). Project success is often considered as achievement of a product produced on time, within budget and to specification, or accomplishment of business objectives to the project (Sauer et al., 2007). Recent researchers have proposed new sets of measures to achieve a transparent understanding of the measures of project success, using success criteria (Atkinson, 1999; Müller and Turner, 2007). The concept of success criteria has expanded from the so-called iron-triangle (time, cost and scope) to include a broader specter of success criteria (Atkinson, 1999, Judgev and Müller, 2005; Müller and Judgev, 2012; Shenhar and Dvir, 2007). Measurement models for project success were developed by several researchers, however, these are specific for different types of projects or aspects of success (Pinto and Slevin 1988; Shenhar et al., 2002; and Turner and Müller, 2006). Müller and Turner (2007, claim that the success criteria varies between projects, and from industry to industry, as every project have its own uniqueness, and varies in size and complexity. Therefore, there is only a limited agreement among researchers on which factors that give positive and individual contribution to project performance (Fortune et al., 2011). Müller and Jugdev (2012) concluded that the definition of project

success is imprecise due to limited agreements among researchers, as well as the identification of factors that measures project outcome.

2.5.1 Success factors critical for project success

Success factors can be defined as the set of input variable that have a significant influence on the performance of a project when managed accurately (Leidecker and Bruno, 1984; Lim and Mohammad 1999). Brown and Eisenhardt (1997) found that communication, process and thrust have influence on project success. Other researchers have established Project Management process (Zmud,1980; Deephouse et al., 1995), PM tools (Zmud, 1980; Sobek et al., 1998;) and metrics (Hartman and Ashrafi 2002) project leadership, and project organisation (Deephouse et al., 1995) as important success factors. The literature review is summarized in table 5 with a full overview of success factors, adapter from Milosevic and Patanakul (2005).

Khan et al. (2013), established a model of success factors based on a literature review on success criteria of the past 40 years. Both soft and hard factors are included in this model, by means of 25 measure variables structured into five elements. The model encompasses project success criteria related to the iron triangle (dimension 1), additional to the following criteria: 1) Project efficiency; 2) Organizational benefits; 3) Project impact; 4) Stakeholder satisfaction; and 5) Future potential.

Table 5. Factors impacting success of development projects from Milosevic and Patanakul (2005)

Factor critical to project success	Publications that identified the factor as critical
PM process	*Zmud* [20][a]; *Deephouse et al.* [21]; *Brown and Eisenhardt* [6]; Sobek et al. [19]; Davidson et al. [27]; Cooper [2]; *Hartman and Ashrafi* [14]
Project organization	Larson and Gobeli [28]; *Deephouse et al.* [21]; Davidson et al. [27]; Cooper [2]; *Hartman and Ashrafi* [14]; Shenhar et al. [13]
Information management system	Davidson et al. [27]
PM tools	*Zmud* [20]; Might and Fisher [3]; Sobek et al. [19]
PM metrics	Davidson et al. [27]; *Hartman and Ashrafi* [14]
Project culture	*Deephouse et al.* [21]; Sobek et al. [19]; Davidson et al. [27]
Project leadership	Sobek et al. [19]; Davidson et al. [27]

[a] Note: Italicized are sources relating to high velocity industries. Other sources are from other industries.

The study of Zakari Tsiga et al (2017) includes samples drawn from companies in petroleum industry. This study present an overview of the critical success factors in oil industry (upstream, downstream and midstream), see table 6.

Table 6. Overview of the factors critical to project success

Factors critical to project success	**Publications that identified the factors as critical**
External challenge	Gudiene et al., 2014 ; Omran et al., 2012.; Tan and Ghazali, 2011.
Client knowledge and experience	Gudiene et al., 2014; Omran et al., 2012.
Top Management support	Ram and Corkindale, 2014; Varajao et al., 2014. Almajed and Mayhew, 2014.
Institutional factors	Gudiene et al., 2014
Projects characteristics	Omran et al., 2012; Yong & Mustaffa, 2013

Project manager competence	Toor and Ogunlana, 2009; Malach-Pines et al., 2009; Barclay and Osei-Bryson, 2009.
Project organisation	Berssaneti and Carvalho, 2015; Almajed and Mayhew, 2014; Varajao et al., 2014
Contractual aspect	Omran et al., 2012; Tan and Ghazali, 2011; Yong, & Mustaffa, 2013; Chan et al., 2004.
Project team competence	Ram and Corkindale, 2014; Gudiene et al., 2014; Varajao et al., 2014; Almajed and Mayhew, 2014
Project risk management	Almajed and Mayhew, 2014; R. Rabechini Junior and M. Monteiro de Carvalho, , 2013. Didraga, 2013
Requirement management	Didraga, 2013; Mirza, 2013.

2.5.2 Project management success

Cooke-Davies (2002) explains the distinction between project management success, which is based on the measure of project performance against success criteria, such as initial estimates of cost, time, quality, resources and activities (Atkinson,1999), and project success, that is assessed by the overall objectives of the project. De Wit (1988) share similar view, evaluating the project management success through specific criteria.

Baccarini (1999) suggests a distinction between project management success and product success. The product success is focused upon the final deliverable of the project, while the project management success is measured against the accomplishment of the triple constraint (iron) triangle. Hence, a successful project require both project management success and product success (Baccarini, 1999). Lim and Mohammad (1999) elucidate that the project framework are comprising of different cycle stages with unique combinations of factors that lead to success to the project. The current life cycle stage of the project will influence which factor combination that can contribute to success.

Project mangement success can also be evalutated by diverse models that have developend through history. Researchers have different ways of modelling PM in order to improve project performance, and many of the PM practices applied in projects are linked to the CSFs identified. Examples of PM models are Project Management Performance Assessment (PMPA) that measure success (Bryde 2003), and Project Excellence Model that assess management of maturity within organisation (Westerveld, 2003).

Previous researchers have had main attention on project management tools and techniques for enhancing the potential for success (Pinto and Slevin, 1987; Wateridge, 1995). However, recently focus have shifted to project managers competence (Crawford, 2007), including his and hers leadership style and its impact to project success (Turner and Müller, 2005; see tab. 7). Crawford (2007) defines project manager competence as the blend of core personality characteristics (self-concepts, motives and traits), skills (ability to perform a task) and knowledge (qualification).

Table 7. Timeline of the measure of success adapted from Lavagnon (2009)

RESEARCH FOCUS	PERIOD 1 1960- 1980	PERIOD 2 1980-2000	PERIOD 3 21ST CENTURY
SUCCESS CRITERIA	"Iron triangle" (cost, time and quality)	Iron triangle Client satisfaction Benefits to organisation End-users satisfaction Benefits to stakeholders Benefits to project personell	Iron triangle Strategic objective of client organizations and business success Benefits to stakeholders End-users satisfaction Benefits to project personell and symbolic and rhetoric evaluation of success and failure
SUCCESS FACTORS	Anecdotic lists	CFS lists and frameworks	More inclusive CFS frameworks and symbilic and rhetoric success factors
EMPHASIS	Project Management success	Project/ product success	Product/ project, portefoilio, and program success and narratives of success and failure

2.6 PM tool and methodologies

Project management methodologies (PMMs) was first established by government agencies, forty year ago, with motivation for controlling plan, budget and quality (Packendorff, 1995). PMM is regarded as one of the success factors, with the objective to improve project effectiveness and increase chances of success (Vaskimo, 2011). Project management literature differentiate between standardized and customized PMMs (Crawford and Pollack, 2007; Curlee, 2008; Milosevic and Patanakul, 2005; Shenhar et al., 2002). It is also contradicting assessments on whether standardized PMMs, customized PMMs or a blend improves project effectiveness, which may have an impact on project success (Curlee, 2008; Milosevic and Patanakul, 2005; Shenhard and Dvir, 1996). Limited or partial PMM in an organization will affect both quality and efficiency in a project, hence, influencing the project success (2011). The PMMs varies in complexity and suitability from organization to organization (Wells, 2013; Joslin and Müller, 2015).

Shenhar and Dvir (1996) demonstrated customization, displaying that project have considerable variation and should not follow the same PM practices. Customization is supported by Wysocki (2014), claiming that the recent literature trend "one size fits all", is not relevant for project management. Payne and Turner (1999) states that there is reported enhance result for projects that are customized to which size and resources used in the different projects. On the other hand, Milosevic and Patanakul (2005) proposed a contingency approach, which combined standardisation and customization. Their research suggests to partially standardise the PMMs in an organisation. Moreover, several experienced project

manangement offices (PMO) uses a methodology drawn from agile project manangement model (Aubry et al., 2010).

2.7 PM Maturity measurement

A project management maturity model allow organisations to score themselves against key processes in project management. These models are developed by applying total quality management principles to best-practice project management. An organisation can use the results of a maturity model assessment to plan future enhancement to their project management practices (PMI, 2013). However, maturity models have not achieved general acceptance due to their practical perspective that include a large quantity of indicators, which is challenging to use as guidance to improve PM practices in an organisations (Shi, 2011).

According to Shi (2011) and Thomas and Mullay (2008), a better option is to identify for the key PM improvement initiatives (PMIIs). These PMIIs include enhancement of tools and techniques, as well as processes, routines, ways of working and processes that are influence at improving project management performance. Fernandes et al. (2014) proposed three key PMIIs groups: 1. Process, tools and techniques; 2. People and organisational learning; 3. General management system.

The value of PM is maximised if: 1) appropriate Project Management Improvement Initiatives (PMIIs) are identified (strategic and tactical; Shi, 2011; Winter and Szczepanek, 2008); and 2) the organisational context must fit the implementation processes (Cooke-Davies et al., 2009; Shi, 2011; Thomas and Mullay, 2008; Zhai et al., 2009). The process with embedding in an organisation has received little attention in PM literature (Fernandes et al, 2015).

Table 8. Main project management improvement initiatives (adapted from Fernandes et al., 2014)

Process, Tools, and Techniques	Implement corporate standardized and tailored project management processes
	Implement corporate standardized and tailored project management tools and techniques
	Implement corporate standardized and tailored project management information system
General Management System	Integrate the project management system with the general management system
	Develop supported infrastructure
	Develop a project sympathetic organizational structure
	Benchmarking to assess project management and continuous improvement
	Establish project management practices as internal standards
People and Organizational Learning	Provide project management training
	Develop a culture of learning
	Project manager professionalization
	Establish project management career path for all project management roles

2.8 Standardized Project Management

Standardized Project Management (SPM) is defined a standardized set of project management practices (Kerzner 2000; Toney and Powers 1997; Milosevic et al., 2001). It is a methodology of managing projects with the best practices; hence, the lack of implementing these practices provides demand for standardization. Standardization is set by making formal instructions to the work activities. Standards, procedures, templates and check-lists are common tools in standardised PM. The principle of SPM is to generate a methodology with PM practices that are predictable and stable (Timmermans and Berg 1997).

Mintzberg (1979) demonstrates the benefits of standardisation, such as large-scale gains, repeatability, enhanced predictability and consistensy of project outcomes. However, Mintzberg (1979) explains through one of his investigations that there are limitations on how far the standardisation is possible.

Milosevic and Patanakul (2005) display that PM tools, processes and leadership are the main factors that impact SPM and project success. In addition, standardization tend to improve risk management and reduce uncertainty, as complex processes are mapped and structured (Bieder and Bourrier, 2013). According to Kerzner (2000), standardized set of PM tools and metrics impact projects success. Similarly, Toney and Powers (1997) argues that standardized processes are a success factor in projects. In addition, organisational culture and information management have impact on project performance (Kerzner, 2013). Errors in organisations can be reduced by the use of standardisation, because it store organisational memory and contain valuable knowledge and experience from previous projects (Haynes et al., 2009). However, Timmermans and Berg (1997) informs that some flexibility in projects are important for achieving successful projects.

In PM literature standardisation is divided into two dimensions: 1) standardisation of organisational design (Mintzberg, 1979; Colbjørnsen,2003) ;2) Standardisation of work processes (approaches and procedures; Harmon, 2003).

2.10 SPM – Main challenges

Identification of the main challenges that is related to the phenomena of standardisation of work activities is based on literature study on “best practices”, organisational theory, standardisation and change management. The main challenges related to SPM is expertise/knowledge, adherence to standardisation, implementation and balancing flexibility. Implementation of best practice and can be considered as an encounter.

2.10. 1 The choice of best practice

The organisation will be able to standardise procedure after “best practice” if the work processes can be identified and documented (Ungan, 2006). However, it remains challenging to identify which practice that is the best and often difficult to measure it. Complexity and level of details are two factors that affect documentation of the best practice adversely. Ungan (2006) are separating the knowledge of a process as follows: 1) information and 2) know-how. The knowledge of information is explicit and can easily be transfer (Nonaka, 1994; Kogut and Zander, 1992), whereas “know-how can be explained as the expertise or practical skills required for efficient implementation (Kougut and Zander, 1992). The “know-how” encompasses partly of the tacit knowledge (Nonaka, 1994), possessed by human, hence, difficult to communicate out (Kougut and Zander, 1992).

Szulanski (1996) point out that causal ambiguity is a factor that could be a barrier for the transfer of "best practice". Causal ambiguity express uncertainty of factors that lead to success of failure, regardless if a process is copied or not (Szulanski, 1996). In particular, it can be difficult to identify the cause of success for a complex work activity, hence, it can be challenging to examine what factors that should be included in the documentation. Conclusively, the tacit knowledge towards the processes and the causal ambiguity can be inhibitory for choice and enhancement of best practice, hence standardisation.

2.10.2 Adherence to standardisation

Standardisation and formal rules are not always adhered to and in some situations they are broken (Feldman and Pentland, 2003). Adherence to standardisation is related to the degree that the employee perform and track the standardisation, which is set by the management of the organisations (Ortmann, 2010). Not execution the standardisation may result in an error (Lei et al., 2016). However, deviation from standardisation is sometimes required to ensure the operation of organisations (Ortmann, 2010). Gilbert (2005) defines standardisation rigidity as a structural characteristic of standardisation that is defined and organised by managers. The term involves the degree of planned standardisation, and states that the more planned and detailed the standardisation is, the more rigid it is (Gilbert, 2005).

Nissinboim and Naveh (2018) indicate standardisation rigidity is not directly related to error reduction, but has relationship with adherence to standardisation. However, there is a gap in knowledge regarding the extent of relationship between standardisation rigidity and adherence to standardisation.

There is a first approach that high level of standardisation rigidity have negative impact on the degree of adherence to standardisation (Nissinboim and Naveh, 2018). Several researchers have example of such cases, where employees do not have confidence in that standardisation is suitable for their situation (Lehman and Ramanujam, 2009). Standardisation can be questioned by employees when the working processes gets more complicated in terms of management, time and effort (Kownatzki et al., 2013). The high level of standardisation rigidity in organisations can interfere with employee's daily work and be considered as an affliction that put stresses on time and human resources (Adler and Borys, 1996; Stern et al., 2009). Thus, the employees may take the risk of not following the standardization, by the cause complexity and in some cases; the employees believe they can perform better (Katz-Navon et al., 2005).

A second approach suggest there is no relationship between enhanced standardisation rigidity and the degree to which employees follow standardisation. This approach utilize standardisation as a tool to enable the employee to perform work activities, and therefore they choose to obey to the standardisation (Adler and Borys, 1996). Accordingly, the employees use the standardisation as an "insurance policy" and by adhering to it; the errors cannot be blamed on them (Naveh et al., 2006).

A third approach explain that enhanced standardisation rigidity gain positive effect on willingness for adherence to standardisation (Katz-Navon et al., 2005). This behavior relates to the conception that standardisation are vital to managers and employees will attempt to strengthen this in order to satisfying the managers. Increased standardisation is recognised as an implication by management to signalise that managers are convinced that standardisation can be useful and effective tool for avoiding errors. Hence, employees will adhere to standardisation, with the intention to meet managers' demand (Nissinboim and Naveh (2018).

2.10.3 Loss of autonomy

Gemünden (2005) claimed that project autonomy is related to the characteristics of a social system and self-governing according to its own rules. Autonomy in the workplace refers to how much freedom employees have to take own decisions and schedules (Ross and Wright, 1998). High levels of autonomy have a tendency to lead to increased satisfaction at work.

The education level has impact on the employee's anticipation to tasks and the ways of working in an organisation. Today, there are increasing numbers of people taking education, and the work is considered more important for a person's self-image and identity (Colbjørnsen, 2003). Different organisations makes stronger demand, in terms of competence and higher level of education. According to Balogun (2011), the loss of autonomy in a workplace, as a cause of change, was perceived by the employees as degrading, as well as loss of professional status. The employee's reaction to implementation of standardisation could be influenced by the level of standardisation, perceived loss of autonomy and the level of education. Given that the procedure or work task is too rigid as a result of high level of standardisation, the loss of autonomy could lead to reduction in motivation and discontent employees (Adler and Borys, 1996).

Autonomy can be regarded for higher levels, such as business level, organisation level and teams. Implementation of standardisation can reduce the autonomy of several levels in the organisation. In particular, a supervisor role that receive detailed working procedures, will restrict the maneuver and autonomy for the supervisor (Björkman and Lervik, 2007; Stensaker and Falkenberg, 2007). The loss of autonomy at business level can be challenging for the compliance of the change management and the new standards (Björkman and Lervik, 2007). According to Lee and Ashforth (1991), standardisation has negatively impact according to role conflicts and related ambiguity to the role responsibility. The loss of autonomy can affect the improvement efforts, as the employees requires permission from the superior(s) and motivation could easily drop (Kondo, 2000; Colbjørnsen, 2003). Thus, standardisation of work activities tend to reduce both innovation incentive and autonomy in organisations. Flexibility, in terms of freedom, in the working environment is considered as an element that could encourage local problem solving in the organisation (Kondo, 2000; Colbjørnsen, 2003). Conclusively, standardisation of work activities could lead to loss of autonomy as well as reduction in the local innovation.

2. 11 Flexibility

Colbjørnsen (2003) argues for the importance of finding the balance between flexibility and standardisation in development of standardised work processes. Large organisations usually requires both flexibility and predictability, and neither can be excluded (Colbjørnsen, 2003; Nesheim et al., 2011). Routines consist of both rigid and flexible components, which can lead to both flexibility and change (Feldman and Pentland, 2003). Nesheim (2011a) describes how too detailed standards can lead to bureaucratic of the organisation, while on the other hand, too loose standards can result in unclear and vague procedures.

2. 12 Communication in projects

Daft & Lengel (1984) claim that effective communication is founded by a proper organisational structure that assign responsibilities and activities to individual or groups. It is important that the project manager ensure clear, consistent and effective communication between the project team and the stakeholder (Rajkumar, 2010). The project manager should monitor a communication management plan, including analysis of the communication for all phases of a project, define frequency and timing, and what delivery

channels to utilize and identify the persons involved (Čulo & Skendrović, 2010; Rajkumar, 2010). Poor communication with client or project team usually have a large impact on project performance (Abudi, 2013). Figure 4 depicts the cost of poor communication (Rajkumar, 2010) and the potential consequences is displayed in table 9.

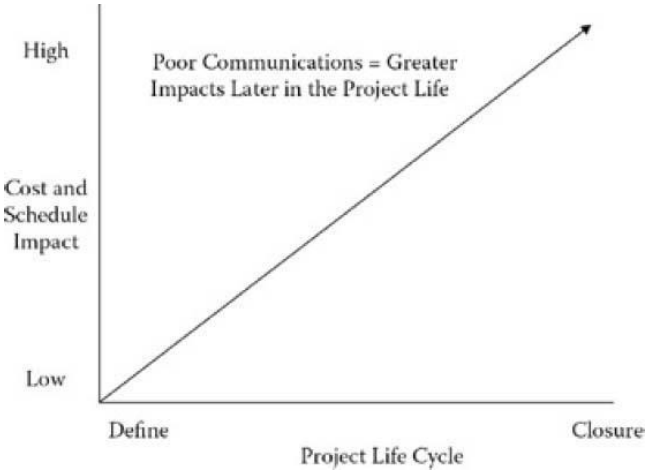


Fig. 4: The impact of communication throughout the project life cycle (Rajkumar, 2010)

Communication can be divided between lean information (numbers, texts) and rich information (speeches, visual signs, body language; Daft & Lengel, 1984). The preferred form is often a balance between both of these medias, as the rich media will cover the high ambiguity tasks, whereas the lean media will cover the well-define and implicit tasks (Daft & Lengel, 1984; Pers.Comm. Brun, 2018).

Political, cultural and linguistical are the main communication obstacles (Čulo & Skendrović, 2010; Rajkumar, 2010). The political communication barriers are typical created in upper management. Project managers should identify and consider the main political players to be able to attain assurance in the project (Čulo & Skendrović, 2010; Rajkumar, 2010). Culture in an organisation relates to their values, assumption, underlying beliefs and ways of interacting and should be assess by project manager to void communication issues (Čulo & Skendrović, 2010; Rajkumar, 2010). The communication link must be transparent, encompass information that is clear, and complete to the receiver (Čulo & Skendrović, 2010). Cross-functional communication enables growth of projects and drives problem-solving capabilities due to effective interaction between different functions (Edmondson and Nembhard, 2009).

Table 9. The potential consequence of poor communication (Abudi, 2013)

Poor Team Communications	Poor Stakeholder Communications
• Misunderstanding around project goals and objectives • Missed deadlines • Conflicts between team members • Individual team members moving in different directions • Decreased productivity on the project leading to increased timelines and going over budget • Lack of commitment on the part of project team members in accomplishing the work of the project	• Lack of or limited buy-in and commitment to the project • Misunderstanding around stakeholder expectations on what is considered project success • Conflicts between the project team and stakeholders, or between stakeholder groups • Stakeholders who may actively work against the project being accomplished • Failed projects

2.13 Risk management in projects

Risk management is a critical success factor and one of the knowledge areas in project management (PMI, 2013). Risk involves both uncertainty (probability) and impact on projects objectives. Risk management. According to PMI (2013), risk management is an important factor for effective project management.

Risk management can be divided into two divisions; 1) the hard aspect of risk that covers initiation, identification, assessment, report, monitor and control and 2) the soft aspect, involving the attitude, communication, monitoring and review (Almajed and Mayhew, 2014; Rabechini and Monterio de Carvalho, 2013)

The risk management framework followed at Nokia Siemens Networks provides guidelines for: 1) Continuous risk identification; 2) Risk evaluation; 3) Risk mitigation and contingency measure definition; 4) Risk monitoring and control and 5) Risk identification efficiency measurement (Lavanya and Malarvizhi, 2008).

3. Methodology

3.1 Research method and strategy

The thesis is based on a qualitative data, acquisitioned from individual semi-structured, primary data from meetings, secondary data and a literature review. Auerbach et al (2003) describes the qualitative research as a research and analysis of non-numerical information, drawn from interviews and interpreting texts, in order to extract significant patterns for the specific phenomena researched. Moreover, Auerbach et al (2003) explains the qualitative research as a method that utilises hypotheses that are obtained from interviews. An abductive approach to qualitative research is used in this study. Dubois and Gadde (2002) describes the logic of abductive approach, using the systematic combination that moves from empirical to theoretical dimension of the analysis. Furthermore, this method permits the researcher to get more depth in their analysis (Dubois and Gadde, 2002).

The first stage of the research was to conduct research literature review. The strategy implemented was to perform semi–structured interview using key categories identified in the literature review, questioning lead project manager to provide their view. The analysis was carried out following the guidelines from DeCuir-Gunby et al. (2011). The use of the interviews enables the author to analyse the data and compare it to theory in the discussion chapter. Both theoretical and empirical information can be drawn from this methodology and provide foundation for the analysis in the discussion chapter.

3.1.1 Literature review

The literature review builds on a qualitative theory study conducted to answer the objectives presented in chapter 1. Literature was reviewed with aspect to current and recent research with relation to standardization and project management oriented aspects. The relevance in literature for the research questions in this thesis was variated. Existing research involving project management aspect of standardisation is fragmented and complex. In addition, recent studies focus on standardisation in the whole industry, whereas older studies have emphasis on standardisation within an organisation.

3.1.2 Study sample

The empirical foundation is based on observations and conversations carried out at the different cross-functional departments (work shop, finance, ITO and rental). Historical projects have been assessed through both sharing folder for the company, BOX and Power BI. Power BI is a business analytical service tool that capture business performance. The secondary data included in sharing folder for company, such as templates, procedures and project information.

The way we work is a department strategy that had start-up in the early 2014, with goal to improve project management practices. The output material is shared in Box, an online mapping system. A general guideline to project processes and responsibilities was made. However, the guideline procedure was outdated and too complex to follow. We arranged three meetings, involving operational leader, senior project coordinator and project Manager.

Internship conducted one year prior to the final year of the master's program, in 2018, included site introduction and tour. Mapping the organizational structure, the department structure and the responsibility of each function was performed during this period.

3.1.3 Improvement of the PM model

Several meetings were conducted in February and early March. The Quality manager, Project Manager, and lead project coordinator were present at these meetings, and gave input to improvements and suggestions for processes given their experience. The previous project management model draft from 2014/2015 was updated and simplified during this spring (2019).

3.2 The interviews

Qualitative data tend to be acquisitioned from interviews conducted on a specific sample. Gill et al. (2008) suggest three main types of research interviews: 1) structured; 2) semi-structured and 3) unstructured. Semi-structured interviews are described as "in-depth" interviews. The semi-structured interview enabler the interviewer to gain more information about the topic of interest and to have more flexibility in the process (Chu and Ke, 2017).

The informants from the interviews comprise senior lead management specialists and operational leader within the department XT &Tools. The interview comprised of 11 questions, which were grouped into 5 main topics, in addition to an introduction part, providing general background information, such as experience and qualifications. Before the interviews, the meetings of the way we work was performed, and information was adapted into the interview questions. A sample interview consent was given upfront. Duration of the interviews took between 45 and 60 min and was recorded.

3.3 Data analysis

Second step of coding interviews. The use of coding is performed by circular process of coding described by DeCuir-Gunby et al. (2011). The raw data from the interview, theory and research literature were input in the coding development. Similar key points and ideas were highlighted and grouped (Flick, 2013).

3.4 Interview questions

The interview question is listed in table 10.

Table 10. Initial questions for semi-structured interviews

Introduction:	
1)	What is your name, age and position?
2)	How long have you worked at BHGE/ GE?
3)	What kind of experience/ project involvement do you have?
4)	Do you have formal project management background/ education?
Historic review/ Mapping PM models/ issues:	
5)	To what extent do you use the Project processes guideline from 2016?
6)	What are the main issues with current project management process that causes delays and cost overruns?
Communication:	
7)	What is your general opinion regarding communication practices between cross-functional departments?
Change management:	
8)	How do OTR/ XT department handle change management in projects?
Risk management:	
9)	How is risk managed in projects?
Standardization:	
10)	What main issues in current PM practices will be improved by standardizing the process on a department level?
11)	What are the main obstacles to standardization of Project management processes for different project types. Demands to flexibility?

4. Empirical

This chapter provide insight in current project structure and project processes for refurbishment and new development.

4.1 Organisational structure

Baker Hughes, a GE company (BHGE) is a business fusion between Baker Hughes and GE Oil and Gas. BHGE is a fullstream provider of integrated oilfield products, services and IT solutions. With a breadth of technical capabilities, vigorous and reliable technology, BHGE deliver innovative subsea solutions and products. The portfolio of products and services is fundamental for BHGE to improving productivity, develop new sources of value and reduce risk. The mission of BHGE is to "Inventing smarter ways to bring energy to the world". BHGE is operating in 120 countries and with over 8000 + employees divided in 14 Manufacturing facilities and 16 service facilities globally.

Oilfield Equipment (OFE) Norway is a service site located in Dusavik, providing portfolio of reliable technology, including subsea trees, manifolds, risers and control systems. This site has portfolio divided into drilling, surface and subsea and are today collaborating with customer such as Equinor, AkerBp and Vår Energi. OFE structure SPC, SPS and Services are displayed in figure 6. OTR (order to remittance) is the department that is under Operating leader and including following departments; document control, Offshore, Wellhead, Tools XT, Rental, PCS and Solution. XT- Tools consists of ~10 Project Coordinators, Project Manager and Planner.

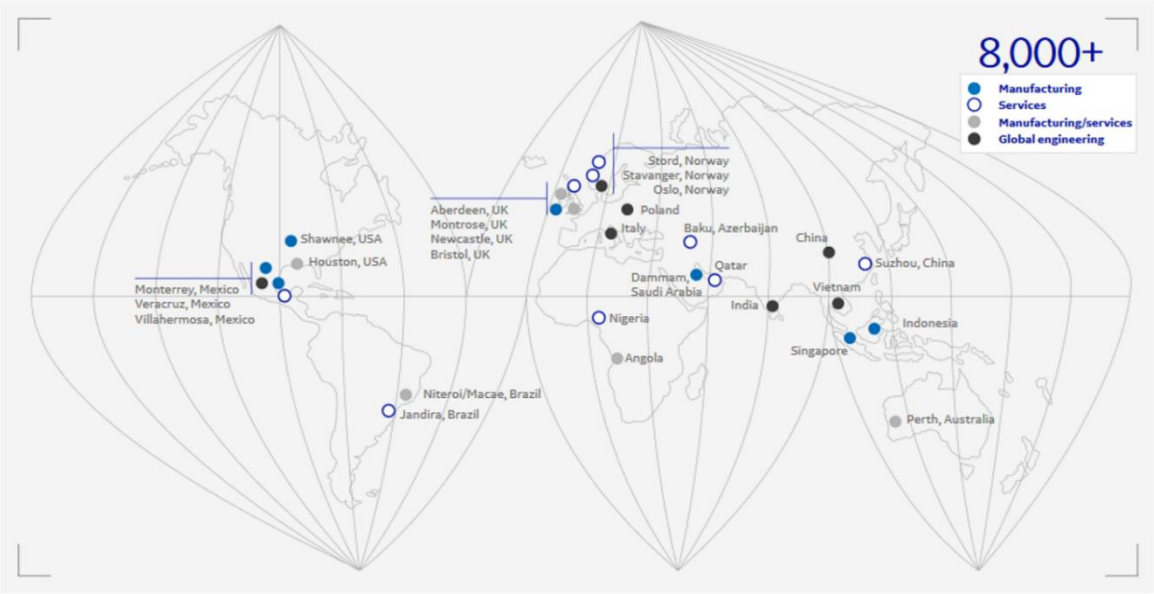


Fig. 5. The global footprint for BHGE

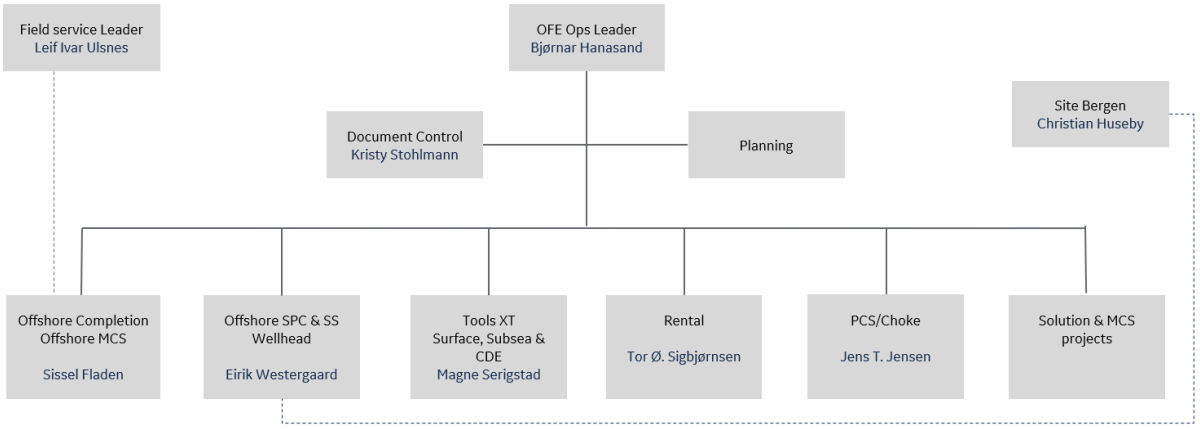


Fig. 6. The Norway Oilfield Equipment organisational map

Reconstruction in the organisational structure took place in February 2014. From a project-based structure that was diversified towards license to a matrix organisation with product groups for the support functions, such as ITO (bidding), procurement, finance. The groups was separated into product groups, such as XT (Production Christmas Trees) & Tools, PCS (Production Control System) and rental. The implementation of change led to a more cost efficient way of working. The loss of silo mentality (the reluctance to share information with employees of different departments in same company) provided an improved cross-departmental communication. The project coordinator and manager received more responsibility and customer contact.

Gated processes was implemented in the spring 2014, to improve on-time delivery and performance. However, the implementation was not a success.

4.2 Project structure

The project structure describes the general process flow used in XT & Tools department with regards to refurbishment and new development projects. The project manager have authority and are accountable for the whole project life and performance. The current project procedure is described in the logical diagram in figure 9. Mostly repeatable projects that covers product such as production XT, Tubing Hangers, Running Tools and tree caps.

The model presented is traditional with five phases: Initial, planning, execution, monitoring and control and closure. For refurbishment, a general process deliverable is divided in three phases: 1) Strip, clean and inspect; 2) Refurbishment and upgrade; and 3) Assembly and Test. No formal project management model is established for projects on BHGE Dusavik. It should be noted that the project coordinator in BHGE Dusavik have nearly the same responsibilities as the project coordinators, hence, project coordinator will fall in the same term as project manager in this study.

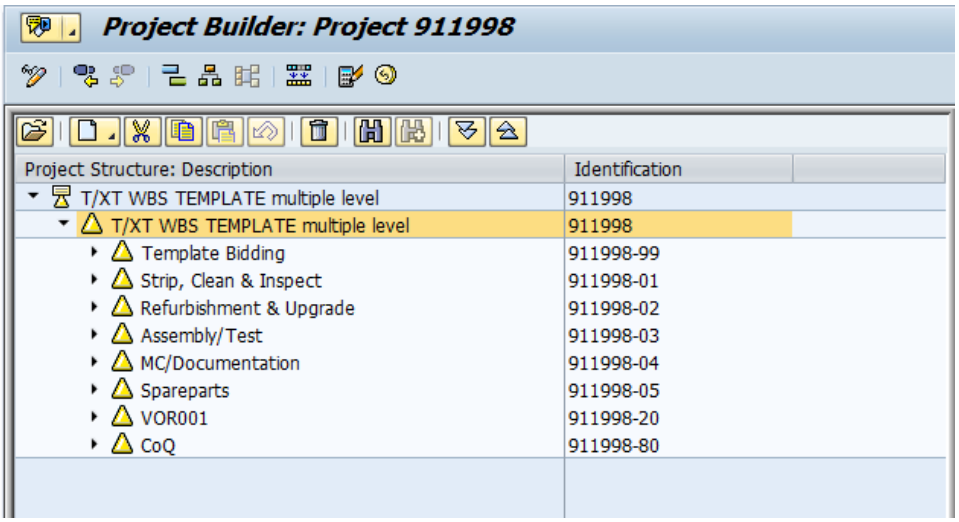


Fig. 7. Template WBS structure for a refurbishment projects.

Different functions in OTR are important for the projects in the XT & Tools Department. In particular, the purchasing department is involved with procurement of spare parts, service part or new production. Documentation approve the technical documentation from the suppliers and finance department controls the cost of the projects. Quality department ensure that the product achieve consistent quality. All mechanical work, from SCI to assembly and test is performed by workshop. In addition, BHGE Dusavik has a weld shop and machining shop. Moreover, the Engineering Department plays a key role in projects. Engineers design the equipment and maintain the design and technical specification (spec). They assist with technical competence and are responsible for discrepancy and justification of the global rejection report (GRR; deviation management tool).

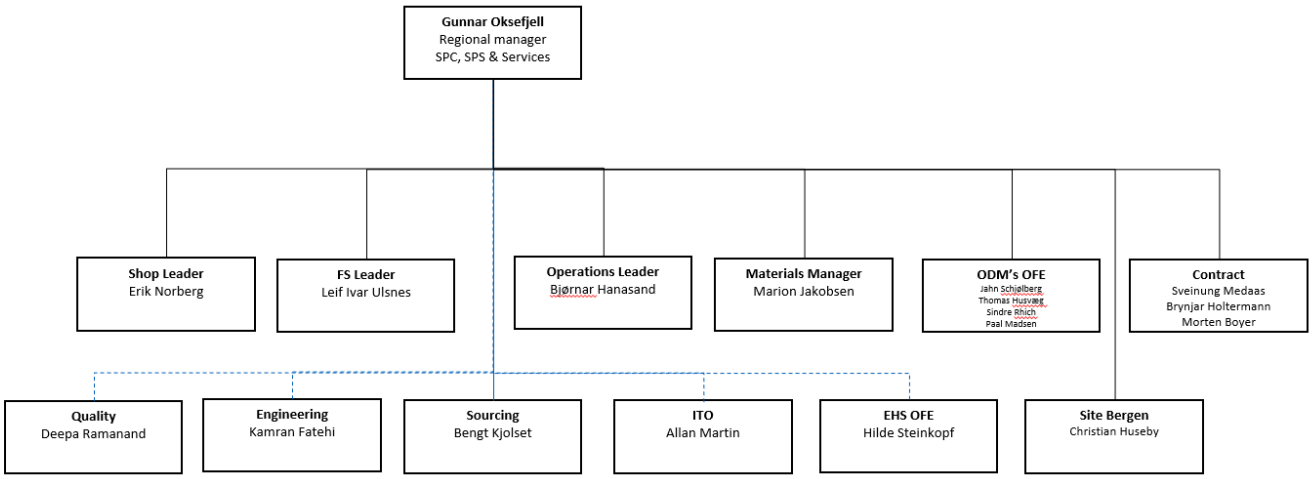


Fig.8. Organizational map of BHGE Dusavik

Figure 9A: Logical diagram for New Production Development

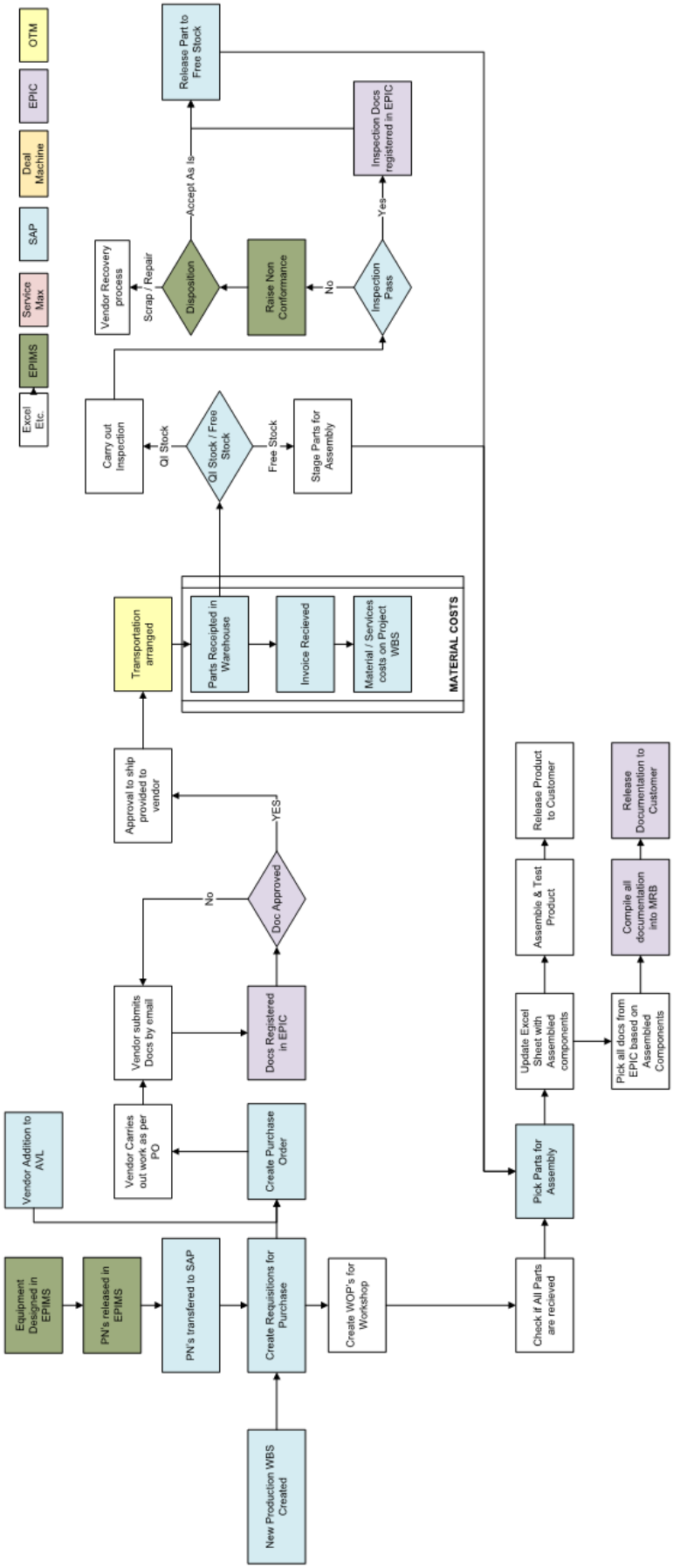
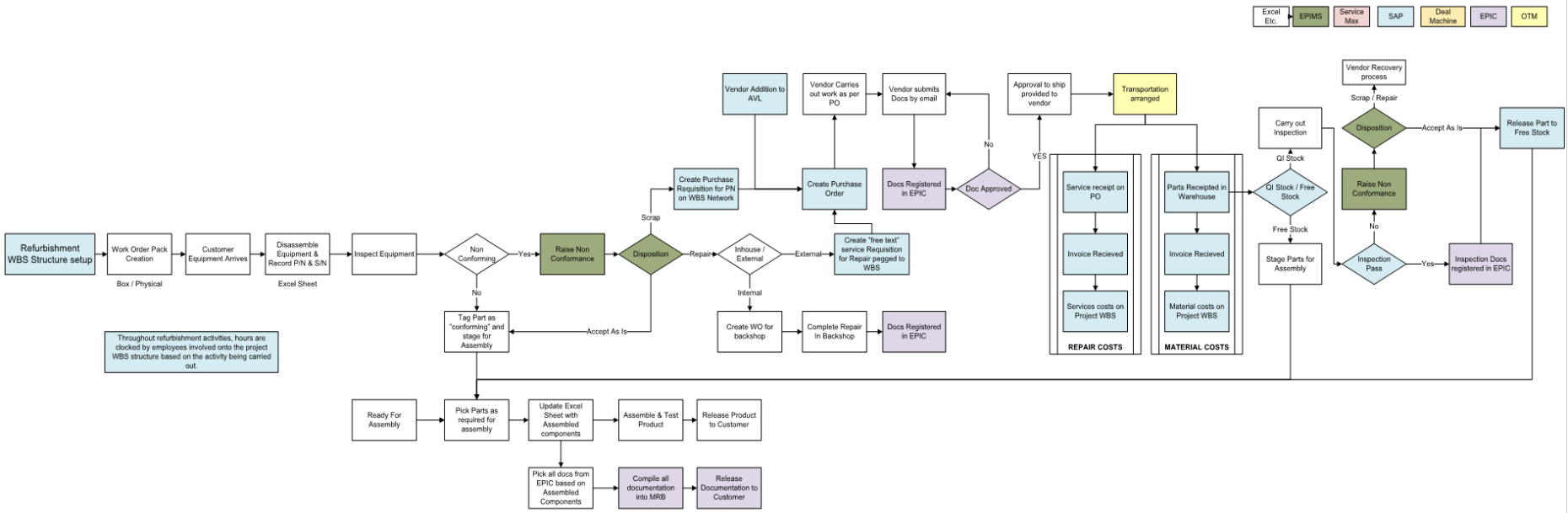


Figure 9B: Logical diagram for refurbishment



4. 3 Project management tools and techniques

Project managers in BHGE Dusavik is using a wide range of interfaces and software to monitor and control the projects, see table 10. SAP R/3 is the ERP (Enterprise Research Planning) system used for integrating the different entities in the organization. Gantt chart is frequently used, and displays the project activities with detailed time plan. Templates are available for most of the activities; however, there is a lack of system for storage, monitoring and updating.

Table 11. Overview of PM tools used in BHGE Dusavik

PM TOOLS	DESCRIPTION
BOX	Sharing box folder system, database.
SAP / R3	The ERP (Enterprise Resource Planning)in use for project related tasks. Every project has a WBS structure. Used by all for booking hours.
E-PIMS	Including the part specification, BOM (bill of material) and deviation management by Global Rejection (GRR) system.
E-PIC	Documentation management, storage, and achieve.
POWER BI	Business analytical service tool that capture business performance.
GANTT CHARTS	A type of planning tool, bar chart displaying project schedule.
PRIMAVERA	Planning tool, generates planning reports and Gantt charts
OFFICE 365	Email, calendar and booking meetings.
EXCEL	To create project time plan and budget
SKYPE BUISNESS	Used by all for virtual meetings and short messages.

4.4 Communication

4.4.1 Meetings

Weekly kick-off for the department is held on the start of the week, covering HSE, updates and challenges for the different projects. Weekly meetings with customer, if required, thus: implication by the project type and characteristics. Kick-off meetings for each project initiates the start of the project and QC (quality control) meeting is performed after SCI (Strip, Clean and Inspect) phase. The project managers usually have meetings with project team on a daily basis. These meetings are efficient.

5. Results

The first phase of interview was to establish background of the informants, and historical review of project management approaches, in BHGE and GE Dusavika. The background information for the interviewers is presented in table 12.

Table 12. Background information of the interview candidates

Background:	**PM 1**	**PM2**	**PM3**
Gender	Female	Male	Male
Years old	33	33	41
Years of experience in OTR	6	7	12
How long have you worked at BHGE/ GE?	10	11	-
Experience/ project involvement/ what product category?	Recertification of drilling equipment, different tools, ricers and tubing hangers	Subsea Portfolio: tree cap, XT (production trees) and tubing hangers. Have assisted in engineering/ design tasks.	Worked in various functions: Apprentice in work shop. material movement, documentation control, project coordinator, portfolio Manager, ITO and Operational leader and Europe Leader
Formal project management background/ education?	Bachelor in Marketing MBA.	General Technical background	College in Bergen Project Management courses provided by GE.

5.1 Main Issues in project management practices

From the data material, the identified problematic categories are identified and displayed in table 13. The employees at BHGE have different ways of doing activities, and are taking short cuts. No arrangement of training for new employee has been given, and there is general a learning by doing mentality. The stated issues are by coding process broken down to four key problem areas; communication, project management, resources allocation and project structure and processes, see table 14. Some of the issues identified are overlapping the categories. The key problems areas will be discussed in subchapters below.

Table 13. Main issues identified in XT & Tools department at BHGE Dusavik

Main issues identified	Description	Interview candidates
Lessons learned	Few project coordinators use/create lessons learned.	PM1, PM2, PM3
Risk management	Few project coordinators use risk management	PM1, PM2, PM3
Lack of defined responsibilities/ role	Scope management, Process guidelines.	PM1, PM2
Cross-department communication	Lack of responsibility role in project and feedback.	PM1, PM2, PM3
Work shop competence	Exchange of personnel. High level of new employees. Team experience, technical skills, commitment and involvement	PM1, PM2, PM3
Project Management competence/ role	Experience, communication skills, coordination and motivation	PM1, PM2, PM3
PM system (tools and metrics)	No systematic use of the available tools, not aligned	PM1, PM2, PM3
Procurement performance	Delays in deliverables used in projects	PM2, PM3
Flexibility	Lack of routines, too loose structure.	PM1, PM2
Project overview	Organisation, planning and control effort, team structure	PM1, PM2, PM3
GRR	Capacity problem, monitoring	PM1, PM2, PM3
Capacity problems	Lack of people, or competence	PM1, PM2, PM3
Cost estimation	Budgeting, wrong estimate, in particular for NDP.	PM2, PM3
Tendering process (ITO)	Bidding process, Lack of responsibility / role Take too much time for project coordinator.	PM1, PM2

Table 14. Key problem areas and problematic category identified.

Key problem areas	Problematic category
Communication	Cross departmental communication Project overview Cost estimations
Project Management	PM system (tools and metrics) PM leadership (competence, culture) Workshop competence Project management competence/role PM processes Risk management
Resources allocation	Tendering (ITO) Procurement issues Capacity in work shop Cost estimation
Project structure (and processes)	Project overview PM process Capacity problems Procurement performance Lack of role/ responsibility Risk management Lessons learned GRR Flexibility

The interviews were asked to rate the importance of success criteria and identify success factors for their projects. The top three of the ranking were: project manager competence, project team competence and project organisation.

5.2 Communication

Cross-functional work is considered challenging. The informants assume that the project manager do not rely on the other departments. There is an impression in the organisation that the project manager that pushes the project get the work performed faster. PM1 and PM2 states that she must trail the different departments, to follow up on their activities. Communication practices is varies, and depends on the query and project context. E-mails is not sufficient, according to PM2, and states that it is important to talk to people and make a bond. Misunderstandings per mail is occurring, and to prevent that, all project managers suggest face-to face communication and ensure that the receiver understand the message. This removes some of the background noise. In addition, all project managers agree that the functioning groups do not receive enough input from the project manager.

The competence and practise in workshop is fluctuating, and this is impact the team effectiveness. The competence is build up by time and by replacements and re-organisations, the team lose some competence. Then, new formalisation is required. PM3 demonstrated that the current communication practices could be compared to a roundabout; everyone expects the others to know which way they will

go. Consequently, misunderstandings around project objective occurs, as well as individual team members moving in different directions. In addition, lessons learned is limited and almost not practiced.

5.3 Project Management

Project management is divided into the two main sub-categories: PM tools and techniques and PM leadership.

5.3.1 PM tools and techniques

The project management tools used in projects are listed in table 11. SAP ERP system is described as complex and do not fit to oil service project management. All project managers agrees in that the processes are circumstantial and requires a lot of manual work. XT & Tools department have created standardised WBS structures in SAP in order to make it more efficient and standardised. These templates comprises of different standardised activities that is characterised for each project type.

5.3.2 PM leadership

From the data collection, it is prominent that the lack of project management competence is one of the major issues in current PM practices. The project managers all agree that competence, experience and leadership are the three main elements required for a project manager. Currently, there is no standardised training or education for the new employees. In addition, no guidelines, templates or activity list are given.

Project management competence are including project managers' technical, behavioural and contextual competence. The project coordinator at BHGE Dusavik is evaluated by the cost margin, expressed as the following formula: Direct Cost Margin = (Revenue - Direct Costs) / Revenue

It is challenging to evaluate the project manager contribution to project by this measure.

5.4 Resources

PM2 states that the main issues with current project management practices that causes delays and cost over-runs was personal competence and resource constraints. The informants highlights that resource constraints are a weakness. Cost estimations in bidding stage is the foundation of the project and is expressed to with regards to time estimation and knowledge. Historical numbers and experience can be used as estimates. BHGE is fairly good at estimation for standard replacement parts in repetitive projects, but not estimates related to new development projects. The time plan for new development is often underestimated, and hence, not realistic estimated and the resource allocation is therefore imprecise. PM3 explains that BHGE goes into a typical trap: mixing activities and do not use the benefits with lessons learned from previous projects. In addition, PM1 argues that there is no link between time estimation in project and the actual working hours in the workshop. The booked hours in workshop is often exceeded, and sometimes without the employees are aware of that.

PM1 explains that the service jobs is sometime difficult to predicts, as unforeseeable events occur, and cannot take these into account. Examples are technical problems in the Bill of material (BOM) and the part spec. There have been issues with the procurement department and the lack of good routines. The longest lead item is critical item(s) for initiating assembly and test phase. Consequently, delays of the longest lead item will cause delays in the project.

One of the interview candidates pointed out the need for standardisation of resources allocation. The PM1 have had experience with project management practices from GE oil and gas in UK, which have project management practices completely different. UK practices are more specific, with responsibility diversified through the different functions, and project manager have less responsibilities. In UK, the ITO bidding process is isolated from the project coordinator. The project manager pointed out that the project managers use too much of their time to bidding phase, which is considered ITO's responsibility. In contrast, operational leader (PM3) share a different view regarding UK practices. PM3 argues that in UK, the responsibility is distributed and much narrower, so they have clearer and more defined work tasks. However, there are several disadvantages, such as everyone is chasing status.

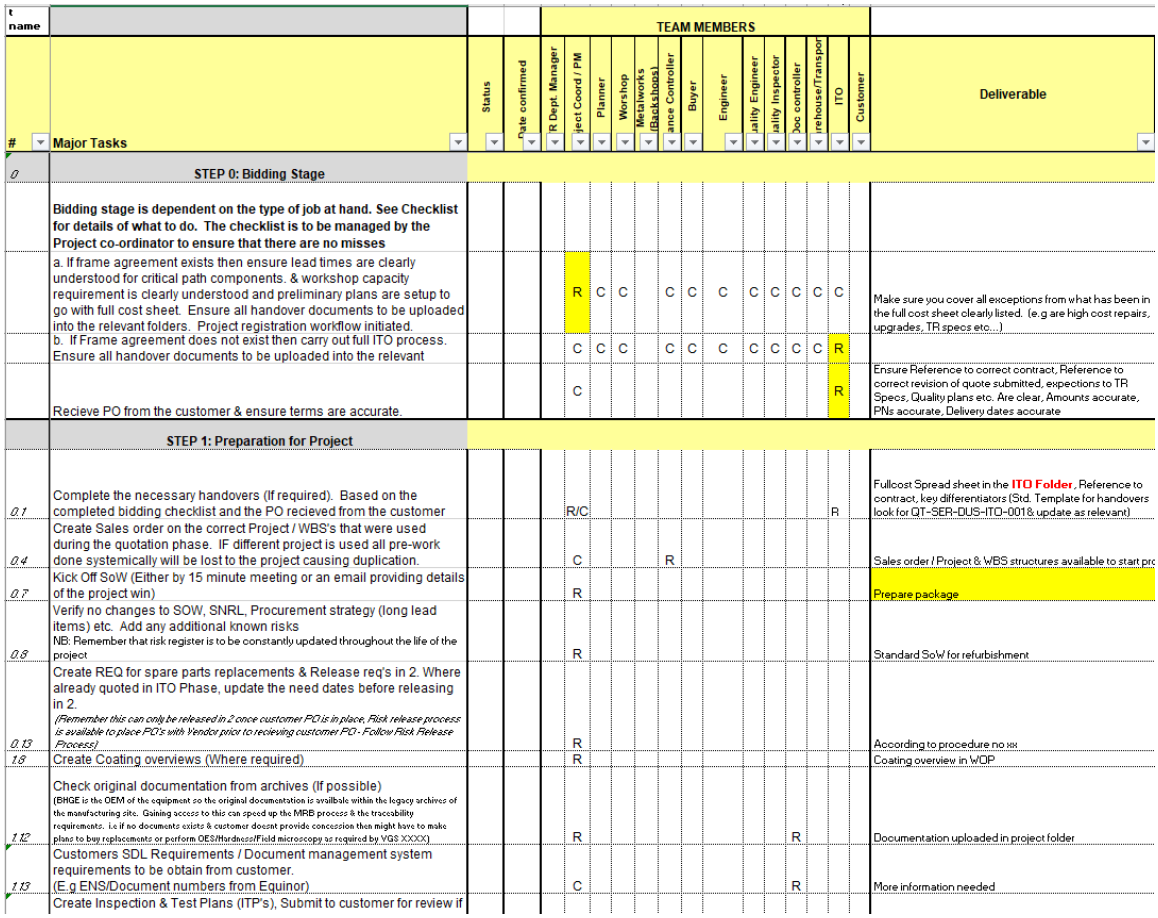
5.5 Project structure

5.1 Project overview

One of the strength at BHGE is the visualisation of the project in the logic diagram (figure 9). The tools used for project overview is diverse, and is a mix of Gantt chart, WBS structure in SAP ERP system, SNR lists and excel. Discussions with project coordinators in XT & Tools department revealed that the administration is heavy and bureaucratic.

5.2 PM process- General model

A general model was established based on the mapped processes and best practice in the company. Mapping project management standards' and process methodology were performed in February and early March. The quality leader, experienced project coordinator and project manager from the XT-tools group were present. The model is a excel file and contain information on how to run a project in XT – tools (not included in this thesis). Preliminary procedure for project management defining the project steps in detail and function responsible. However, according to PM3, a model with procedure will be too detailed and circumstantial, however, he assumes it to be a good check list for new employees. An extract of the model 2019 is presented in figure 10.



t name				TEAM MEMBERS													
#	Major Tasks	Status	Date confirmed	R Dept. Manager	ject Coord / PM	Planner	Worshop	Metalworks (Backshoos)	ance Controller	Buyer	Engineer	ality Engineer	ality Inspector	Doc controller	rehouse/Transpor	ITO	Customer	Deliverable
0	STEP 0: Bidding Stage																	
	Bidding stage is dependent on the type of job at hand. See Checklist for details of what to do. The checklist is to be managed by the Project co-ordinator to ensure that there are no misses																	
	a. If frame agreement exists then ensure lead times are clearly understood for critical path components. & workshop capacity requirement is clearly understood and preliminary plans are setup to go with full cost sheet. Ensure all handover documents to be uploaded into the relevant folders. Project registration workflow initiated.				R	C	C		C	C	C	C	C	C	C	C		Make sure you cover all exceptions from what has been in the full cost sheet clearly listed. (e.g are high cost repairs, upgrades, TR specs etc...)
	b. If Frame agreement does not exist then carry out full ITO process. Ensure all handover documents to be uploaded into the relevant				C	C	C		C	C	C	C	C	C	C	R		
	Recieve PO from the customer & ensure terms are accurate.				C											R		Ensure Reference to correct contract, Reference to correct revision of quote submitted, expections to TR Specs, Quality plans etc. Are clear, Amounts accurate, PNs accurate, Delivery dates accurate
	STEP 1: Preparation for Project																	
0.1	Complete the necessary handovers (If required). Based on the completed bidding checklist and the PO recieved from the customer				R/C											R		Fullcost Spread sheet in the **ITO Folder**, Reference to contract, key differentiators (Std. Template for handovers look for QT-SER-DUS-ITO-001& update as relevant)
0.4	Create Sales order on the correct Project / WBS's that were used during the quotation phase. IF different project is used all pre-work done systemically will be lost to the project causing duplication.				C					R								Sales order / Project & WBS structures available to start pro
0.7	Kick Off SoW (Either by 15 minute meeting or an email providing details of the project win)				R													Prepare package
0.8	Verify no changes to SOW, SNRL, Procurement strategy (long lead items) etc. Add any additional known risks NB: Remember that risk register is to be constantly updated throughout the life of the project				R													Standard SoW for refurbishment
0.13	Create REQ for spare parts replacements & Release req's in 2. Where already quoted in ITO Phase, update the need dates before releasing in 2. *(Remember this can only be released in 2 once customer PO is in place, Risk release process is available to place PO's with Vendor prior to recieving customer PO - Follow Risk Release Process)*				R													According to procedure no xx
1.8	Create Coating overviews (Where required)				R													Coating overview in WOP
1.12	Check original documentation from archives (If possible) (BHGE is the OEM of the equipment so the original documentation is available within the legacy archives of the manufacturing site. Gaining access to this can speed up the MRB process & the traceability requirements. i.e if no documents exists & customer doesnt provide concession then might have to make plans to buy replacements or perform OES/Hardness/Field microscopy as required by VGB XXXX)				R										R			Documentation uploaded in project folder
1.13	Customers SDL Requirements / Document management system requirements to be obtain from customer. (E.g ENS/Document numbers from Equinor)				C										R			More information needed
	Create Inspection & Test Plans (ITP's), Submit to customer for review if																	

Fig. 10. Extract from the PM updated model (2019) displaying the project steps in detail and responsible function

5.3 Risk management

There is no formal practice for risk management at XT and Tools department. PM2 did not know that there was a risk register procedure practice in this organisation. On the contrary, PM3 demonstrates that the risk does not have to be formal. Project managers should use the people in the different departments to identify the risks and mitigate them. Request if there is possible pitfall related to the work shop. Risk management should be a living process and continuously mitigate throughout the project. However, all managers agree that the living risk analysis and risk register is generally not in use by project managers in BHGE Dusavik. PM2 states that the project are repeatable and therefore the risk is encountered. The workshop have competence that can be viable for the project manager.

Risk for new development must be taken more seriously according to PM3. He has examples of projects where risk have not been thoroughly considered. Despite this, there is no formal practice for risk management at XT and Tools department. PM1 did not know that there was a risk register procedure practice in the organisation. Biggest risk is to oversee something according to PM1.

5.4 Change management:

GRR system in Epims is the main tool for handling changes in project. If the change is customer related, such as a change in scope of work or provisional cost update, a variation order request (VOR) is utilised. The main problem concerning the GRR system is the capacity for this function, as there several steps and

people involved, as well as it is costly. The project manager often use a lot of time chasing after status, because there is no escalation system.

5.5 Lessons learned

The statements from the interviews together with observation display that the use of lessons learned is varied, however, too few coordinators report lessons learn on a regular basis. Capturing lessons learned should be a continually performed during the project life. However, PM3 states that it is challenging to make lessons learned systematic.

5.6 Standardisation

All of the informants believed in the opportunity of standardisation. The project managers agreed that the use of templates, variable structure and checklists is can be valuable, in particular for new employees, and potentially improve project management practices. Indeed, the role and responsibility for each PM process is currently vague. In fact, ambiguity concerning whom to contact in the different departments is also an issue, due to the role and responsibility is not transparent throughout the company.

It is common in OTR department that everybody has their own way of working. There is not a straightforward procedure for PM management and other supporting functions. The project managers interviewed expect that the use of standardisation tools, such as use of templates, guidelines and checklists, most likely will improve project management practices. Coordination issues related to project processes could be reduced when standardise the project procedure according to PM2. BHGE repeatedly make mistakes on same type of tools. According to the workshop, things that are reported is not concerned in the next project. No learning is adapted. BHGE have the tools, but do not use them optimal.

The interviewers agreed that standardisation in planning phase could give value for performance. The WBS structure is established and categorised by cost controllers after project type and characteristics. Thus, this function is standardised. However, there is a disagreement on whether to use a standard model “one –fits –for- all”, or to generate different models that are dependent on the project type, characteristics and the boundary conditions for each project. PM1 was most sceptical about implementation of standardisation due the type and project are different, hence, need different way of handling the project, which could not be standardised. Unforeseen events occur frequently, and need to be adjusted after project type. Consequently, all informants assume that standardisation will reduce flexibility. According to operational leader “freedom is key”. Reduction of flexibility will affect the autonomy and moral to the employees: as it is not attractive to work as a «machine” pushing buttons. In addition, PM2 points out that the narrow-mindedness is a negative effect of standardisation.

Tab. 15. Summary of the obstacles to standardisation and benefits from standardisation

What are the main obstacles to standardization of project management processes for the different project types?		
PM1	PM2	PM3
Challenging to plan/predict in the service industry	Coordination issues, project processes can be stopped due to a standard.	
Competence of Project Manager (technical, experience, leadership)	Competence of Project Manager (technical, experience, leadership)	Competence of Project Manager (technical, experience, leadership)
Flexibility is reduced	Flexibility is reduced	Flexibility is reduced
Loss of autonomy.	Loss of autonomy.	Loss of autonomy.
Lack of ownership of the Responsibilities and roles	Pressure on the supporting functions	
	Small-mindedness	
What main issues in current PM practices will be improved by standardizing the process on department level?		
Transparent handover	Qualifications and requirements	Qualifications and requirements
Qualifications and requirements	Cross-department communication	Cross-department communication
	“Lean” processes – better flow	
Lessons learned	Lessons learned	Lessons learned

6. Discussion

In this section, the theory from the literature review and the findings from the results by interviews and observation will be complied. The structure is based on the research questions and the aim of the thesis.

6.1 Project structure and processes

As established in the results, several of the project managers were suggesting one general model that could be used as a checklist of new employees. This is interesting, based on recent literature argues for PM toolbox customization by project size and characteristics (Wysocki, 2014; Payne and Turner,1999; Shenhar and Dvir, 1996; Hessenkämper and Steffen,2015), which contrasting the project manager. From PM literature, there is large differences between the project types, in terms of size, duration of each phase, competence, capacity and EVM (earned value management; Kernzer, 2013).

In order to improve PM practices, five project types were developed based on their common characteristic:

A. Preventive maintenance

B. Demobilization/ Mobilization

C. Condition based maintenance (CMB)/ Strip Clean & Inspect (SCI)

D. Refurbishment/ Overhaul/Recertification

E. New Development Product (NDP)

One of the project type is radically different from the others, (E). The new development projects in BHGE Dusavik are characterised by three product phases: fuzzy front- end with concept development, product design and validation and commercialisation. However, there is a lack of feasibility study before the concept phase on new development production (Wysocki, 2014).

Agile project management approach is intended for innovative projects, often with constant change request. Based on the nature of project, with clearly defined goal, but with unknown solution at the outset of the project, an agile approach is suggested, to replace the current traditional approach (Wysocki, 2014; Coram & Bohner, 2005;).

Traditional and approach is suggested for the project types A-D. All types are repetitive projects, with well-defined goal and initial user requirements, thus, lower grade of uncertainty (Wysocki, 2014). Traditional approach simple and predictable, and linear with clearly defined boundaries. (Špundak, 2014; Wysocki, 2014), which make it easier to plan and monitor without the need of accounting for much changes (Wysocki, 2014; Shenhar & Dvir, 2007).

Table 16. The use of required and optional parts of the PM methodology by project character.

Variable	Project type technological uncertainty Low → High			
	A) Prev. main.	**B) Demob/ Mob**	**C) SCI / CMB**	**D) Overhaul / recert.**
Processes (R= required, O= optional)				
Initiation and definition				
Conditions of satisfaction	O	O	R	R
Project Overview Statement	R	R	R	R
Approval of request	R	R	R	R
Plan				
Conduct planning session	R	R	R	R
Create WOP (work order package)	R	R	R	R
ITP (inspection test plan)	R	R	R	R
WS –OTR handover	R	R	R	R
Risk register	O	R	R	R
Execution				
Kick-off meeting	O	O	R	R
Activity of schedule	R	R	R	R
Monitor and control				
Progress report	R	R	R	R
Project team meetings	O	O	R	R
Approval of deliverable	R	R	R	R
Closure of project				
Lessons learned	R	R	R	R
Close-out checklist	R	R	R	R

Table 16 is an example of a toolbox customization by project character for BHGE. This is a simplification, showing an attempt to make it simplified and to get an overview for new employees. From the process flow chart for refurbishment, the projects have many steps and are not that easy to follow. Effective production processes are developed through continues improvement and learning. An implementation model that fits the different project types and the responsibility functions and roles are identified is

suggested as a project intensive to enhance project performance. Higher focus on training is also proposed.

6.2 Risk management

A proper risk management system is suggested based on PM literature and the interviewees. It is proposed to enhance the risk register by making a template for each deliverable product and the most common risks. This is an easier and more user-friendly approach, including a risk evaluation matrix, with a template, so the project manager can fill in information.

6.3 Project Management Tools and techniques

Standardisation improvements suggestions are based on the current need for standardise the project system. Implementation of "template-WBS", where the repetitive projects associated to a product category (such as XT, Tubing Hanger and Tree Cap) have a well-defined template format in SAP (ERP system) that includes all standardised planning phases. Thus, purchase requisitions that before was made manually, such as ordering spare parts, water blasting and coating, are now auto generated, and will only needs to be released by project manager. Easy to use and will improve efficiency because the manually work is reduced. However, the templates must be continuously be improved. In addition, a shared map of all PR made are to be created, and categorised by product/ product group.

There is a general lack of a satisfactory systematic approach to store existing knowledge gained from previous projects. From the result, lessons learned from previous projects are stored in a variety of ways, or absent. Many project managers do not report lessons learned at all. Content management system (CMS) used in the company is BOX. The database system used in BHGE do not have a single access point for project related information that is searchable throughout the organisation; it is divided in folders, with different restrictions to access. The consequences that can arise if the organisation do not have a single access point of project information is misalignment, non-conformity, education and knowledge distorted (Hessenkämper, and Steffen, 2015):

1) Misalignment: Budget and timespan planning is not communicated out properly. PM1 states that the workshop need to be more aware of the timespan planning and budget.

2) Non-conformity: solutions/ lessons learned of previous projects are overseen

3) Knowledge distortion: unclear distribution of information, using a mix of several media which have poor links to each other.

4) Education and training: New employee requires long training before they attain adequate knowledge.

The project management initiative is in line with the study of Besner and Hobbs (2006), which suggest that the databases for historical data and lessons learned /post mortem are the organisational learning and memory tools that have the highest potential for contribution significantly to improved project performance. Lessons learn should also be included into the sharing map and imposed to be a living register that continuously is updated throughout the project life. This will provide shared knowledge, competence and experience for each product. From literature, lessons learn score one of the highest ranking for project management tool that potentially improve project success (Fernandes, 2013; Besner and Hobbs, 2006).

PM1 suggested that time estimates and the actual booked hours should be aligned in SAP, or other software program to keep track and be transparent. A warning should be turned on when the estimates are reached, so this is absorbed by the project.

Bivariate analysis on standardised project management factors on development of project success claim that the systematic project system (methods and metrics) have the most impact on the project management (Milosevic and Patanakul, 2005). From this plot, one can observe that the correlation coefficient for the factors of standardized PM process and PM project leadership have high scores. This implies that the PM system, PM process and PM leadership have equal impact are PM initiatives that should be prioritized. This is also in line with PMIIs identified by Fernandes et al (2014).

Table 17. The influence of standardised project management factors on project performance (from Milosevic and Patanakul, 2005)

Standardized project management factor	Correlation Coeffecient[a]	Mean values of standardization of project management factors			Top vs. low group, *t*-test
		Low group[b] project success	Middle group[b] project success	Top group[b] project success	
Standardized PM process	**0.43**[c] ($p < 0.01$)	2.33	2.40	3.25	**2.01** ($p = 0.05$)
Standardized project organization	0.05	3.00	2.68	2.92	−.14
Standardized information management system	0.27	2.50	2.28	3.21	1.19
Standardized PM tools	**0.48** ($p < 0.01$)	2.33	2.88	3.88	**3.65** ($p < 0.01$)
Standardized PM metrics	0.24	2.00	2.88	3.29	**2.53** ($p = 0.00$)
Standardized project culture	0.08	2.33	3.28	3.21	1.62
Standardized project leadership	**0.46** ($p < 0.01$)	2.33	3.40	4.00	**4.39** ($p < 0.01$)

[a] Correlation coefficients.
[b] Mean values of standardization of each PM factors for low, mid, and top groups of projects in terms of project success.
[c] Bold numbers are statistically significant.

Based on the information from the interviews and experience the researcher, the current ERP system is a cumbersome, time consuming and disordered system, in which give rise to a lot manual work for both project managers and employees. SAP is out-dated system, thus, BHGE Dusavik is currently the last site that is using SAP. Most of the BHGE sites utilizes Oracle Project Portfolio Management (PPM), which is a modern cloud ERP system with integrated PM solutions (Laszewski & Nauduri, 2011).

Ocrale's database provides a large support of activities and functions in project management: to analyse and management all phases in the project, as well as risk management and mobile communication tools. Oralce 's project portfolio management cloud system offers a comtemporary, versatile and predictive project management system what delivery project transperency to the organisation. Oracle facilitates service projects and agile/waterfall projects, and is suggested as the most sophisticated software applications supporting project management by Kostalova et al (2015). The system is reported user-friendly and intuitive, which is in contrast to SAP.

Software for shuedule and monitoring of projects is suggested to be the most useful PM practice based on research from Fernandes et al., 2013. In particular, PM software for task scheduling is the highest intrinsic value (intrinsic value is present extent of use combined with potential improvement) identified by Besner and Hobbs (2006), and therefore potential can improve project performance.

6.4 Project success

From the literature review on project success there is an unsatisfactory understanding of the relation between project management performance and project success. In addition, much of the literature on

pay no attention to the project manager, his or her competence and leadership. Conversely, adequate leadership in projects is considered as a success factor in general management literature.

Determining the critical success factors will give the organisation a competitive advantage because they potentially increase chance of project success (Milosevic and Patanakul, 2005). Drawing from the literature review and empirical, BHGE have five variables related to project success; 1) External Issues and contractual aspects; 2) project management practices (including communication); 3) project related factors; 4) project procedure 5) Client satisfactory. The critical success factors will in turn give achieved specific performance level.

6.4.1 Project Manager as a success factor for projects

Crawford (2007) suggest that competence of the project manager is depended on project success, and the project manager is considered as a factor itself for successful performance on the projects. PM literature reveals that people management encourages to project success on a higher level than technicals do (e.g. Scott-Young and Samson, 2004). However, the research on the soft (people) side of project management is limited (Kloppenborg and Opfer, 2002). Project managers should have skills and competence as follows: adaptable, generalist, effective, ambitious good at communicating and well organised (e.g. El-Sabaa, S, 2001). Kerzner (1989) claims that the "the major factor for the successful implementation of project management is that the project manager and team become the focal point of integrative responsibility". This implies that the key factor for successful project lies in the project manager and the project team, and not the client. On the other hand, client has a significant role for project success, and mainly for early decision-making.

It is reported from the informants and the experience from the researcher that BHGE Dusavik put little effort in improving competence and educational training for new employees. No formal training program is given to new employees, and the organisation currently have an imprinted learning by doing philosophy. However, a performance development (PD) tool is currently in use at BHGE Dusavik for improving the competence and ensure continues improvement by a set of expectations.

Oil service industry is dependent on market and oil companies' response to that. Historically, the market tend to be fluctuated. As the market is growing after a long down period, in 2019, the need for raised staffing is prominent. In addition, there is higher exchange among staff, and loss of competence is present.

6.5 Communication

Excellent practice of communication is one of the critical components for project success. In fact, most projects fail due to communication issues according to PMI (2013). Communication is one of the ten knowledge areas for project management from the PMBOK. In addition, Greenhalgh et al. (2004) demonstrates that effective communication is one of the key PMIIs.

Cross-functional communication plays an important role for the BHGE, as communication drives the projects and poor communication can lead to significant misinterpretations (see table 9). As explained in results, most of the project leader using a balanced way of communicate, both verbally and virtually by emails, which is preferred by researchers (Daft & Lengel, 1984). Project manager tries to have a regular daily face-to-face meetings with the work shop. This is a routine, and bring information and status on each project and build up thrust and show interest in the people. This is supported by literature to be the best practice and to have a balance between formal and informal communication (Turner and Müller,

2004). By face-to- face communication, the project manager can observe the non-verbal communication and ensure that the receiver properly understood the message. Indeed, reliability is not present in written communication (Zulch, 2014).

However, misunderstandings and confusion do occur and causing problems that escalates cost. Thrust and lack of responsibility or autonomy, could be the reason for the findings above. One example is that there is lack of thrust in the functions: if you send an email, you are not sure when you will get answer back, or if you get it at all. It is therefore vital is to certify that clear and consistent information is given to the different functions/ departments. Cross-department meetings once a weekly or bi-weekly is suggested for continuously monitoring the projects and give transparency and collaboration across the departments.

Capacity problems in periods of high demands from stakeholder(s) can influence on communication, affecting both project team and stakeholders, negatively. Periods with low personnel capacity and high level of orders, will provide more a higher backlog, and often put higher demands on people.

According to Rajkumar (2010), poor communication will influence cost with time. Poor communication may be related to person manager is unable to efficiently manage a conflict or feeling overwhelmed by the project. Often, the stakeholders of a project can complain and find issues or mistakes in the way project manager handling the project, which could lead to avoidance of that individual. However, fail of engagement of stakeholder can cause damage to the project by not be responsive and held a negatively communication line (Abudi, 2013). Indeed, over-communication to the stakeholder's impacts negatively, as the stakeholder will lose the engagement and attention. Finding the balance is the key for communication, and the use of a well-structured communication plan will enhance communication practices.

Communication management is the fundamental for the interaction for several disciplines that involves in processes in development of a project. Rajkumar (2010) states that more effective communication results in better project management. From the communication management, figure 4, the system plays an important role, with standards, functions, procedures and documents. Consequently, in order to have an excellent communication management, the standards and procedure regulations must be in place. In addition, competence on the personal level is important according to Oliver (1983); therefore, it is suggested to increase the competence among project managers and departments involved with projects.

Communication management as a process function could improve current communication based three key processes are identified in literature (PMBOK): 1) Communication Plan management 2) Manage communication; 3) Monitor communication. Communication planning intends to engage stakeholders, project functions and workshop by spending time to understand each function and stakeholder and how they want to be communicated with, in order to meet the objectives of the project. The communication plan requirements steps are explained with the 5W's (What, Why, Who, Where and When) and how (Rajkumar, 2010).

Communication management is not practiced as a formal function in BHGE Dusavik. However the ITP (inspection and test procedure) is created and including the planning the overall customer in the planning phase. This is provided to the customer, for acceptance. Indeed, more communication between customer is expected due to unpredictable events that is challenging to anticipate. The communication plan is most critical for lager and complex projects. Therefore, a simple overview is proposed for smaller

projects. Building relationships with client and internal was one of the suggestions from PM2 that enhance communication, with is supported by literature (Abudi, 2013)

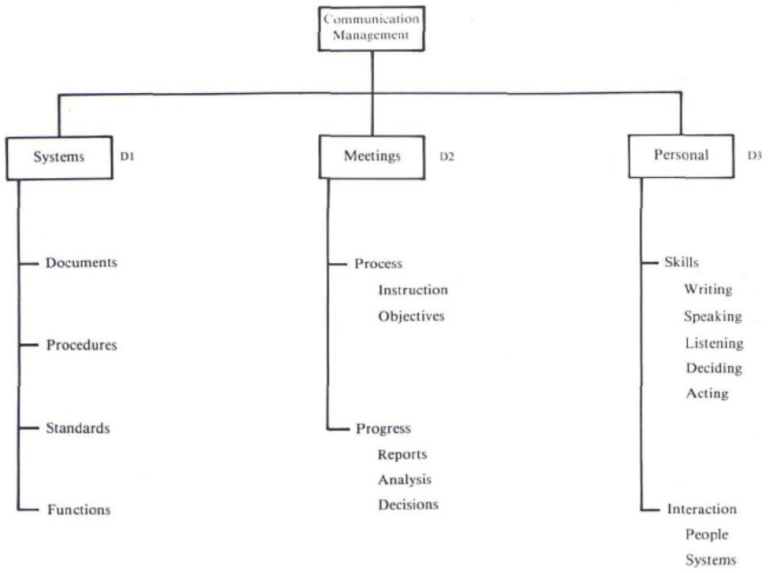


Fig. 11 Communication Management (from Oliver, 1983)

Project success is depended on both stakeholder and project team give accurate information of their needs, updates and schedules. Currently, email and skype is the main communication tools for providing this information. Could we challenge web-based technology and use a more integrated tool, which is more transparent?

Handover is used as a communication tool between some of the functional departments. Handover from project manager to workshop was proposed this spring (2019), for improvement between the departments. The handover is communication tool that describe the delivery, duration, the use of test equipment and other important notes related to project. The handover increase the ownership of the project to the workshop, as well as give more responsibility up-front. This ensures consistency and well-defined planning with input from the workshop.

6.6 Resource allocation

A major concern for BHGE is that many projects exceed budget and and/or are delayed. Cost estimation, in particular for new development is described by the interviewees as one of the reasons. Historical data can give us input for realistic estimation, but can also be considered as outdated, particular with the fluctuations in the marked. Turner et al. (2008) state that the resource allocation is the most important planning tool according to organisations that they have interviewed.

As stated in the results, the employees in the workshop do not have incentives to work within budget. The link between time estimation and hours booked of a project do often not match, and is underestimated. One reason could be that new employees that needs more training and experience to work at the pace that is required. Alternatively, they are not aware of the time estimates or have no incentive to work as fast as possible. A possible solution is to arrange incentives, which is expected give motivation for the employees. Furthermore, implementation of a handover phase between workshop

and OTR is assumed to give more ownership to the workshop and this initiative that would give more responsibility, in which can be a motivational boost.

Cost estimation for new production development projects is considered challenging to predict. The reason may be tracked to the lack of proper feasibility phase, and the projects might initiated without solving the technical queries first. There is a risk having a lack of a robust and consistent planning phase, combined with a resource cut. Deviation is planning phase is consistent with relation between the fuzziness and cost escalation theory from Verganti (1997). Systematic lessons learned in the future is a prerequisite for enhanced estimation.

It is further stressed out by the interviewees that there is departmental issues with procurement. One of main issues is related to resource allocation is the longest lead item. It is challenging to receive some of the items within the right time from suppliers, and hence, result in delays. This point at a need for investigation of the procurement strategies.

Regarding the ITO handover phase and the responsible to the project manager, the interviewees had different opinions. The key principle from PM literature is that the project manager is included in every stage, from initiation to project finalisation. Storbacka et al. (2009) suggests that the project managers is responsible from the initial bid and several advantages are related to this approach. No information gaps can occur when the same person is monitoring from initial bidding to delivery phase. The project managers also have the commercial background, and therefore have the skills to discuss the project details at an early stage. Finally, potential for establish a beneficial relationship with the client. These arguments above is also consistent with the interviewer PM3.

6.7 Standardisation

SPM literature points at several advantages related to standardisation that are related to project performance. Milosevic et al. (2001) suggests higher standardisation of project system may result in higher schedule-driven, cost-driven- and quality-driven project effectiveness. Three standardised PM factors are of interest: standardised PM tools, standardised leadership and standardised PM processes (Milosevic and Patanakul, 2005).

6.7.1 Balancing flexibility and standardisation

Nissinboim and Naveh (2018) examined the standardisation associated with error reduction, with emphasize on employees choice. Results drawn from figure 12 demonstrated that the highest level of error reduction is related to environments where standardisation rigidity is intermediate and employees are allowed high degree of discretion, which lead to high degree of adherence to standardisation. In addition, error reduction is not related to high standardisation rigidity, as increased standardisation (rigidity) results in reduced flexibility (Nissinboim and Naveh, 2018). This is a supported view from project managers in BHGE, which argues that procedures and tools only can be standardised to an extent. PM2 in BHGE Dusavik point out that “freedom is our success”. Thus, a project manager should have the required skills to deal with unforeseen circumstances and flexibility.

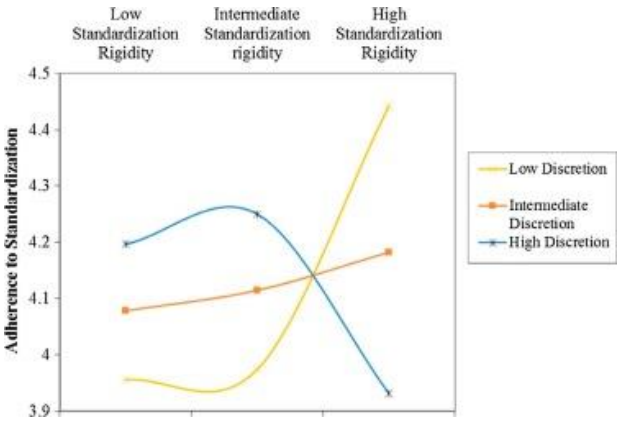


Fig.12. The interaction between employee discretion and standardisation rigidity on adherence to standardisation (from Nissinboim and Naveh, 2018)

Nissinbom and Naveh (2018) argues that the balance between structure and flexibility influence performance of the project. Thus, managing and balance the structure and flexibility requires effort and involvement from both management and employees. It should be stressed that standardisation rigidity is beneficial up to a certain level, an inflection point (Milosevic and Patanakul, 2005; Naveh and Marcus, 2005).

According to Nesheim (2011) there is a need for balance between standardisation and flexibility in high reliable organisations. High reliability organisation (HRO) is defined by organisations that is complex, high level of technology and vulnerable for human error. BHGE is considered as a HRO based on the complexity of projects and the required focus on safety. Standardisation will ensure uncertainty and unforeseeable event to an extent, but flexibility plays an important role (Grote et al., 2009). Thus, standardisation rigidity and flexibility requires to be balanced and within a standard in the implementation of the standardised PM procedures. The loose coupling concept from Grote et al., 2009 is suggested, to balance between standardisation and flexibility by accommodate both need of adhering to the standardisation and ensure autonomy, see figure 13.

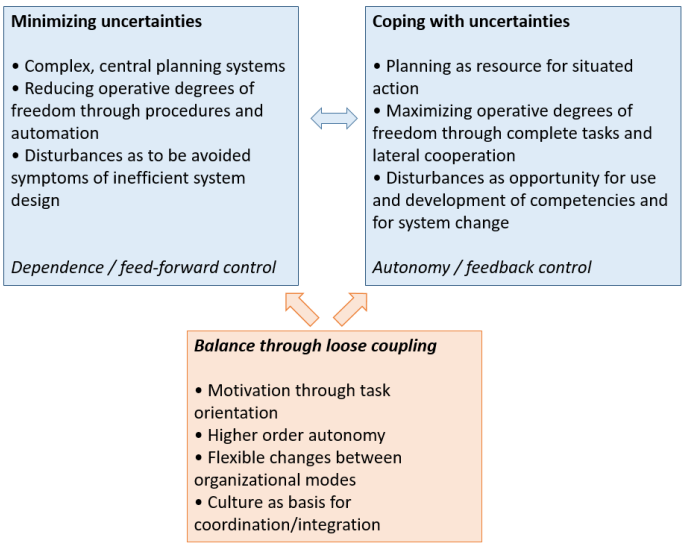


Fig. 13. Balance through loose coupling model from Grote et al., 2009

Based on the literature review, the experience of the researcher and the interviews, BHGE should have focus on reaching an intermediate level of standardisation and permit for employees choice by encourage the employees to use discretion. Focus on standardise planning phase gives a proper foundation in the planning phase is important for the project. By implement a change in an early stage of a project, the cost is less than in the later stages (Verganti, 2009).

6.8 Project management improvement initiatives

The framework from Fernandes et al (2014) places interest of 15 main project management improvement initiatives (PMIIs) divided into three PMII categories: 1) processes, tools and techniques; 2) general management system; and 3) People and Organizational. The PMII categories are in line with the findings in this study based on the interviews and material. Moreover, the areas of scope, time, risk and communication and integration are assumed to have an implication on project performance. In particular, communication and integration, risk and estimation of scope and duration are important PMIIs that are in consistent with results in this study. The tools and techniques are suggested improved and standardised. Fernandes et al (2013) reports that PMIIs is particularly applicable for PM tools and techniques in planning phase. Based on BHGE is a service company, the planning phase is the most effective and easiest to implement. The second phase, the updates and repairs, is a phase that is considered challenging to standardise. Given that projects are repetitive, the planning phase can be standardised to a higher level.

As explained earlier in the study, the software application is one of the main PMII that is suggested for BHGE Dusavik. Implementation of integrated software and standardisation of processes is a large investment, but is assumed to improve many of the main issues from the results that generates the most delays and inefficiency. Based on the analytical material and SPM literature, standardisation is assumed to enhance communication, improve lessons learned system and adapting learning into the organisation and improve departmental responsibilities.

The key PMIIs identified for BHGE by collecting observations and interview response are: 1) corporate standardisation and tailoring of PM processes; 2) manage PM competences and provide PM training; 3) corporate standardisation and tailoring of PM tools and techniques and 4) develop a culture for learning. It should be noted the new PM practices must “fit” within the organisation in order to deliver the anticipated outcome (Cooke-Davies et al., 2009). Therefore, the key PMIIs must be evaluated and prioritised in order to find the main factors of embedment (Fernandes et al., 2015).

7. Conclusion

This thesis have examined the current PM issues at BHGE Dusavik in order to find potentially project management practice improvements. Standardised project management is assumed to impact project effectiveness (Milosevic and Panakul, 2005). There are several benefits related with implementing standardisation of the project management practices at XT & Tools at BHGE: 1) enhanced communication 2) improved lessons learned system, learning from previous projects and 3) improve departmental responsibilities, which provides collaboration and transparency through the organisation. It is suggested to exchange the current software system, which is currently complex and disorganised, to an integrated cross-dimensional analytic platform that give insight to project performance and allows the project manager to monitor, track and improve performance. In addition, the project manager competence is important because well-performed project management what fits within organisation can lead to effective and repeatable processes.

Four key project management improvement initiatives for BHGE is suggested in this thesis; 1) corporate standardisation and tailoring of PM processes; 2) manage PM competences and provide PM training; 3) corporate standardisation and tailoring of PM tools and techniques; and 4) develop a culture for learning. The key PMIIs is good indicators to which initiatives that should be evaluated and prioritised. However, any nonconformities and disagreements must be ruled out before implementation of standardised project management can be initiated.

8. Limitations of the Research and Future Work

There are several aspects that was not taken into account in this study, but which could be of interest to investigate in the future. First, organisational culture could be interesting area for investigation. Second, change management for organisational change, and the resistance for change was not considered in this thesis. Final, the value to PMIIs and the embedding factors for implementation of standardisation of PM processes and tools and techniques require further examination.

The methodology used in this thesis have some limitations. Few numbers of candidates for interview makes it challenging to reach a general conclusion (Bryman and Bell, 2007). If more project manager had been interviewed, the results obtained could potentially have been different. However, the project managers that were interviewed had several years of experience and the interviews was in-depth and provided sufficient information about the current PM practices and processes and the standardisation aspects.

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