Business Process Modeling Practices among Norwegian Organizations

[Master Thesis]

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Jahan Zeb, Muhammad

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- **ARIS** Architecture of Integrated Information Systems
- **BPM** Business Process Modeling
- **BPMM** Business Process Maturity Modeling
- **BPMMM** Business Process Management Maturity Model
- **BPMN** Business Process Model and Notation
- **BPR** Business Process Reengineering
- **CMM** Capability Maturity Model
- **DMS** Document Management System
- **DND** Den Norske Dataforening
- **EPC** Event-driven Process Chain
- **ERP** Enterprise Resource Planning
- **ICT** Information and Communications Technology
- **IDEF** Integrated DEFinition
- **IS** Information Systems
- **ISO** International Organization for Standardization
- **IT** Information Technology
- **ITIL** Information Technology Infrastructure Library
- **KPI** Key Performance Indicators
- **NCS** The Norwegian Computer Society
- **PM** Process Modeling
- **PMP Model** Process Modeling Practice Model
- **PM-Success Model** Process-Modeling Success Model
- **PEMM** The Process and Enterprise Maturity Model
- **QA** Quality Assurance
- **RAD** Rapid Application Development
- **ROI** Return on Investment
- **SCOR** Supply Chain Operations Reference Model
- **SEM** Structural Equation Modeling
- **TPS** Toyota Production System
- **UML** Unified Modeling Language

Abstract

This research presents a study to increase the understanding of how businesses in Norway are working with their processes and to what extent Business Process Management (BPM) is adopted by Norway based companies. For this an existing *Process Modeling Practice (PMP) Model* is revised and used in a survey of eighteen Norwegian model-based process-change projects. We used the approach to develop an interview guide including questionnaire to explore the current trends in process modeling in Norway. There is a positive relationship between *project outcome* and *process modeling* dimensions like: *outsourcing/consulting* and *team work*. There is no positive relationship between *career opportunities* and *project outcome*. Practical and theoretical implications of this study are also discussed. Significant paths for future work include improving instrument validity and detailing the PMP model by including other dimensions of *process modeling*.

Key words: Business process management (BPM), Enterprise modeling, Process modeling, Process Modeling Practice (PMP) Model.

1. Introduction

World trade markets have changed a lot over the last few decades. Consumer options have multiplied, organizations' battle for attention has become stronger and the need to be competitive has increased. The globalization of world markets is forcing companies to continuously improve their own practices by being constantly exposed to several competitors *(Business Case Studies, 2014)*.

An important question that has emerged because of this increased competition is how companies should organize themselves and act to achieve maximum utilization of its resources and to achieve the best results. For example, the competition that the U.S. auto industry met from Japan in the 80s meant that the Americans had to learn and understand how one could produce faster and with fewer errors. The answer was a business organization and philosophy stemming from studies of the *Toyota Production System (TPS)*, called *Lean (Harmon, 2010)*. Today, Business Process Management (BPM) often receives attention from companies who want to achieve maximum utilization of their resources and attain the best results. The idea is that all business processes work should be carried out as specified by *Hammer (2010)*. It is therefore likely to organize and orient companies by key value-creating processes. Business improvements and efficiency opportunities should be clarified by creating a system that monitors, conducts, supports, and enhances processes under competent leadership. This holistic process management mindset is increasing. More and more companies recognize the value of organizing themselves this way *(Business Case Studies, 2014)*.

It seems form earlier studies that BPM is becoming more and more important for Norwegian businesses. In a country where the cost of labor is as high as in Norway, the companies have to find ways to optimize the way they work.

Today, *Process Modeling (Curtis et al. 1992)* is recognized as vital for Business Process Management *(Harmon 2010)*. However earlier in Norway, organizations involved in *Business Process Reengineering (BPR)* projects were totally unaware of the available process modeling techniques and tools; and these were not considered central among them *(Iden, 1995)*. Since then, a number of

modeling techniques and tools have been proposed and adopted by companies. For example, process models are commonly used to document existing practices, analyzing these practices and suggest future improvements. Process models are also used for structuring the vast amount of information that materializes in process-change projects. Other studies were conducted to investigate the use of modeling for process development in Norwegian companies *(Dalberg et al. 2005)* and to examine the relationship between process change in projects and *project outcome (Eikebrokk et al. 2008).*

There are few available theories and empirical studies to facilitate research on process modeling in Norwegian model-based process-change projects. The purpose of this research is to revise and empirically test the *Process Modeling Practice (PMP) model (Eikebrokk et al. 2008)* while adding more *process modeling* dimensions in that model. Our new proposed dimensions (of *modeling processes*) i.e. *outsourcing/consulting*, *career opportunities*, and *team work* focus on how they are related to *project outcome* in our unit of analysis, model-based process-change projects.

This study focuses not only on understanding the existing practices of BPM in Norway but also to help organizations understand what is concerned in realizing the success criteria for process modeling, to identify its challenges, to avoid the drawbacks, to explore what methodologies, techniques, and tools are being used in Norway, and how organizations realize the benefits of process modeling. The main theoretical focus is on the *Process-Modeling Practice (PMP) Model* (*Eikebrokk et al. 2008).* It presents relevant theory in business process modeling.

We conducted a qualitative survey and developed an interview guide. The research process consisted of two complementary parts. During initial part of the research, a 30-40 minutes questionnaire was completed by 18 respondents. We tried to represent major industries in the study. Respondents were drawn only from Norway. The second part of the research comprised in-depth qualitative interviews with the same respondents. Targeted personnel for this research were those who had participated in one or more model-based process-change projects, e.g. consultants, facilitators, project managers, IT managers, process developers, process owners, quality managers and system developers.

Analysis is divided into three categories. First section represents the data summary; we call it *process modeling landscape in Norway*. Second section gives a very close look at the data while finding some patterns in the data, called *Pattern Analysis*. Last section reviews *respondents' own subjective opinions, reflections*, their understanding of the projects and what they think about BPM practices' and its' future in Norway.

Our insights are based on the qualitative findings from the questionnaire, illustrated by subjective findings and quotations from the qualitative interviews.

1.1. Research Motivation

Many enterprises are realizing the importance of both business and IT to have control of the enterprise/business processes. To achieve the goals, organizations are typically concerned with processes because they are supposed to standardize, improve, and optimize the prevailing processes. Instead, based on requirements, IT develops different software solutions to support and to improve the overall business performance with suitable applications and business processes.

Furthermore, highly volatile scenarios for businesses and increasing complexity and development of advanced technologies give big challenges to management. To address these challenges, *BPM* is the center of attention for companies all over the world. Renowned companies transform plans into execution using processes to produce quick and measureable results while creating a sustainable and robust BPM competence *(Miers, 2005)*.

Valuable business knowledge is essential to explain processes from the business's point of view. In the same way, IT expertise required to transform business processes into code and to develop relevant applications. For the IT applications to actually address the real business processes, the major hurdle is to bridge the gap between business and IT personnel so that they may understand and collaborate with each other. We support this mindset, and that is one of the reasons why we choose to work on this area in this master thesis. It seems Norwegian industry in process management is growing and still there is a need to adopt the worldwide practices.

1.2. Research Problem

1.2.1. Background

Working on process modeling practice, *Eikebrokk et al. (2008)* revised the Process Modeling Practice model – called the *a priori PMP model (Bandara et al. 2006)* – and used it to analyze Norwegian model based process change projects. Limited available literature in Norwegian context at the time, in 2007, made the researchers of the study to contribute their efforts for *Process-Modeling Success (PM-Success) Model*. Based on the Hofstede cultural index, they emphasized social and organizational aspects due to the high worker involvement in the Norwegian context *(The Hofstede Centre, 2014)*. Therefore, *process competence* and *project outcome* in terms of learning were considered as prerequisites for *process modeling*.

The *a priori PMP model* was revised based on a comprehensive review of the process modeling literature (keeping in mind the Norwegian cultural context, and researchers' personal experiences from attending various process modeling projects). *Modeling process* and *model artifact* are described as the two main variables of the *a priori PMP model*. In the revised model, the dependent variable *project outcome* (i.e. state of the organization after initiating the *modeling process*) is determined by two independent variables *process competence* (i.e. state of the organization before initiating the modeling process) and *modeling process*.

Nine hypotheses were made and a questionnaire was developed and sent to Norwegian organizations in 2007, *Eikebrokk et al. (2008)*. The targeted sample consisted of quality managers, process owners, IT managers, process developers, system developers, and consultants. The participants were asked to answer the questionnaire based on their own self-selected projects with which they had been engaged during the last five years.

The results indicated that the *modeling process* is positively related to *project outcome*, where a *modeling process* was measured in terms of *top management support, in-project training, lack of resistance,* and *model type*. On the other hand, no significant relationship was found between *process competence* and

project outcome. *Process competence* was measured in *process-modeling competence* and *process-oriented competence*.

1.2.2. Our Research Directions

As mentioned earlier, the study by *Eikebrokk et al. (2008)* was conducted a while ago, and it seems that the Norwegian market is emerging in adopting process modeling techniques and tools. It would, therefore, be interesting to follow-up the last study and also to look for new dimensions of the *modeling process*. Our research work addresses the following areas in a broader perspective:

1. To increase the understanding of how businesses in Norway are working with their processes.
2. Seek to clarify the *BPM* practices used in process-oriented organizations and projects in Norway.
3. What methods, techniques and tools are used to model processes?
4. To identify needs and success criteria for methods, techniques and tools for process development and modeling.
5. What are the challenges for process development and process modeling?

1.3. Research Limitations

This study has small sample size. Our research mainly focused on organizations operating inside of Norway. We started with those respondents that were contacted in the last study *(Eikebrokk et al. 2008)*. Many organizations from the last study were contacted, but because of personnel's busy schedule and relocation we did not get as many responses as we were expecting. We also contacted other organizations that were not contacted earlier or were new in the market. In total, 60 professionals from different organizations were contacted but only 18 responded.

Because of small sample size, we faced some limitations to claim the generalizability of our research. We limit the third dimension of *modeling process*

*(*i.e. *career opportunities)* in terms of salary; we did not include bonuses, job designation, and etc.

1.4. Task Structure

The next section presents relevant literature about process, business process management, process modeling, theory of process change, the *a priori PMP model*, the revised research model, and also our proposed dimensions of *modeling process*. Section 3 then describes the research design, before section 4 presents our results. Section 5 discusses the results along with our opinions, and concludes the research work. Finally, section 6 points out our research limitations and also offers paths for further research work.

2. Literature Review and Theory

This section introduces the research field of *Process Modeling* which is one of the underlying themes of this master thesis. Therefore, the literature review is presented along with brief summaries of the relevant articles. Furthermore, theoretical framework for this research work is presented. In the end, we also described how different this research is from previous research studies.

2.1. Research Literature

We will start with some general information about process, business process management and process modeling followed by empirical studies in this area. And then we will categories the literature base of business process modeling into three groups. Theories about practical business process change and *Process-Modeling Success (PM-Success) model* will be described. As this research is related to Norway based organizations, so some of the literature in Norwegian context will also be presented.

2.1.1. What is a Process?

Hammer (2010) defines process as, *process means positioning individual work activities – routine or creative – in the large context of the other activities with which it combines to create results*. A process can be defined as a sequence of activities in a sequence. In an organization, processes are comparable with human habits or routines. They can be seen as an acquired tendency or preference to act in a particular way in a particular situation. *Hodgeson, (2008)* argues that these habits are necessary to avoid the burden of a full reflection of all actions.

Hammer (2010) summarizes the concept of process and claims that *any process is better than no process*. He explains that a well defined process will at least deliver predicable results and can serve as the basis for further improvements. He also mentions that *all work, is process work*. Here he points out that all work is performed either in one form or another for processing. He introduces different types of processes like: (1) core processes that create value for external customers and thus are central to the organization; (2) enabling processes that create value for

internal customers, and includes financial reporting and systems development; and (3) governing processes are management processes because of them the organization runs, e.g., risk management, performance management and etc.

2.1.2. Business Process Management (BPM)

It is a collective term for a process-oriented approach to organizations; in other words, it is an integrated system for improving business performance with the control on end-to-end different business processes *(Hammer, 2010)*.

When one goes from a functional to a process-oriented enterprise view then it opens up a need for process management. The main idea behind process management is that organizations should coordinate and manage their processes as assets. It is precisely through their processes, their chains of activities and everything contained within them, that the company realizes its goals. The basis for process management is therefore the idea that there is value creation for the company that processes are coordinated, controlled and managed in a good way *(Wolf and Harmon, 2012)*.

In a survey of 399 companies conducted by *Wolf and Harmon (2012)*, they argued that there is no common understanding among people about BPM. There are different definitions of BPM as *Business Process Management*, or *Business Performance Management*, some refer it to a more general approach to manage process change and others points it to the use of different software techniques to control the runtime execution of business processes. They compare the organizations' understanding of BPM form 2005, 2007, 2009 and 2011; figure 2.1. The research findings showed that there are different understandings of what process management is and reflected the different approaches to the execution of process management.

	2005		2007		2009		2011	
A top-down methodology designed to organize, manage, and measure the organization based on the organization's core processes	141	40%	110	40%	93	36%	164	41%
A systematic approach to analyzing, redesigning, improving, and managing a specific process	93	26%	79	29%	88	34%	108	27%
A cost-saving initiative focused on increasing productivity of specific processes	41	12%	36	13%	33	13%	58	15%
A set of new software technologies that makes it easier for IT to manage and measure the execution of process workflow and process software applications	56	16%	26	9%	22	8%	50	13%
Other, Please Specify	22	6%	23	8%	23	9%	19	5%
Total	353	100%	274	100%	259	100%	399	100%

Figure 2.1: How organizations understand BPM. *(Wolf and Harmon, 2012)*

In another study, *Bruin and Doebeli (2010)* explain that there are three common perceptions of business process management like: (a) it is an IT-based business solution to control and automate the processes; (b) it is an approach to control and improve processes with a focus on process lifecycle; and (c) it is an approach that directs an organization by taking a process-oriented view. Our research work is based on the idea of the third conception, meaning that business process management is about managing, controlling and governing the processes of the organization.

To clarify the concept of business process management, we will first give a brief introduction of Business Process Management structure, hereinafter referred to as *Process Management*. Then we will further explain the concept in terms of organizational capabilities and process enablers, as mentioned by *Hammer (2010)*. To make process management work; *Hammer (2010)* suggested four organizational capabilities: leadership, culture, governance, and enterprise. He also mentioned five enablers of a process (i.e. process design, process metrics, process performers, process infrastructure, and process owner) and argued that without them a process will be unable to functional sustainably.

2.1.2.1. Process management structure

Process management is a holistic perspective on how to organize, manage and lead a business, and it includes the notions like process philosophies, process methods and technologies; figure 2.2 *(BPM Resource Cementer, 2014)*.

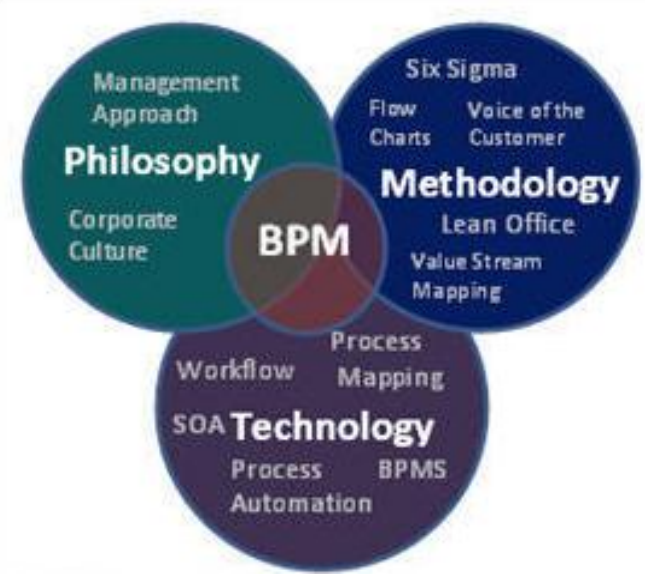


Figure 2.2: BPM Structure *(BPMresourcecenter, 2014)*

Figure 2.2 shows that the process management consists of different directions and the elements. Therefore it may take many different forms. Process management is *Management Philosophy* guided by a company's management that gives importance to the understanding and optimization of business processes. Key aspects of process management are Change Management and Performance Management. It can be referred to a *Methodology* for introducing a continuous process improvement lifecycle. BPM also, sometimes, refers to *Technology* that is selected to help to perform the methodological activities.

There is no perfect solution how process management should be reflected in each company. It is important to develop a process management structure that is appropriately tailored to the individual organization. Some organizations agree but it is not so important if a business has a methodical approach that, for example, is strongly associated with *Lean* or *Six Sigma*. The important thing is to make sure

that the introduction of BPM is comprehensive and involves philosophical, technological and methodological compatible *(BPM Resource Center, 2014).*

2.1.2.2. Process enablers

Process Design: the specification of the process is referred to as the process design *(Hammer, 2010).* Without a clearly defined design there will be uncoordinated individual activities and confusions at organizational level. The process design includes what tasks are to perform, at what location, under what circumstances, and to what degree of precision etc.

Process Metrics: The rules and standards that govern how a process should be performed are goal achievement and satisfying customer needs. Business targets need to be set in terms of a balanced set of process metrics and performance monitored against them *(Hammer, 2010).*

Process Performers: people who engage to process work need an understanding of the overall process and its underlying goals. They also need the ability to work in teams and to manage themselves to be able to recognize the advantages of end-to-end work *(Hammer, 2010).*

Process Infrastructure: Process performers need to be supported by both IT and HR systems. Fragmented IT systems do not support integrated processes. Effective processes require IT systems that support the work and information flow from the beginning to end. IT systems should be used as key facilitator and enabler to integrate different processes, for example *Enterprise Resource Planning (ERP) systems*. Conventional HR systems (training, compensation and career) need to be re-oriented from fragmented job perspectives and should focus on process role, for example results-based compensation systems *(Hammer, 2010).*

Process Owner: everyone should be aware of his roles and responsibilities, and how the process objectives are linked to the organizational objectives. They must understand and perform their roles as per defined in the process design. Process owner is the one with complete authority and active responsibility for a

process. He is responsible for an end-to-end process and in a position to manage it on an end-to-end basis. The process owner must be assigned for each process. *(Hammer, 2010)*

2.1.2.3. Organizational capabilities for process

Leadership: informed, knowledgeable, engaged and motivated leadership is necessary for the effective implementation of process management. Introduction of processes involves major changes. Management provides direction, creates commitment and allocates significant resources needed for implementation. Leadership must realize that to overcome all other problems their involvement is necessary *(Hammer, 2010).*

Culture: process oriented culture demands all employees to put the customer first. The culture must support collaboration across all the organizational functions. Employees must be comfortable working in teams, have positive attitude to accept changes and experience a shared responsibility to satisfy customers. The culture also holds a focus on continuous process improvement *(Hammer, 2010).*

Governance: to realize organizational goals, the governance structure must be formed about the processes that assigns responsibilities and ensures the integration among all the processes. An executive committee consisting of process owners and senior management should be established. This body should coordinate and manage the challenges associated with dependencies and priorities. Especially, to manage the transition to processes, governance structure needs to be put in place *(Hammer, 2010).*

Expertise: process design, implementation, management and improvement require deep expertise of people who are involved in process work. This may require knowledge of techniques and tools for process modeling along with management support. It is necessary for the organizations to develop and also emphasize the institutionalization of this capability to carry out their process related programs *(Hammer, 2010).*

These four capabilities affect each other but often some of them are overlooked. According to *Hammer (2010)*, if one of the capabilities is less developed than the other they could reduce the effect of the other. That is why the overall strength of the capabilities determines organizational process management capacity or process maturity.

2.1.3. Business Process Modelling

According to *Curtis et al. (1992)* and *Gill (1999)*, *process modeling* is known as the graphical description of how businesses perform their operations/tasks by defining the various entities, actions, and interactions along the control flows. Its basic purpose is to represent the business processes and also to decompose all the business complexities to a minimum level for performance improvement. With the passage of time, the success of process modeling has become a pivotal concern for many organizations, because its end results could be the implementation of IT systems, new processes, and even changes in the organizational structure itself *(Bandara et al., 2006)*.

Prior literature has mentioned the use of process modeling at different stages of business instead of its overall implementation at once. *Bandara et al. (2006)* described the use of process modeling in: (1) model based detection of weaknesses in a process, (2) adjusting renowned worldwide practices – e.g. *Information Technology Infrastructure Library (ITIL)* and *Supply Chain Operations Reference Model (SCOR)*, in a certain area of the business, (3) the description of a new business plan or strategy, (4) the design of the business process view as a part of an *Information Systems (IS)*, and (5) end user training. *Kesari et al. (2003)* classify the process modeling advantages in *IS* projects into three types: (1) documentation benefits i.e. simple and common language with clients, (2) design benefits i.e. understanding the current process to make it more efficient and effective for the end project implementation, and (3) use benefits i.e. graphical representation of all the processes, and assisting the iterative development process.

2.1.4. Empirical Studies of Business Process Modeling

Regardless of the emerging interest in process modeling, still there are not enough empirical theories and models of business process modeling practice *(Eikebrokk et al., 2008)*. They divided the available business process modeling literature into three categories. According to them, **one group** of research has surveyed the users of process modeling and reports on the *efficacy of process modeling*. *Wietzel (2006)* proposed that suitable process orientation, documentation, and analysis are important for improving the overall efficiency of the process quality. *Kueng and Kawalek (1997)* conducted a study in the process modeling projects and interviewed the participants working in those projects; they reported that process models are useful for easing communication between process modeling users and IT professionals. *Kesari et al. (2003)* interviewed twelve practicing consultants and draw conclusions about the significance of process modeling.

Another group of studies consists of case studies of *process modeling* in organizations. *Krogstie et al. (2006)* presented an approach to increase the value of an organization and of a project from process modeling activities. *Karltun et al. (1999)* examined the results of applying business process modeling as a change project in three different organizations. They found that process modeling provides more comprehensive and easily understandable glimpses of the business. *Djohan et al. (2002)* addressed the importance of both process and information modeling within an emergency department in Australia by proposing an integrated architecture for clinical process and information system. The **third group** suggests theories of *process modeling*, containing *PM-Success model (Bandara et al., 2006; Eikebrokk et al., 2008)*.

2.1.5. Theory of Practical Business Process Change

Larsen and Myers (1999) have conducted a study of the implementation of enterprise resource planning software package at financial firms in New Zealand. They argued that short term financial results from *Business Process Re-engineering (BPR)* were spectacular, and the long term implications were worrying because of some factors such as workers' skills level and morale were reduced with the passage of time. *Kueng and Kawalek (1997)* argued that via process based

structures, both process management teams and IT systems struggle to enhance their effectiveness. Interviews with the participants working in process modeling projects revealed that process models are useful for bridging the communication gap between process modeling users and IT professionals.

A couple of business process change studies have been carried out in Norwegian settings. *Iden (1995)*, after interviewing the Norwegian *Business Process Reengineering (BPR)* consultants, found out that they are completely unaware of the available process modeling techniques, methods, and tools. *Moltu et al. (2000)* interviewed both academics and management consultants in Norway, found diversity of various *BPR* practices. Norwegian process change projects place less importance on essential solutions and thinking than the North-American BPR literature points out.

A research conducted by an IT consulting company *Capgemini AS (May 15, 2012)* investigates different trends in BPM and how some organizations have been able to gain benefits after implementing BPM, although other have to struggle. It also point outs some key barriers to BPM implementation and also some areas to focus to achieve benefits of BPM.

2.1.6. Theory of Process-Modeling Success Model

Sedera et al. (2003, 2004) has described two variables of *PM-Success model*: (1) critical success factors, and (2) success measures. They further divided critical *success factors* into: (a) project specific, and (b) modeling related. Project specific *success factors* are: (1) stakeholder participation, (2) management support, (3) information resources, (4) management of the process modeling projects, and (5) process modelers' expertise or experience. Modeling related *success factors* are: (1) modeling methodology – guidelines for the process of modeling, (2) modeling languages – grammar, and (3) modeling tools – software for design, maintenance, and delivery of process models. On the other hand, *success measures* are divided into: (1) model quality, (2) user satisfaction, (3) individual impacts, (4) process impacts, and (5) project efficiency.

Krogstie et al. (2006) studied how process modeling is used in various parts of a Norwegian engineering company. They explained that when modeling is used for process development, software development, and quality systems. They also explained the methodology to increase the value of an organization and of a project. Process modeling challenges and opportunities were also highlighted.

Eikebrokk et al. (2008) suggested that changing the process, represents changing the work practices of the workers and also changing the relations among various stakeholders. They pointed out that the process change should be sensitive to organizational, professional, international, and cultural aspects. Based on the Geert Hofstede cultural index *(The Hofstede Centre, 2014)*, they compared Norwegian national working cultural perspective with the North-American literature.

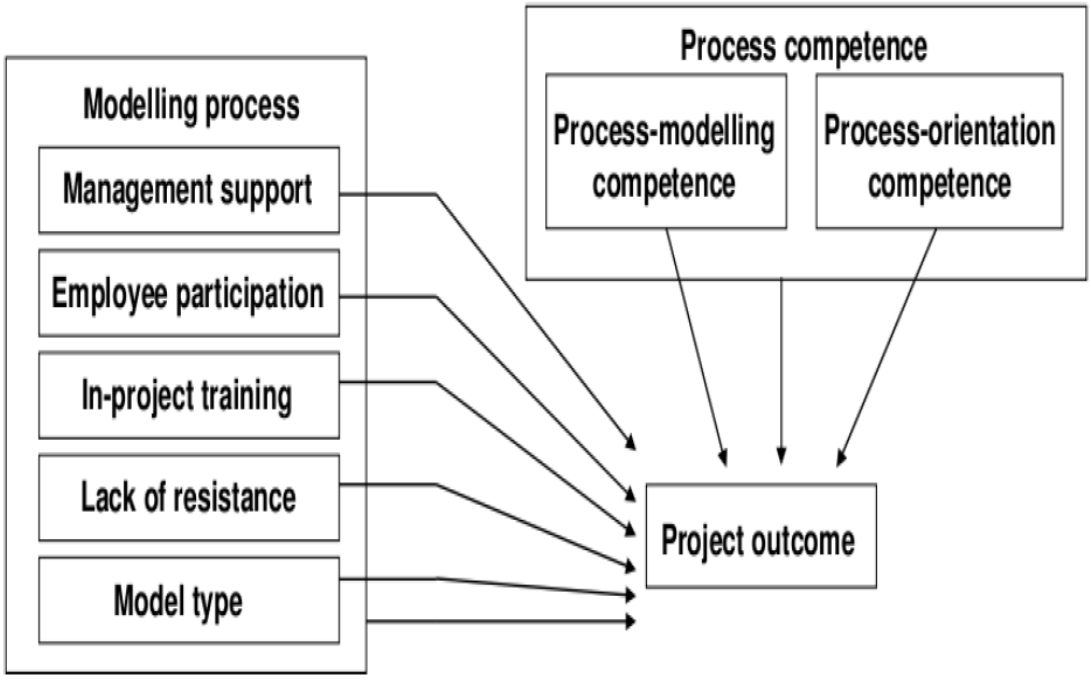


Figure 2.3: The revised Process-Modeling Practice (PMP) model. *Eikebrokk et al. (2008)*

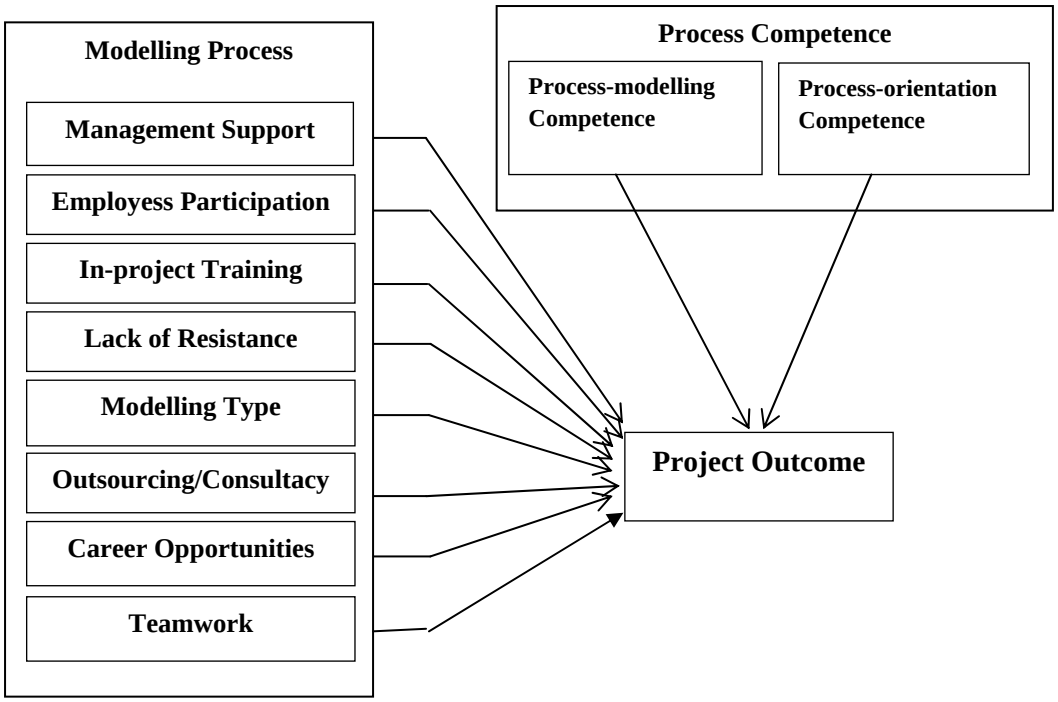


Figure 2.4: The updated Process-Modeling Practice (PMP) Model

Three more categories which are suggested by us in this study in the *PMP model* are briefly discussed here. *Outsourcing/Consultation* refers to the use of outside expertise when no one in the organization has the skills needed to effectively develop the models or when organization is not interested to invest in the *modeling process* for a longer period of time.

Career Opportunities play an important role which motivates both professional modelers and students to pursue modeling field with more interest and with more hard work which may result into organizational goal achievement in a long run.

Teamwork increases the likelihood of adoption of new techniques, tools and methods. Good teamwork reduces not only the physical distance but also the psychological distance among team members and thus facilitates quick learning among team members.

2.1.7. Process Maturity Model

In 1987, Watts Humphrey developed a *Capability Maturity Model (CMM)* for software that explained how to transform the capability for developing software by focusing on software process improvement, *(Paulk, 2009)*. The main assumption of this model was that where management understands processes and has the ability to manage them systematically then those companies can respond to demands much easily and quickly. Later different versions of this model were published. *Rosemann and de Bruin (2005)* developed a model, called *Business Process Management Maturity Model (BPMMM)*. They mentioned that through this model it's possible to identify and assess the maturity of BPM policies and practices within an organization; figure 2.5. They also made the comparison of low and high process maturity to understand the richness and range of BPM maturity. Available literature shows that recent development in the field of BPM inspires many researchers that were trying to develop BPM models.

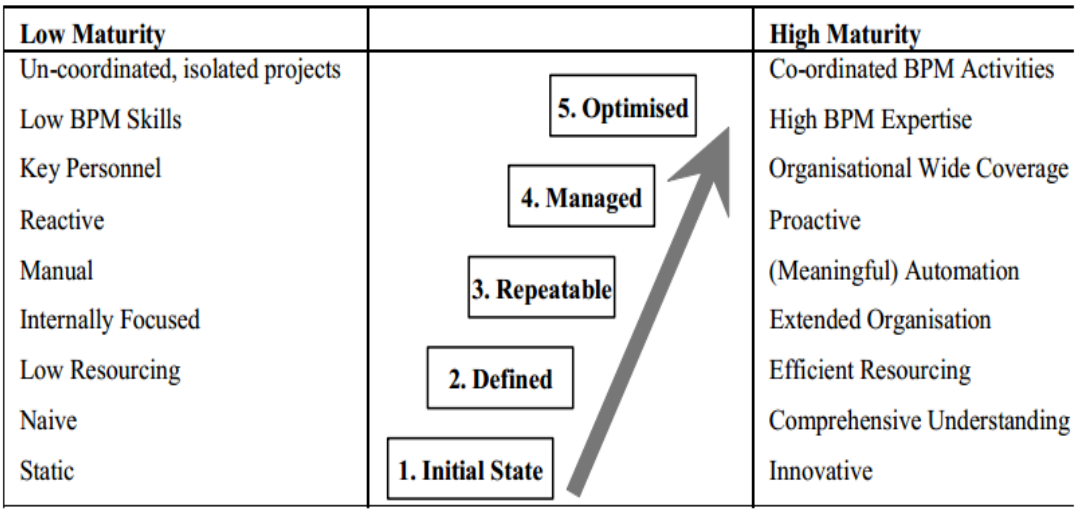


Figure 2.5: Comparison of Low and High Maturity. *Rosemann and de Bruin (2005)*

Though, *Rosemann and de Bruin (2005)* proposed model helps in the development of process management but cannot facilitate the management to have concrete solutions or methodologies to shorten the gap between actual and desired state of the prevailing process maturity, (*Pesic, 2009)*. In the study of an integrated approach for BPMMM and Six Sigma, *Pesic (2009)* enriched BPMMM with the improvement methodology.

For assessing the capability and maturity of business processes, *Curtis and Alden, (2007)* developed the *Business Process Maturity Model (BPMM)* that offers an open-standard roadmap for evaluating process maturity and guiding process improvement.

Hammer M. (2007) explained that both the process enablers and organizations' capabilities provide very helpful and effective means for organizations not only to plan but also to evaluate process based transformation as well. Based on this argument he proposed a model called, *The Process and Enterprise Maturity Model (PEMM)*, table 2.1. In the same study, he also showed that how organizations that use *PEMM* can easily perform process transformation and address it to measure, evaluate, and improve the existing performance.

Process Enablers	Enterprise Capabilities
Design: the comprehensiveness of the specification of how the process is to be executed.	**Leadership:** senior executives who support the creation of process.
Performance: the people who execute the process, particularly in terms of their skills and knowledge.	**Culture:** the values of executives who support the creation of processes.
Owner: a senior executive who has responsibility for the process and its results.	**Expertise:** skill in, and methodology for, process design.
Infrastructure: information and management systems that support the process.	**Governance:** mechanisms for managing complex projects and change initiatives.
Metrics: the measures the company uses to track the process's performance.	

Table 2.1: The Process and Enterprise Maturity Model: *Hammer M. (2007)*

Capgemini AS conducted a research named *Global Business Management Report* to help organizations in realizing the benefits of BPM, and not only this but also to avoid the consequences that most of the organizations have already faced due to less effective processes. The researchers at Capgemini AS developed a *Capability Maturity Model* for their study to understand the present process

maturity level of the organization and also a possible roadmap for future improvements. This maturity model is inspired by the model developed by the Software Engineering Institute of Camegle Mellon University, figure 2.6.

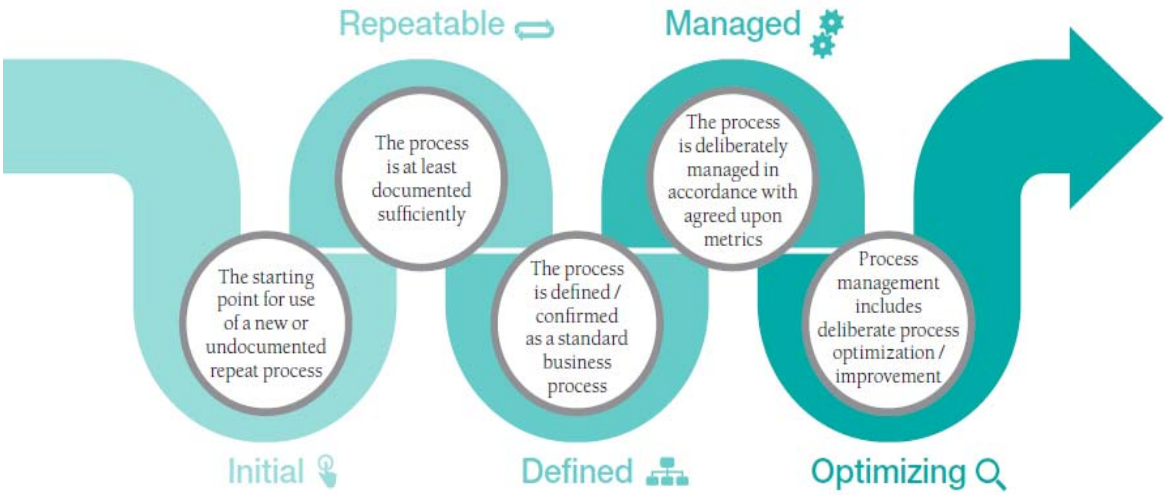


Figure 2.6: The Capability Maturity Model: *Capgemini AS (2012)*

The process maturity scale defined in this research work *(section 3.1.3.2)* is an inspiration from the literature review of business process management modeling as whole.

2.2. Theoretical Framework

The theoretical framework for this research consists of process modeling, process modeling practice, business process management, and enterprise modeling. In addition to these, literature on survey methods and validity also been used. The main focus of the research is, to use and update the *PMP model* and interview guide by *Eikebrokk et al. (2008),* to identify process modeling practices in Norwegian companies.

In addition, the research finds out process modeling methodologies, techniques, tools and skills; and the impact of our suggested dimension of *modeling process* at the overall performance of the organization in terms of *project outcome*.

2.3. Different from Other Research

Most of the published work related to process modeling describes new or extended process modeling techniques, and practices in a survey study along with, the design of corresponding modeling tools or the application of modeling languages.

In 1995, *BPR* in Norway were totally unaware of the available process modeling techniques, and tools *(Iden, 1995)*. In 2000, there was a diversity of various *BPR* practices and Norwegian process change projects did not give much importance to fundamental solutions which were seriously considered in North-American literature *(Moltu et al. 2000)*. In 2005, a survey was conducted in Norway based companies to investigate that when modeling was used for process development *(Krogstie et al. 2006)*. In 2006, an in-depth survey was conducted in some Norwegian companies to examine the relationship between *process change* and *project outcome*; the Norwegian national working cultural was also considered for the model-based process-change projects *(Eikebrokk et al. 2008)*.

One potentially relevant work for the process modeling practice is the revision of the *Process Modeling Practice (PMP) model* and to use it in a survey of Norwegian model-based process-change projects. As mentioned earlier that the study by *Eikebrokk et al. (2008)* was conducted a while ago, and the Norwegian market is emerging in the *process management* in terms of adaptation of new technologies and skills. It would be interesting effort to further analyze the process modeling practices among Norway based companies with some new perspectives. The interview guide including questionnaire is developed with the suggested dimensions of the *modeling process*. Also in this research, organizational and social dimensions of *PM* behavior and effects will be identified.

3. Methodology

In this section, we will present the methodological framework for the research work. The design of an interview guide including questionnaire will be discussed along with the added new categories. After this, the adopted procedure to contact the respondents will be described i.e. how companies were contacted and what channels were used to find relevant respondents. In the end, we will describe how the analysis was carried out.

Our insights are based on the qualitative findings that are illustrated by the participants' own views and quotations from the qualitative interviews.

3.1. Research Design

3.1.1. Instruments

This research follows qualitative survey research strategy that combines interviews and questionnaires *(Bryman, 2008)*. It is similar to a statistical or quantitative survey in that we ask several people to get same type of data in a rather uniform and systematic way to look for patterns. But it is different because we do not interview a large group of people and therefore harder to generalize to a larger population.

Surveys can be conducted with different types of data generation methods most commonly are questionnaires and interviews but observations and documents are also used *(Oates, 2006)*. The data collection consists of two complementary parts. During initial part of the research, a 30-40 minutes questionnaire is completed by respondents. The second part of the research comprised in-depth qualitative interviews with the same respondents.

We are going to choose an interview guide along with questionnaire as a data generation method *[please find more information in section 3.1.3]*. The interview guide has a brief list of memory prompts to follow in semi-structured interviews to direct the conversation towards the research topic, to identify what to ask for and in what sequence *(Bryman, 2008)*. The questionnaire part has a pre-

defined set of questions, assembled in a pre-determined order. Respondents are asked to answer the questions, thus providing us with data to look for patterns and make generalizations about the actions or views *(Oates, 2006)*.

3.1.2. Participants

3.1.2.1. Data resource

To conduct our research, firstly *Den Norske Dataforening (DND) - The Norwegian Computer Society (NCS)* was contacted which is the largest special interest society for information technology (IT) in Norway *(Den Norske Dataforening, 2014)*. It is an independent forum for Norway's IT professionals to offer their members updated information within their field of interest. It has different groups. We selected the *Prosess og Kvalitetsstyring (i.e. Process and Quality)* group to focus on. Apart from this, many other companies were also contacted which we knew or assumed had adopted model-based process-change projects. We tried to cover major industries for this study. Respondents were drawn only from Norway.

Some companies responded like: Capgemini AS Bergen, Capgemini AS Oslo, University of Bergen, Karabin AS Bergen, Accenture AS Bergen, Bynett AS Kristiansand, Qualisoft AS Oslo, FirstPoint BTC Bergen, Cillion AS Oslo, Itera Oslo, and Skyss Bergen.

3.1.2.2. Sampling technique

A sampling technique is how one will choose actual people or events or documents form ones' sampling frame *(Oates, 2006)*. There are two main categories of sampling techniques: probabilistic and non-probabilistic *(Oates, 2006)*. We used *Snowball sampling*; which is a non-probabilistic sampling technique. Here we made initial contacts with a small group of people (i.e. *Den Norske Dataforening*) who were relevant to our research topic and then we used them to establish more contacts with others *(Bryman, 2008)*.

We also used *"Purposive Sampling"* which is a non-probabilistic sampling technique as well. Because in this sampling technique, we hand-picked the sample

while choosing those which are more likely to provide or to generate valuable data to meet the main purpose of our research *(Oates, 2006)*.

For this research work, the same strategy has been followed which was adopted by *Eikebrokk et al. (2008)*. Targeted respondents were those who had participated in one or more process developments projects, e.g. consultants, facilitators, project managers, IT managers, process developers, process owners, quality managers, and system developers.

3.1.2.3. Sample size

Those organizations which were contacted in the last study, we expected to get responses from most of them. We succeeded to find some professionals who were somehow engaged in the model-based process-change projects. In total, 60 professionals from Norway were contacted but only 18 responded.

3.1.2.4. Response rate and non-responses

In the start, we were aware that there could be a possibility that we might not be able to get the responses from the same organizations or the same personnel which were contacted in the last study. While keeping in mind this obstacle, we also included other companies which were not in the last survey. This effort not only helped to broaden the sample size but also to analyze the organizational and social perspectives which will open new doors for further research.

3.1.3. Data Collection

The main focus is to get the questions in the interview guide answered and the questionnaire filled and also to help participants so that if they have some misunderstandings or ambiguities about any part of the questionnaire they get help quickly. Keeping in mind the availability of the participants, we also considered sending the questionnaire electronically and having Skype meetings.

The approximate time was around 1 hour along with the introduction about the research and filling the questionnaire. Apart from the interview guide we also included some open conversations about the research topic.

3.1.3.1. Pre-test and pilot-test:

The interview guide can be evaluated before use in a pre-test, where its content is shown to people who are expert in either the interview guide design or in the questionnaire design *(Oates, 2006). Eikebrokk et al. (2008)* formulated a semi-structured interview guide and evaluated the questionnaire in a series of 8 pilot interviews. The final interview guide consisted of 26 open-ended questions. As for this study, we have suggested few more categories; some questions are added in the interview guide. We used literature and suggested dimensions: *outsourcing/consulting, career opportunities* and *team work* to the *PMP model*.

3.1.3.2. Interview guide and questionnaire

The interview guide developed for this study: (1) we created a certain order of the research questions but we were also prepared to change the order during the interviews; (2) we formulated interview questions in a way that helped us to answer our research questions; (3) we used clear and relevant language to the respondents; (4) to contextualizing respondents' answers, we asked general and specific information about them. Before the interview we also focused on some practical details like: (1) ready to make notes during the interviews and have a recording machine with us; (2) we assured that interview should take place in a quiet and private setting; (3) we prepared ourselves for some of the unexpected situations that can arise during the interview.

The questionnaire developed for this study consists of six main parts: *Part – 1: Background questions*, which consists of three further sections. *Section – A: Personal Information* part includes seven questions about the interviewer and his/her business. *Section – B: Operations* includes four questions related to the type of business, number of employees in the project, and the prevailing maturity level of the business. *Section – C: Initiatives / Project* consist of five questions about any initiatives taken for BPM, main purpose of the project, employees' participation in

the modeling work, use of any contracted resources, and established practice of publishing process models and process description.

Part – 2: Modeling of the Process – Purpose, Techniques, and Tools: asks four questions, this explains whether it has been designed any graphical models of the process-es, what was the purpose of the creating models, and the techniques and tools used in the preparation. *Part – 3: Modeling of the Process – Implementation*; consists of six questions to know how the works of preparing models and process descriptions have been completed and who has participated.

Part – 4: Challenges; this part helps to know what the respondents have experienced as the most important challenges of the project related to the work of processes (in general). *Part – 5: Re-use*; focuses on how the process descriptions and models are used and managed after they were made and used the first time (their original conditions). Lastly, *Part – 6: Perceived Usefulness*; includes four questions about how useful process modeling has been for the project and what could be the downside of the process modeling.

We used a maturity model for this research which is divided into five different levels; table 3.1. Process maturity level – 1 indicates almost no maturity while level – 5 represents the highest level of process maturity. These process maturity levels can be used for further process improvement initiatives.

Level – 1	Processes are not named or documented *(No documentation)*
Level – 2	Processes are documented but practice varied *(Limited documentation)*
Level – 3	The processes are documented and practices are standardized *(Documented Processes)*
Level – 4	The processes have been subject to analysis and improvement
Level – 5	The processes have goals, goal achievement is monitored and processes are developed on the basis of goal achievement *(Goal achievement based processes development)*
Others	*(Please specify)*

Table 3.1: Process Maturity Levels

3.2. Analysis

Qualitative data analysis is not carried out in the same way as quantitative data analysis *(Bryman, 2008)*. One example of general problem in data analysis is whether there is any outlier in our collected data or not. It could be in different ways: outlier may be on every variable, he may be on one variable, and may be multivariate but not exactly on a specific variable. Reasons could be like; mistakes in the measurements, mixing of distributions, misunderstanding of some points or because of contamination *(Unwin, 2001)*.

We divided the analysis into three parts. The first section represents the data summary gathered via interview guide and questionnaire; we call it *Process Modeling Landscape in Norway*. Results are described according to the parts about which the questions are asked.

The basic idea behind the data analysis is to look for patterns in the data and then to draw some conclusions. Therefore, second section gives a very close look at the data in order to find some patterns. In this section, we also identified the impact of our proposed *modeling process* dimensions on *project outcome*.

Last section reviews respondents' own subjective opinions, reflections, their understanding of the model-based process-change projects and what they think about BPM practices' and its' future in Norway.

To analyze our findings, we used techniques from grounded theory and narrative analysis.

3.2.1. Grounded Theory

We used grounded theory which is probably one of the most prominent approaches for analyzing qualitative data and generating theory out of data *(Bryman, 2008)*. *Strauss and Corbin (1998)* mentioned that grounded theory is a general methodology that can be applicable to both qualitative and quantitative studies. Data collection, analysis and theory are in close relationship to each other *(Strauss and Corbin, 1998)*. The originators of grounded theory *(Glaser and Strauss)* have different paths of thinking so there seems lack of agreement on the

concept of grounded theory *(Bryman, 2008)*. He stated that grounded theory can be used for different kinds of data but typically data is used to refer to qualitative data. He also suggested that in some cases the use of grounded theory generates concepts rather than theory by itself.

Qualitative analysis is a cognitive approach and everyone has his own cognitive style, which may be understandable to some group of people but cannot work for others. So the intension should be to have a theory that helps understanding of the research area not just to discover a theory *(Helen and Sarah, 2004)*. They suggested adopting the Glaserian approach for grounded theory and argued that stop talking about this theory and get on by actually doing it, is only a starting point for others who will gradually make their own understanding of the grounded theory.

While using grounded theory, we used terms such as concepts, categories, properties, hypotheses, and theory. As in this research, firstly, we had to collect data through questionnaire. Second, from the collected data, main points were marked. Third, the main points were grouped into similar concepts in order to find some patterns in the data. Fourth, from those patterns, categories were formed, which were the basis for our hypothesis or assumptions, conclusion and suggestions.

3.2.2. Narrative Analysis

Narrative is a framework for understanding the interviewee and interview data in qualitative research *(Sandelowski, 1991)*. She explained further in her research that narratives are understood as stories that include an effort to make something out of interviews to show the experiences of interviewees in a possible manner. According to *Bryman (2008)*, the use of narrative analysis shifts the center of interest from *what actually happened?* to *how do people make sense of what happened?*

To avoid the problem of loss of information in the settings, we also used narrative analysis. We believe that this aspect of the generated data is important, because of the nature of working environment and other non-monetary benefits

which often can be retold as stories. Drawing on our semi-structured interview guide with key actors regarding the process modeling and its after effects, we presented respondents' contrasting narratives.

3.2.3. Reliability

Reliability is about whether the used method produces the same results at a later time under the same conditions *(Bryman, 2008)*. In other words, providing the same information to two different users with the same point of interest; the experiment or the survey should return the same results. Reliability has to do with the quality of measurement which means that the consistency or repeatability of research measures *(Trochim, 2006)*.

Trochim (2006) argued that we cannot calculate reliability but we can only estimate it. For this study, variations might be expected in some areas because of technological advancements and skills development in business process modeling practices in Norway. However, conducting the same study if not a long time span is involved and under same conditions, it would be optimistic to say that this study will get the same results in future as well.

3.2.4. Content Validity

The goal of this research is to update the research work of *Eikebrokk et al. (2008)* to develop a relevant and useful theory of process modeling practice, where content validity addresses the integrity of the effect of proposed *modeling process* dimensions (i.e. *outsourcing/consultancy*, *team work*, and *career opportunities*) on *project outcome* in the *PMP* model. We used conventional qualitative content analysis *(Hsieh and Shannon, 2005)*, in which categories were derived from the data. And furthermore, this approach is used for grounded theory development *(Zhang and Wildemuth, 2009)*.

For the analysis of *process modeling* and project purposes, we considered the *project outcome* into four dimensions: *goal achievement, organizational impact, process oriented impact* and *process modeling learning (Eikebrokk et al., 2008)*.

The reason of having content validity is to assure that the variables of interest are properly expressed in the constructs that are developed and the instruments used to measure these constructs have the correct contents *(Eikebrokk et al. 2008)*. *Eikebrokk et al. (2008)* improved the content validity through several stages of interviews in their study.

3.2.5. Internal and External Validity

Internal validity is addressed by having a good match between our observations and the theoretical ideas that we developed during the research work. Internal validity is the approximate truth about the conclusion regarding cause and effect relationships *(Trochim, 2006)*. In other words, internal validity gives the self-confidence to conclude that what we did in the research caused what we observed. *Trochim (2006)* mentioned some threats to internal validity. We analyzed our qualitative survey data and pointed out some possible threats.

External validity is the degree to which findings of a study can be generalized across social settings of others *(LeCompte and Goetz, 1982)*. According to *Trochim (2006)*, external validity is the degree to which the findings of the research would be suitable enough to point to other people in other places. For this, we explained why we selected Norwegian organizations for this study and that our findings may also be relevant for other Scandinavian countries like Sweden and Denmark.

Same as internal validity, there could be some threats to external validity where we could be wrong; these threats are people, places, or time *(Trochim, 2006)*. Our study is basically conducted in Norway, with those people who responded, and during a very limited time. So, will it be possible if we generalize our research findings to another context, for example, to another place, with slightly different people, at a slightly later time.

4. Results

In this chapter we described collected data from the survey and showed some interesting findings from it. We followed the *snowballing and purposive sampling techniques* to find respondents. Interviews were conducted personally, on phone, and on Skype. Interview guide and questionnaire were developed which can be found in the Appendix-A.

We have divided the analysis into three categories. First section represents the data summary; we called it *Process Modeling Landscape in Norway*, in second section we had a very close look at the data while finding some patterns in the data, called *Pattern Analysis*. Last section reviews *respondents' own subjective opinions, reflections*, their understanding of the projects, and what they think about BPM practices' and its' future in Norway.

For this research work, total of 60 professionals from different industries were contacted but only 18 responded, giving a response rate of 33.33%.

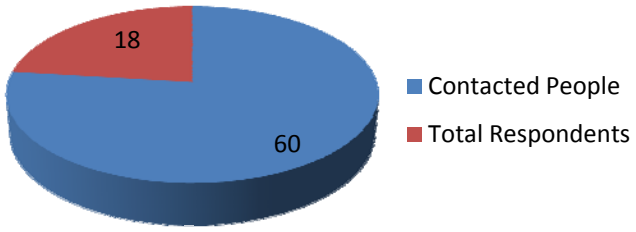


Figure 4.1: Contacted vs. respondents

Professionals from different industries responded; private organizations had the highest number of respondents as compared to public sector organizations. Major industries were contacted but Consulting and IT industries has higher number of responses. Respondent-QQQ explained that *"organizations do not spend money and efforts to make their processes efficient by themselves; however it's easy to find some consulting companies to do this job. Perhaps private organizations are more interested to improve their performance as compared to public organizations"*.

We also received responses from organizations in education, oil and energy, manufacturing, telecommunication, pharmaceutical, and transportation industries.

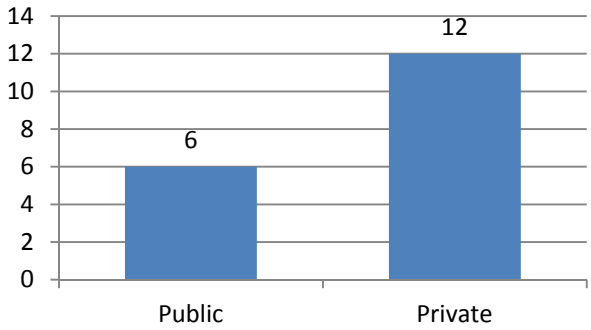


Figure 4.2: Distribution of responses according to public and private sectors

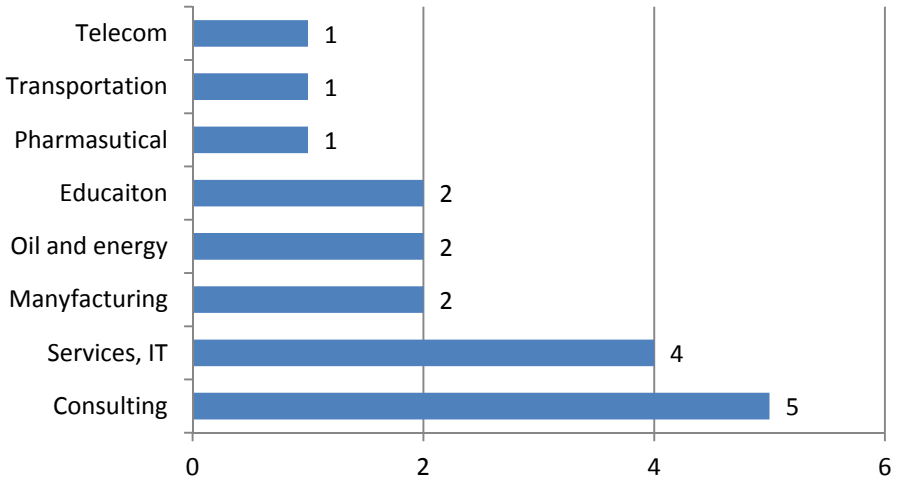


Figure 4.3: Distribution of responses according to industries

It's easier to find some contacts from private sector; our data shows that private companies are more interested to go for new efficient and effective ways to improve their performance. And therefore, when professionals from private sector were contacted they showed more interest in this research work. Respondent-QQQ from a consulting company claimed that *"It's not very much challenging to convince private organizations to adopt BPM as compared to public organizations"*.

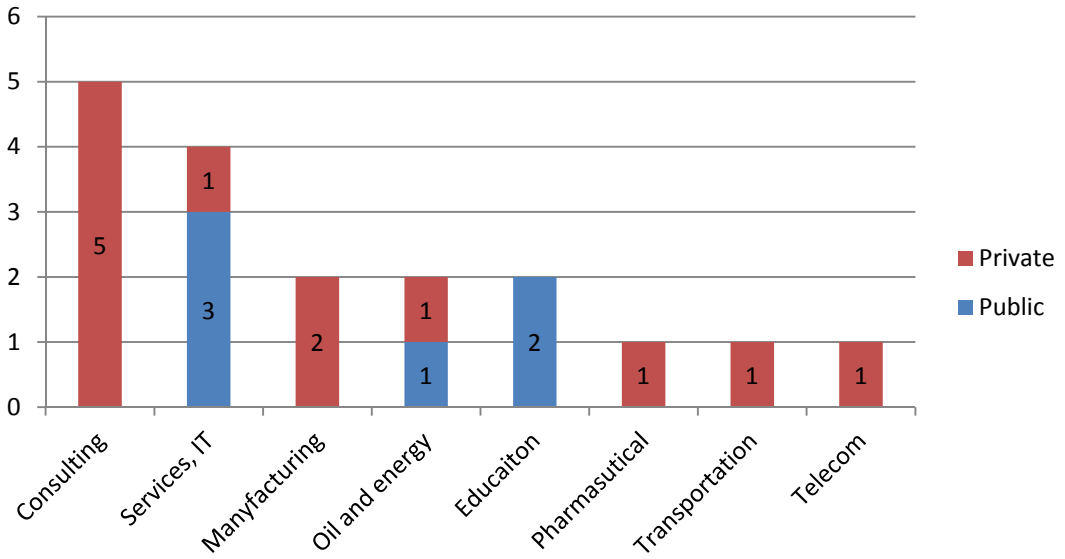


Figure 4.4: Responding industries on the basis of public or private sector

Geographical distribution of the respondents represents the opportunity to contact the companies and respondents personally. Perhaps to begin with this research, the first contact was from Bergen then through snowballing sampling techniques, more contacts in Bergen were interviewed. Though it was easy to find respondents in Bergen but still people from out of Bergen were also contacted as well.

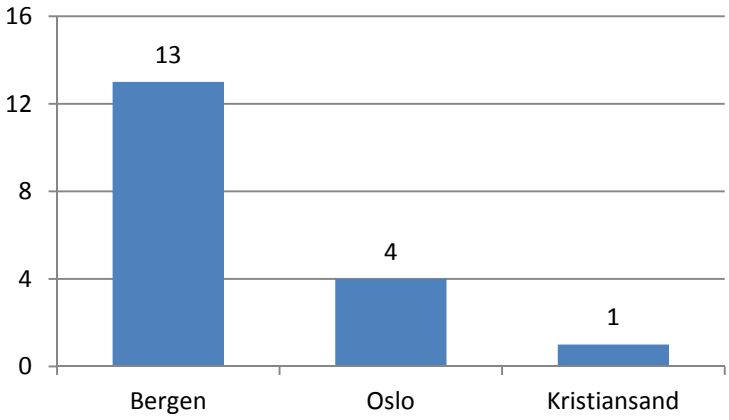


Figure 4.5: Distribution of respondents with respect to cities

4.1. Process Modeling Landscape in Norway

Here we will present the summary of the data gathered via questionnaire. Results are described according to the categories on which the questions were asked.

Part – 1: Background Questions

A. Personal Information

We will begin with the background variables. This demographic information indicates the response group. Background variables are shown through descriptive statistics. After the descriptive information about the respondents' demographics, we will further take a look at the more concerned information.

The survey data represents that majority of respondents were males. Though, it was not the intention to approach only men.

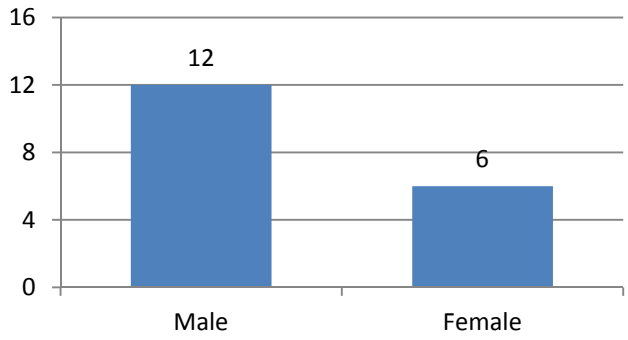


Figure 4.6: Distribution of responses with respect to gender

Majority of the respondents belong to the age category of 30-50 years old; figure 4.7. One argument could be that as BPM is not being practiced in Norway since very long time, so it's' hard to find senior professionals above the age of 50 years. One respondent was over 50, because he was working in project management and then got involved into another project where BPM was introduced.

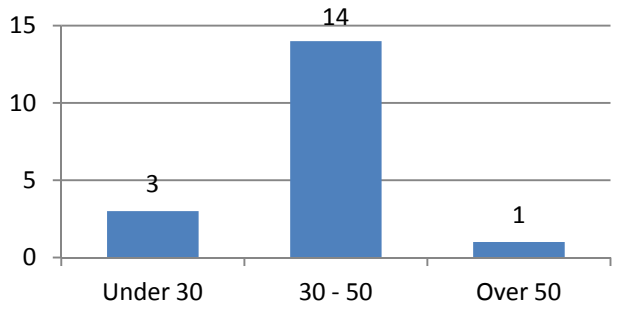


Figure 4.7: Age distribution of respondents

As mentioned earlier in methodology chapter that one criterion for selecting respondents was that only those personnel were considered who were working in BPM (when the research was conducted) or had been involved in one or more process-development projects. For this, quality managers, IT managers, process developers, process owners, system developers, facilitators, project managers, and consultants were contacted.

The largest respondents' group was senior consultants / process analyst. Unfortunately, we could not find more responses due to time and availability of the respondents, but at least we found one respondent from different positions which are important in process development. Other respondent groups were project coordinator, project management consultants, managing consultants, manager business solutions, group leaders, head of BPM section, head of IT section, and system developers; figure 4.8.

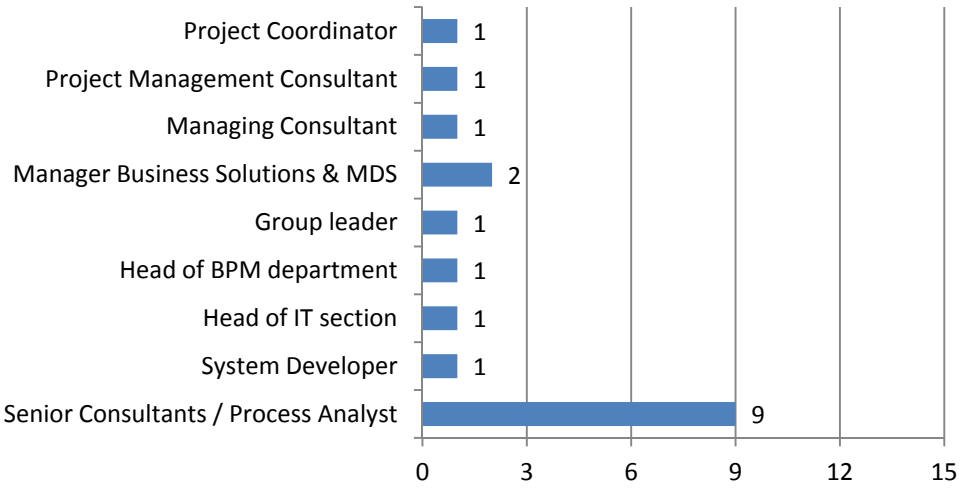


Figure 4.8: Respondents' current position in the company

Project size ranged from 2 to 260 people, with an average of 74 people per project; figure 4.9. As this research addresses those respondents who at the time of this research were either involved in any process-development projects or worked in last 5 years. Respondents mentioned their role in process-development project as process modelers, team leader, process developers/facilitators, moderator, project manager, process mapping, and external consultants; figure 4.10.

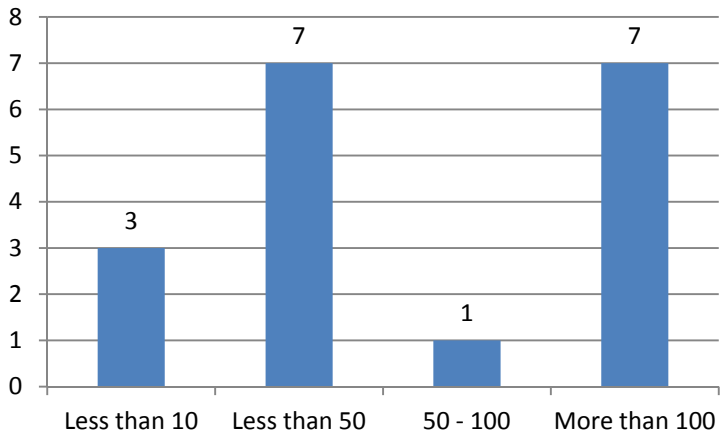


Figure 4.9: Number of employees in the project

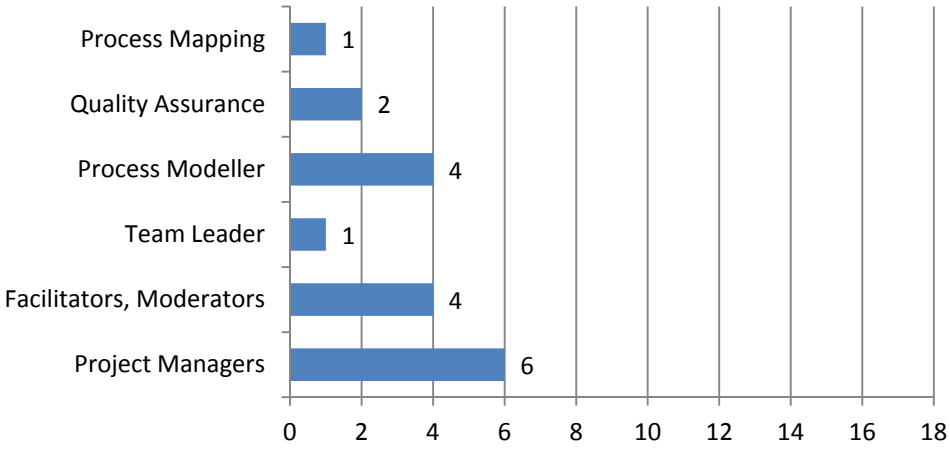


Figure 4.10: Respondents' current/last role in process modeling project

Majority of the respondents' professional affiliation or background was IT, there were two respondents who started working in BPM after finishing their graduation and they did not study BPM at university level but while working in different projects they learnt and became experienced; figure 4.11.

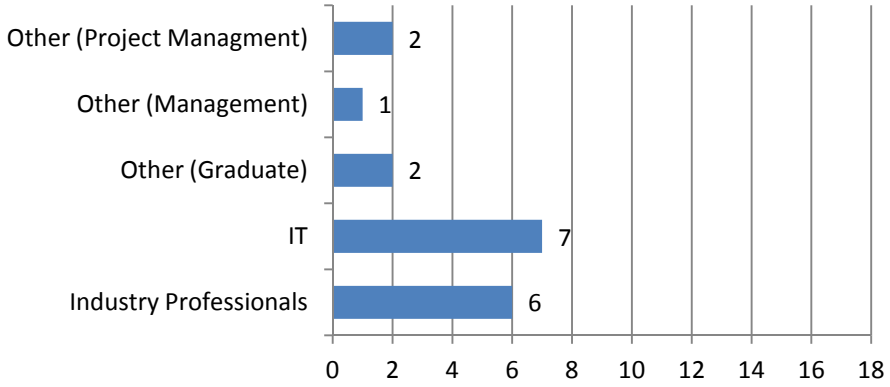


Figure 4.11: Respondents' professional affiliation/background

Respondents' experience ranged from one month to 14 years. On average, the respondents had worked with documentation and improving process for 5.59 years; figure 4.12. Self-study/practical experience and training together were their main source of knowledge of process thinking and process modeling; figure 4.13.

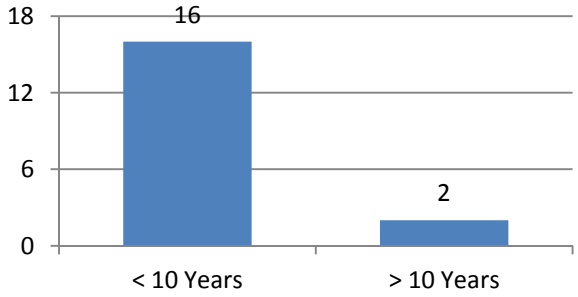


Figure 4.12: Respondents' experience in documenting and improving processes

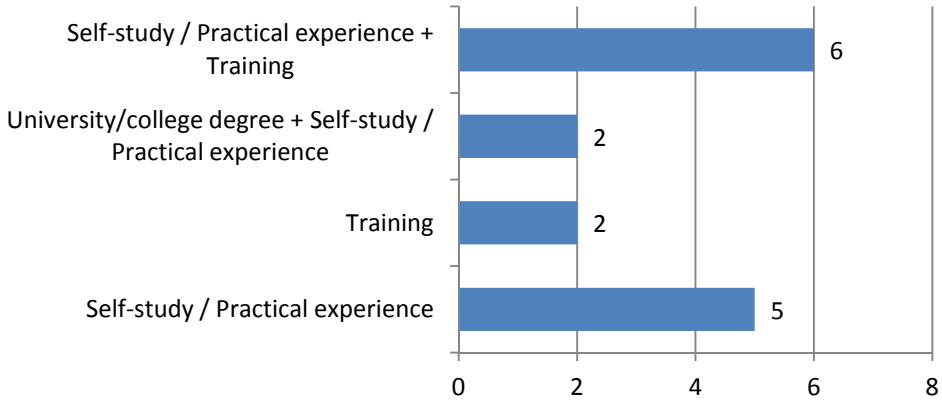


Figure 4.13: Respondents' main source of process thinking and process modeling knowledge

Part – 1: Background Questions

B. Operations

The process maturity levels used for this research also help to identify where the respondent organization lies in terms of its process maturity. The results show that 6 out of 18 organizations (33.33%) were at maturity level of "no documentation" and 10 organizations (55.56%) were at maturity level with "limited documentation", figure 4.14. Data shows that there is only one organization that is at a higher maturity level with "complete documentation" of the processes. We encouraged respondents to explain any other process maturity levels if they do not find any in the provided list of possible process maturity levels in the questionnaire.

Process maturity levels	% of responses
Processes are documented but practiced varied *(limited documentation)*	55.56%
The processes are not named or documented *(no documentation)*	33.33%
The processes are documented and practices are standardized *(following the documentation)*	5.56%
The processes have goals, goal achievement is monitored and processes are developed on the basis of goal achievement	5.56%
The processes have been subject to analysis and improvement	0.00%
Others (please specify)	0.00%

Table 4.1: Process maturity levels before the project started

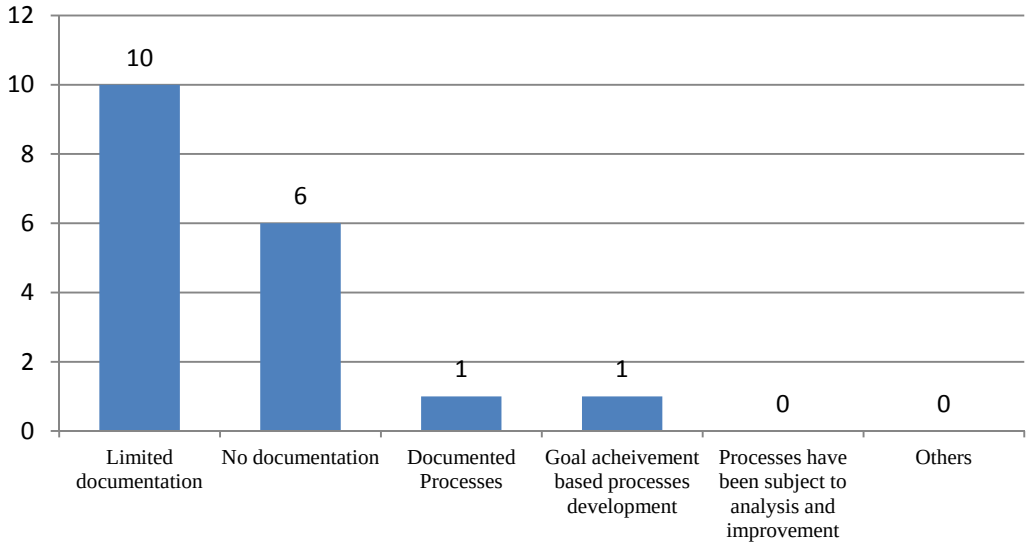


Figure 4.14: Respondent organizations' reported process maturity level

Part – 1: Background Questions

C. Initiatives / Projects

Apart from many other general purposes of the project where process modeling was included like, better control, what is being done, get the list, and no external pressure; respondents were asked to mention other main reasons where the process modeling was used in the projects.

10 respondents (55.56%) pointed out that BPM was used to "standardize practices" and 9 respondents (50%) said that BPM helps to resolve business challenges. On the other hand, 8 respondents (44.44%) believed that BPM was adopted to make the organization process oriented. 6 respondents (33.33%) stated that BPM was adopted for "quality assurance" and for "streamline/rationalize". The broader analysis of the results shows that respondents agreed that the focus of BPM was to bring improvements at organizational leave; figure 4.15.

Respondent-Q11 argued that *"some clients want to get quality certification (like ISO 9001) that's why they want their processes to have complete and clear documentation. To have this job done, organizations contact some consulting companies rather than to have some permanently employed group of people at their place which probably cost more."*

Another respondent-Q4 showed his enthusiasm about the importance of BPM in completion of projects on time that *"usually it's hard to finish the project on time, but BPM helps to define roles, actions, responsibilities, start/end, flow of information, and etc. BPM also helps to reduce lead time in the project."*

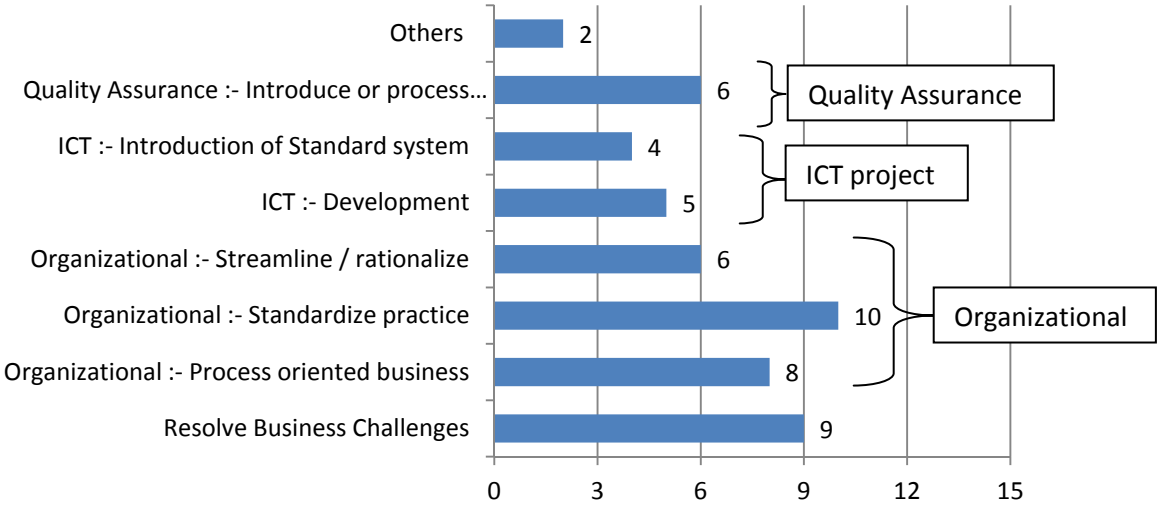


Figure 4.15: Main purpose of the project where process modeling is/was included

13 respondents (72.22%) of the survey, when asked about the goal that employees should participate in the modeling work, stated that when BPM was adopted then everyone worked according to their own assigned responsibilities and not only to do process modeling; figure 4.16.

Respondent-AA explained that *"when the decision was made to adopt BPM then some people were responsible for process modeling but others should also be present during meetings or workshops to demonstrate the actual picture of the business and also to suggest some changes or improvements in the processes."* Respondent-R15 stated that *"there was not pressure on employees that they have to participate in modeling work but it was very much encouraging from the management as they were also involve in process improvement"*.

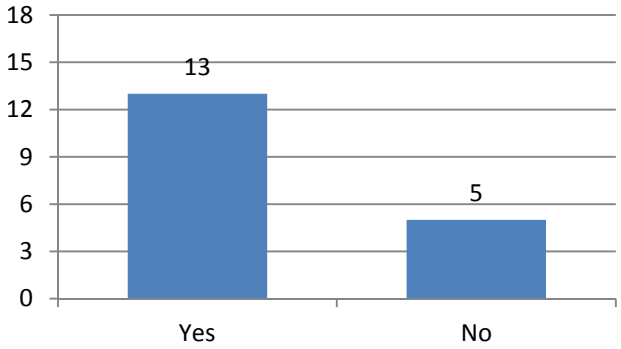


Figure 4.16: Organizational goal to engage employees in modeling work

Half of the respondents (9/18) stated that there was a methodology (collection of methods, techniques, tools) for process modeling before the project started; figure 4.17. Respondent–S4 explained that *"Yes, we were following methodology but it was not standardized"*. Respondent–S6 supported the use of MS-Excel other than spending extra money for some BPM software, *"No, we were not using any standardize methodology but work activities were listed in MS-Excel spreadsheets which was easy to use and also cost effective"*.

Respondent–S7 explained about the adopted process management practices that *"Methodology was not defined; part of scoping was choosing the "design base" for the process models and governing documentation"*. Respondent–S8 stated that *"Yes, we were using Bruce silver books"*. Some other responding organizations were using *BPMN model*, *ITIL*, *ARIS*, *Value chain*, *KPI diagrams*, and some variation of BPMN (adapted to the system). Respondent–S17 explained that *"Bow tie was used for identifying risk. BPMN for creating work processes. And ARIS for publishing the work processes in the management system"*.

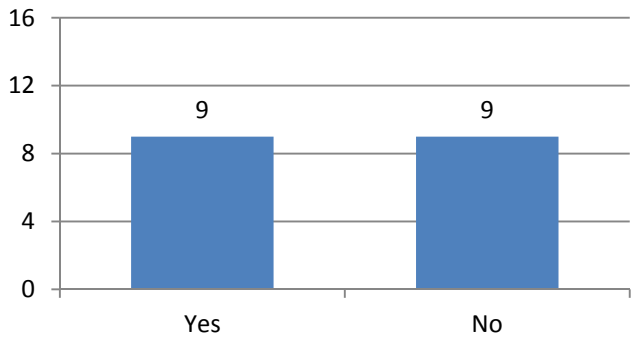


Figure 4.17: Adopted methodology before the project started

6 respondents (33.33%) said that contracted resources were used in efforts to model processes: figure 4.18. Respondent–T11 criticized the organizational capability for skilled professionals that *"Knowledge resource was not available at the company, so we have to go for some consulting companies, though it cost us some money but we got the quality standards"*. Respondent–T13 explained the risk sharing with contracted companies that *"We used contracted resources to facilitate us for that particular project which helped us to reduce risks of hiring someone by our own who could not deliver"*.

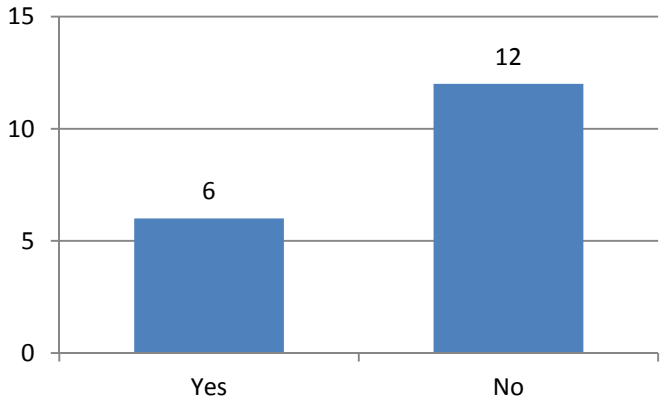


Figure 4.18: Use of contracted resources for process modeling

12 respondents (66.67%) of the survey stated that their organization had an established practice of publishing (books/intranet) of their process models and process descriptions before the project started; figure 4.19.

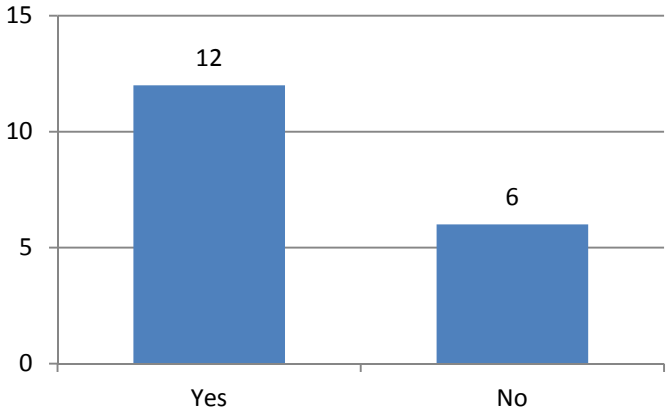


Figure 4.19: Organization's established practice of publishing process descriptions

Part – 2: Modeling of the Process – Purpose, Techniques, and Tools

Here we are interested whether the organizations have designed graphical models of the process (es), what was the purpose of creating models, and the techniques and tools used in designing process models.

All of the respondents stated that in all those projects where they have been working, they were engaged in some activities to develop graphical models for the processes; figure 4.20.

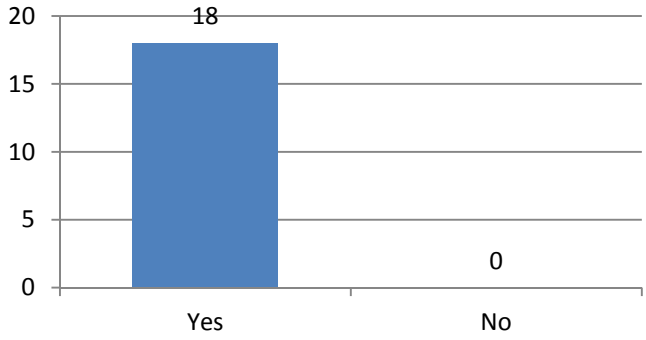


Figure 4.20: Developed graphical models of the process?

15 respondents (83.33%) of the survey agreed that the main purpose of designing the process models has been to improve the existing processes; figure 4.21. 13 respondents (72.22%) said that other purposes for designing models were to *document the process and standardize practices (for quality assurance perspective)* and *analysis for future improvements*. 12 respondents (66.67%) stated that *to understand the current situation in business*, as the main purpose for designing process models. *Requirements specification for ICT solutions*, was the purpose where 9 respondents (50%) were following it in designing graphical models.

We encouraged respondents to explain any other purposes if they do not find any in the provided list of possible purposes of designing graphical models in the questionnaire. One respondent-X11 added the purposes of designing graphical models that *"Automation of the process was one of the main objective for which we developed the graphical models"*.

Purposes	% of responses
Designing a new improved process	83.33%
Document the process and standardize practices (QA perspective)	72.22%
Analysis for future improvement	72.22%
To understand the current situation in business	66.67%
Requirements specification for ICT solution	50.00%
Others (please specify)	5.56%

Table 4.2: Purposes for designing graphical models

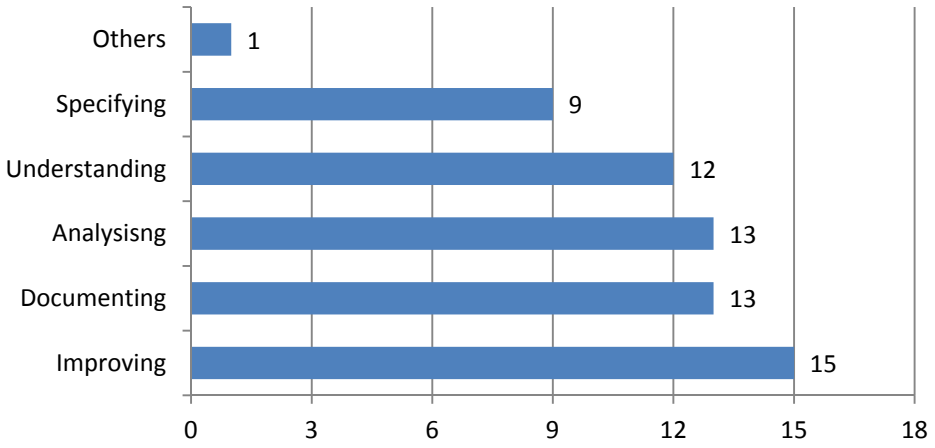


Figure 4.21: Purpose of the project where graphical modeling is/was used

In Norway, 9 out of 18 respondents (50%) of the survey used process modeling in different projects while using Swimlane diagrams. And only 4 respondents (25%) used *BPMN* and *Value Chain* each for process modeling. 2 respondents each (11.11%) used process modeling techniques like *flowcharts – informal (not defined notations)*, *flowcharts – formal (defined notations)*, and *ARIS*; figure 4.22.

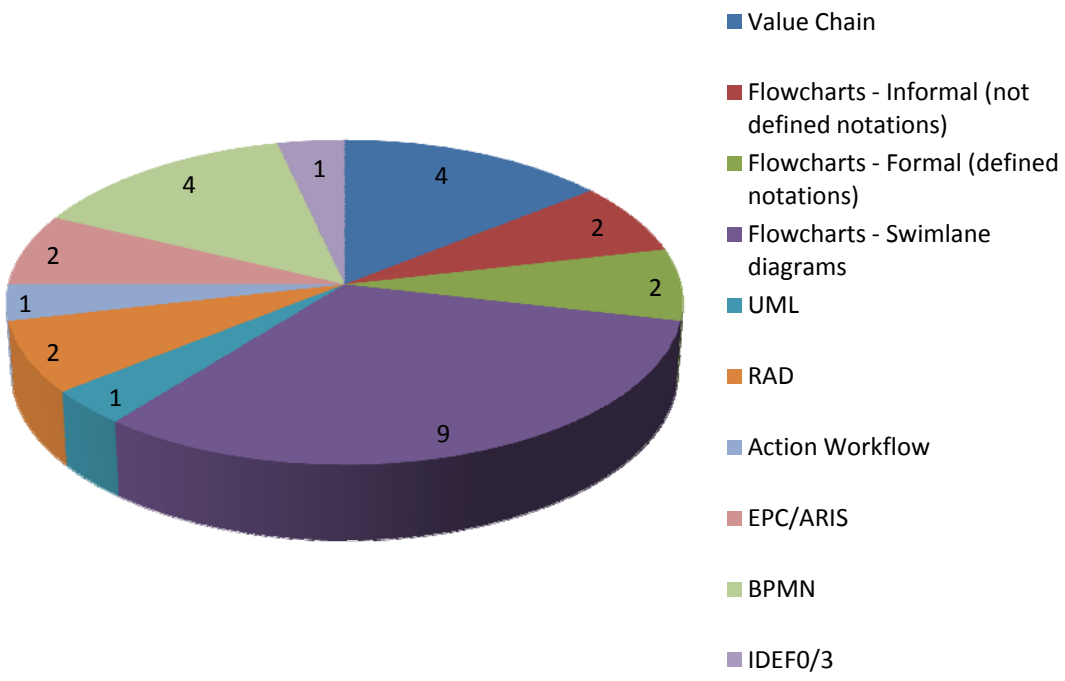


Figure 4.22: Techniques used for process modeling

13 respondents (72.22%) used MS-Visio for process modeling. 6 respondents (33.33%) used ARIS in various projects as a tool for designing process models. On the other hand, in 6 different projects MS-Excel was used. We did not limit the respondent to select form the given famous tools but they were encouraged to mention any other tools if they do not find any in the provided list of tools used for process modeling in the questionnaire. Therefore, 4 respondents stated tools like: *BizAgi*, *iGrafx*, *K2*, *Qualiware* for process modeling; figure 4.23.

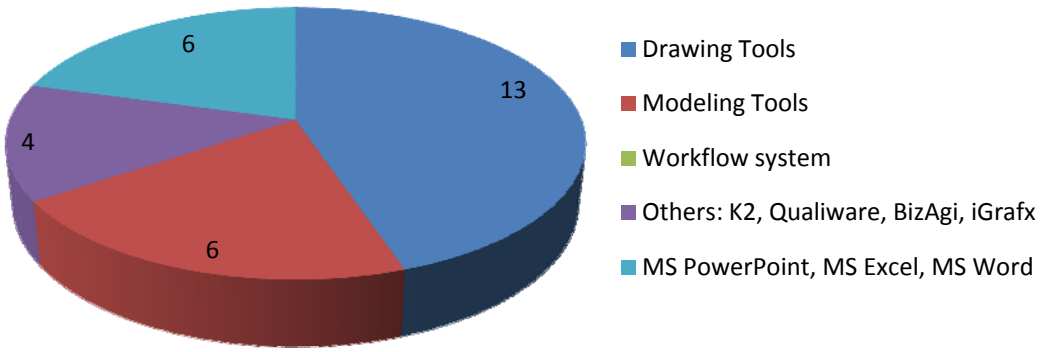


Figure 4.23: Tools used for process modeling

Part – 3: Modeling of the Process – Implementation

Based on the data from Norwegian projects where process modeling was used, here we will know how the work of preparing models and process descriptions have been completed and who has participated in the process improvement.

Respondents were requested to mention some properties of the processes which were modeled. 13 respondents emphasized *activities* and *roles* as one of the main properties which were taken into account while modeling the processes.

In addition to activities and roles the properties or constructs mentioned by respondents were: the most popular ones (figure 4.24) and then least popular ones (mentioned only once by different respondents). The most popular properties of the processes are: *systems/tools*, *start/end*, *customer journey*, *process time*, *wait time*, and *workflows*.

On the other hand, each respondent stated few properties – which we call them least popular ones like; *business rules*, *challenges*, *collaboration*, *communication flow*, *data gathering*, *decision points*, *decision making processes*, *down time*, *defects*, *employee talent*, *gateways*, *groups*, *handovers*, *input/output factors*, *interactions*, *iterative loops*, *interfaces towards other processes*, *inventory*, *lead time*, *modeling the general process*, *movements*, *non-value added to work*, *overproduction*, *requirements (both for securing work and competence)*, *responsibilities*, *sub-processes*, *system dependencies*, *transport*, *waste*, and *waiting*.

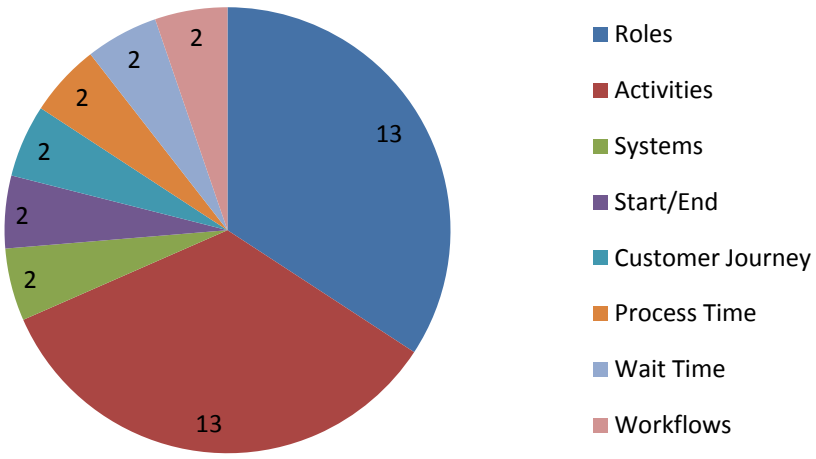


Figure 4.24: Most popular properties of the processes which were modeled

During the interview meeting with respondents, on our request, we had a chance to look at the current and previous models and process descriptions. They vary from a detailed level to a very basic one, which shows the prevailing process maturity level at the time of process modeling.

17 respondents (94.44%) believed that BPM should be treated as management level concern; figure 4.25. Consultant-C11 stated that *"BPM has a growing belief among Norwegian organizations that it should be supported at a management level as well"*. Respondent-C19 who did not agree with management involvement in BPM criticized that *"management has the main concern to maximize profit, no matter what employees do but the goal should achieve. So, project teams decide what methodology and tools to select"*.

16 respondents (88.89%) also mentioned that "representatives for the working of the process on a daily basis" and "process owners" should participate in the process modeling. Only 9 respondents (50%) stated the important participant of process modeling as "resource persons from IT side"; figure 4.25. Respondent-Z agreed with the importance of IT people in BPM that, *"IT people should be there to better understand the processes and then it will be easier and time saving to do the modeling"*.

12 respondents (66.67%) stated the involvement of "external consultants" in process modeling and while emphasizing the collaboration among employees and consultants, they said that, *"if organization is going to hire some consultants for process improvements then they must be involve in meetings and they should be welcome to gather as much information as they consider useful and also the concerned employees should cooperate with them"*.

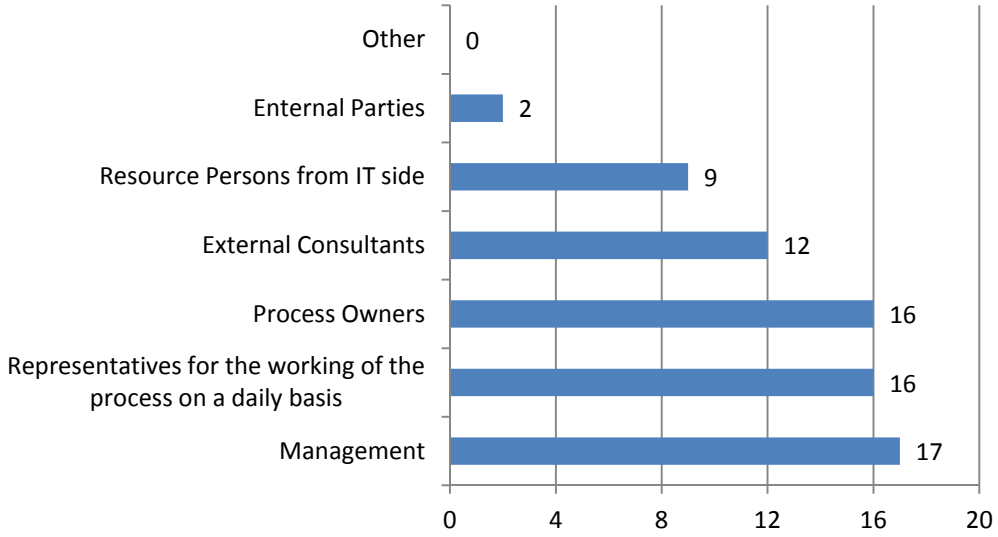


Figure 4.25: Participants in process modeling

13 respondents (72.22%) said models are designed through group work but only 4 respondents (22.22%) favored model designing through interviews where one person model after the information is obtained from various informants separately which is time saving and cost effective, means not everyone should be present at once and discuss which might take longer time; figure 4.26.

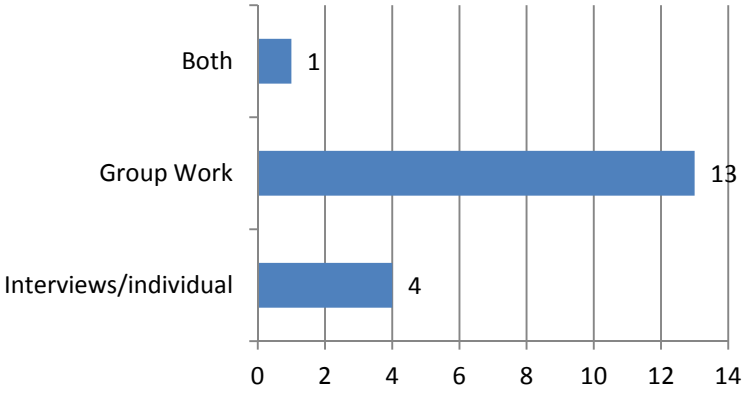


Figure 4.26: Process modeling approach

Those participants who said process modeling as a group work were asked to mention the average time spent each week for modeling session. 9 respondents (50%) said that for some projects few hours every day were enough to sit together and discuss; figure 4.27. 3 consultants (16.67%) explained that *"after gathering required information, usually on average we spent 2-3 days to do only modeling.*

After that we do not spent time on modeling but of course if needed we sit again and improve the models". During the interviews, we came to know that in these group sessions, management involvement is valuable all the time but only in the start of the project or at times when some decisions have to make.

When models were designed then computers with projectors were used in the group sessions to explain the whole process. Respondents of the survey mentioned that grey sheets, brown papers, flip cards, white boards were more convenient to draw models along with the discussion on them. While attending a one day workshop organized by *Capgemini AS Norway* at Bergen, we observed that participants were given a case study and they have to work in groups of 5-6 people and use brown sheets along with flip cards to draw model. Different shapes and colors of the flip cards were used to represent processes, resources, and decision points.

Participants stated that from the very beginning clear division of roles like facilitator, modeler, and informants were defined.

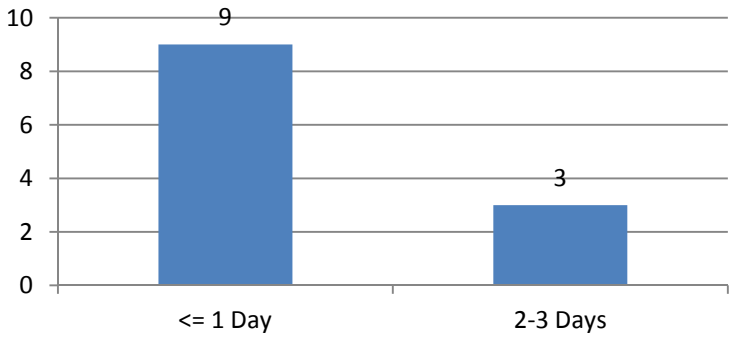


Figure 4.27: Time used in a process modeling session

12 respondents (66.67%) said that, for the very new projects, based on their personal experiences and team discussions they come up with the consensus for validating the process models; figure 4.28. They were not following any previous process descriptions but only their experience and skills. But 6 respondents (33.33%) stated that they used some other models' descriptions and when they were going to have some quality certifications then they shared the industry experiences.

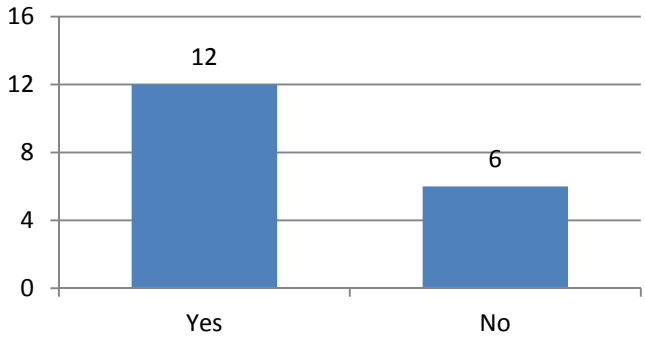


Figure 4.28: Measures to validate process modeling?

For the process modeling success criteria, 15 respondents (83.33%) said that decision about selecting a methodology could play an important role; figure 4.29. Competences or skills of the process modeling participants have been rated second important success criteria by 13 respondents (72.22%). Tools and techniques were not considered as very much important.

Respondent-AG3 argued that *"its modelers job to get the information from all the relevant persons, and he should be experienced enough to understand the process. Success depends on asking the right question at right time to a right person"*. Respondent-AG6 also explained the skills level of facilitator during the workshops that *"facilitators should have sound experience, knowledge of BPM, and also be able to guide the participants"*.

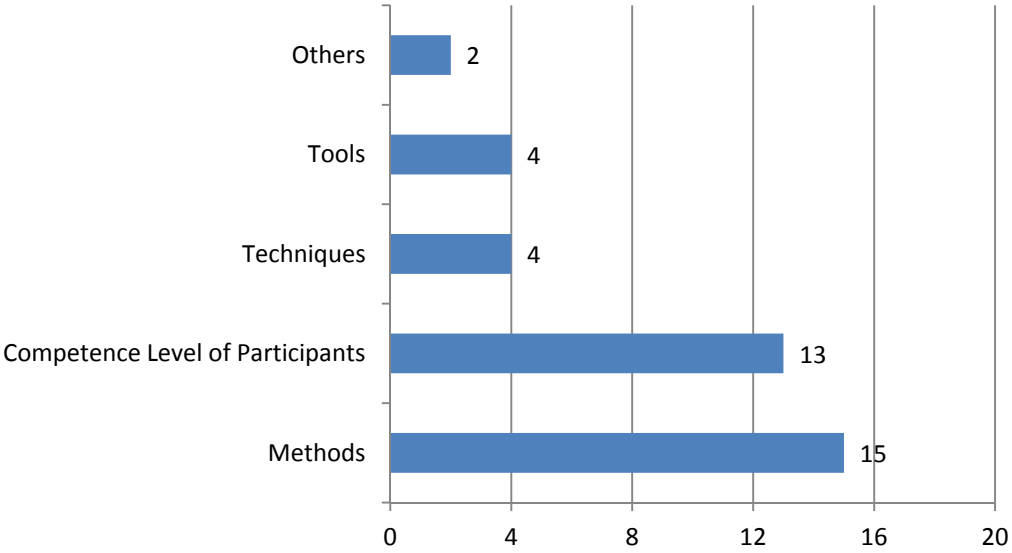


Figure 4.29: Success criteria for process modeling

14 respondents (77.78%) of the survey said that organizations do not offer any direct career opportunities for those who adopt process modeling; figure 4.30. Perhaps, in the start of the project everyone knows his responsibilities. 4 respondents (22.22%) were very enthusiastic about BPM and mentioned that "as *BPM profile is increasing in Norwegian market; it's really a good chance to perform well in process improvements and process modeling to receive better career opportunities"*.

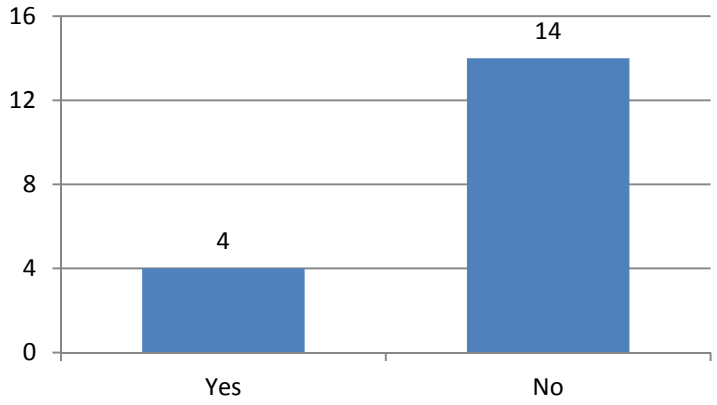


Figure 4.30: Career opportunities for employees to adopt process modeling

Part – 4: Challenges

Here we were interested in knowing what the respondents of the survey experienced as the most important challenges of the project related to the work of process improvements, in general. We mentioned some challenges in the questionnaire, and asked the respondents to select three most important challenges; but if they thought they encountered any other challenges then they could add their own in the table under the heading "Other"; table 4.3.

Challenges	% of responses
The employee's understanding / expertise of process thinking	83.33%
Management's willingness and ability to engage	72.22%
Involvement of employees	61.11%
Technical resources and expertise to translate process design for necessary IT support	11,11%
Others *(please specify)*	11.11%
Suitability of modeling techniques	5.56%
Project	5.56%
Suitability of modeling tools	0.00%

Table 4.3: Challenges to the process modeling

Majority of the respondents stated first three challenges as the most important one. Out of them, 15 respondents (83.33%) pointed that "The employees' understanding or expertise of process thinking" is the very important one; figure 4.31. 13 respondents (72.22%) stated "management's willingness and ability to engage" as the second important challenge. And 11 respondents (61.11%) said "involvement of employees" as the third important challenge to process modeling work. Here we also encouraged respondents to share any other challenges if they did not find any in the provided list of possible challenges to the process modeling in the questionnaire.

Respondent-AJ10 argued that *"discovering cost of the existing process is also one of the other important challenges in process improvement projects"*. Consultant-C17 explained the process modeling challenges that *"it's difficult to be able to standardize work processes used globally. There are many different ways of*

working, so the decision which methodology, techniques, and tools should we select is quite complicated. While working in modeling groups it's not easy to have a consensus and to understand each other because of cultural differences as well. And when some process improvement suggestions are proposed then the next question arises, how the people will react who will be affected with those changes".

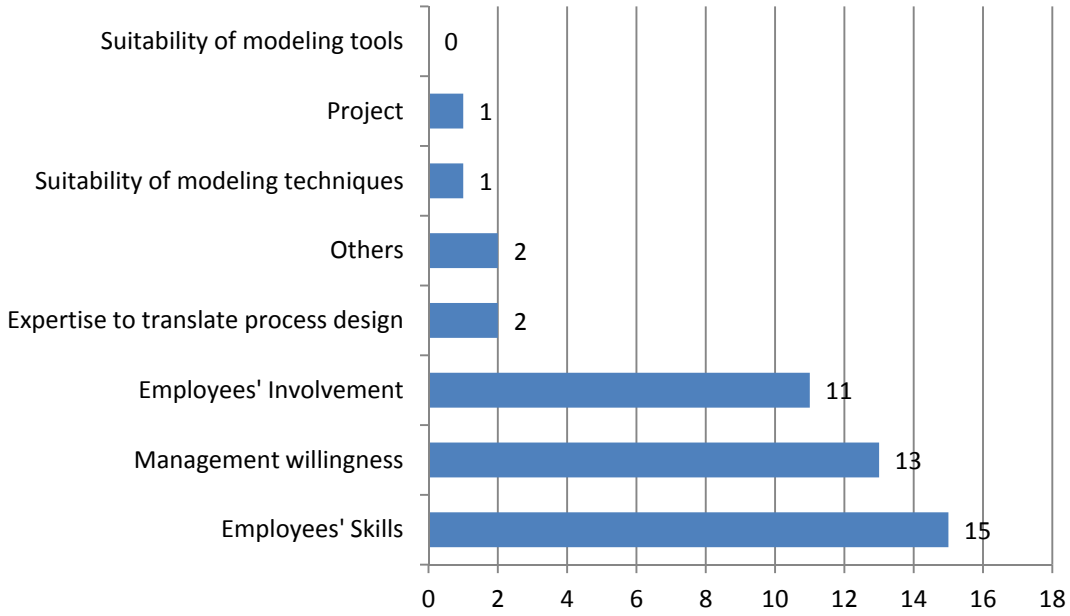


Figure 4.31: Challenges for process modeling

Part – 5: Re-use

Here we were interested in knowing how the process descriptions and models were used and managed after they were made for its primary purpose. 13 respondents (72.22%) said that mostly process descriptions and models were reused for quality improvement; figure 4.32. 12 respondents (66.67%) mentioned that they were reused for employees' training.

Respondent-AL6 stated that *"those process models are considered as part of the Process Oriented Management System – powered by Qualiware tool and repository (part of a quality)"*. Respondent-AL9 argued that *"these process models are developed to get quality certifications like ISO-9001"*. Respondent-AL10 explained that *"process models are included in local documentation for further analysis and design, creating electronic workflow for Document Management System (DMS)"*.

Through interview discussions, it seemed that once the project is finished then those process descriptions and models which were developed earlier rarely reuse again in some other projects, but mostly for training purposes.

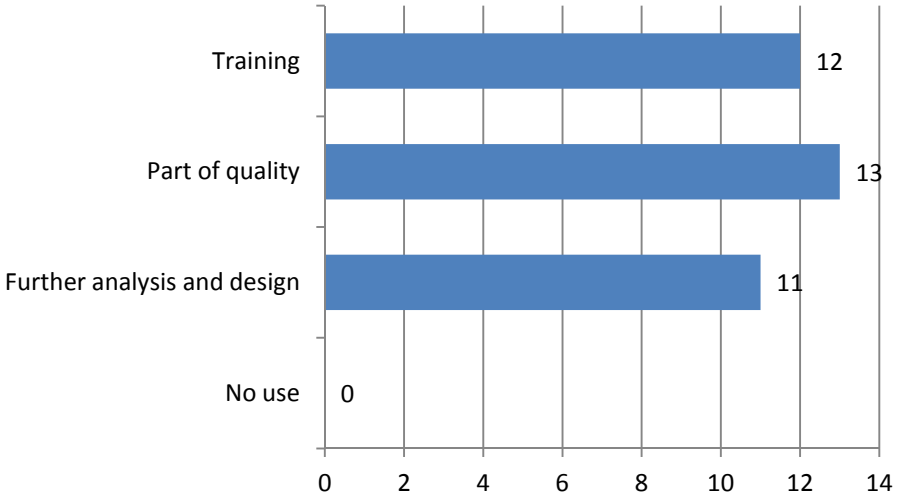


Figure 4.32: Reuse of the process models

Part – 6: Perceived usefulness

Respondents were also asked about how they perceive usefulness of the process modeling for the projects. Majority of the respondents were strongly agreed that use of process models made it possible for the project to complete its tasks faster than they could otherwise have done (i.e. accomplish tasks more quickly), and process modeling gave the project better results than they otherwise would have received (i.e. enhanced effectiveness), and process modeling used in projects made it easier for them to carry out project work (i.e. make it easier to do the job); figure 4.33.

Consultant-C17 strongly disagrees with usefulness of process modeling and made it conditional while arguing that, *"it's difficult to be able to standardize work processes used globally. If you are working in a team on process modeling or cooperating with employees as an external consultant, it's not always easy to have consent on one point and to understand each other because of cultural differences and different ways of working"*.

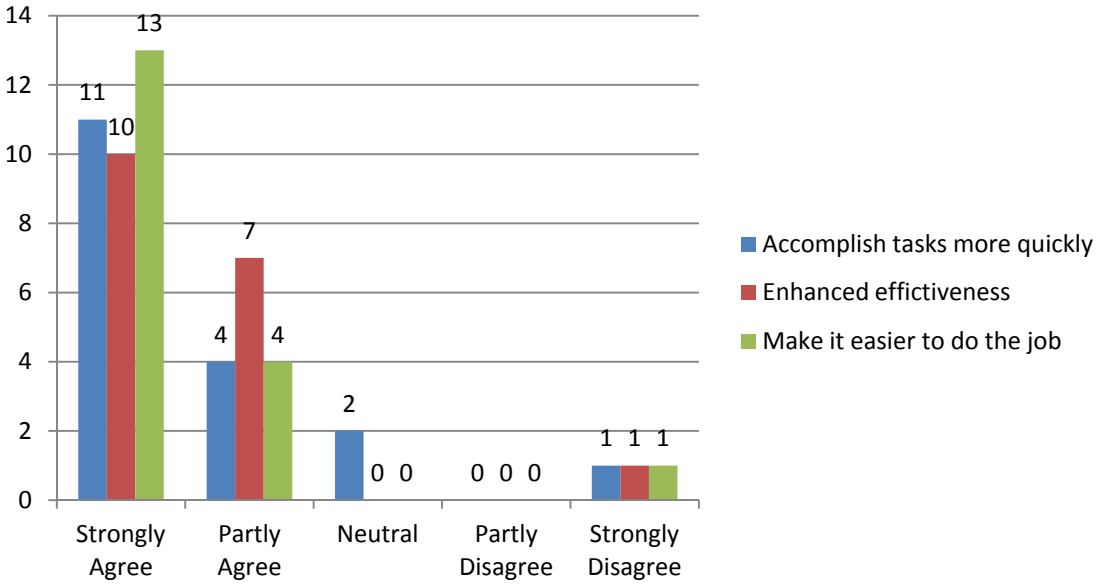


Figure 4.33: Perceived usefulness of the process modeling

12 respondents (66.67%) stated that risk of over analysis turned into the biggest disadvantage of process modeling. 9 respondents (50%) mentioned that to make graphical models, it's very important to understand the actual process as a

whole, which is time consuming. For 5 respondents (27.78%), process modeling is costly; figure 4.34.

Respondent-AQ5 criticized that *"not everyone agrees on its upsides and it's difficult to keep attention to models after they are done and published"*. Respondent-AQ explained the risk of process modeling that *"if process models are not made available for the users and not maintained properly then they are of no use at all"*.

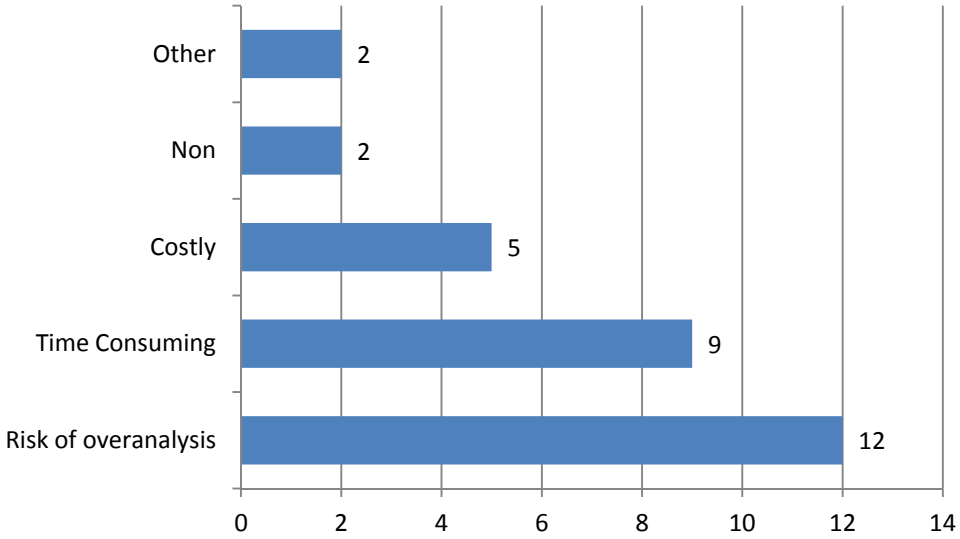


Figure 4.34: Downsides of process modeling

4.2. Pattern Analysis

Here we will have a close look at the data and find some patterns in the data.

To make more understanding of the results, we decided to examine the process maturity levels of the organizations according to the private and public sectors (figure 4.35), and with respect to industries (figure 4.36). 7 private sector organizations (38.89%) are reported being on maturity level with "limited documentation". It is very seldom to see any organization at level–5 of process maturity. Highly unusual consultant-C17 claimed to be at highest level of process maturity of "processes have goals, goal achievement is monitored and processes are developed on the basis of goal achievement".

Levels	Process maturity levels
Level – 1	The processes are not named or documented (No documentation)
Level – 2	Processes are documented but practiced varied (Limited documentation)
Level – 3	The processes are documented and practices are standardized (Following the documentation)
Level – 4	The processes have been subject to analysis and improvement
Level – 5	The processes have goals, goal achievement is monitored and processes are developed on the basis of goal achievement

Table 4.4: Numbering of Process maturity levels

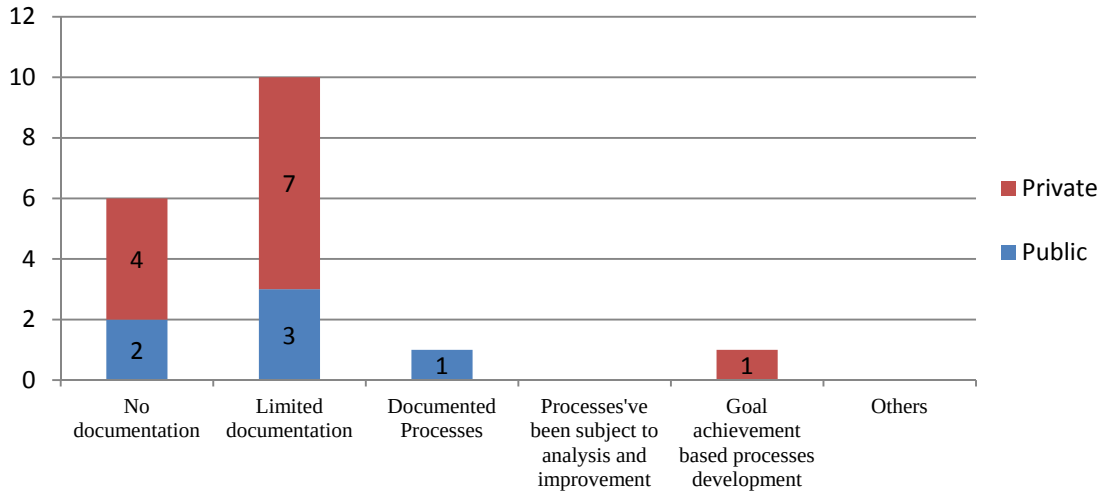


Figure 4.35: Respondent organizations' process maturity level with respect to private/public sectors

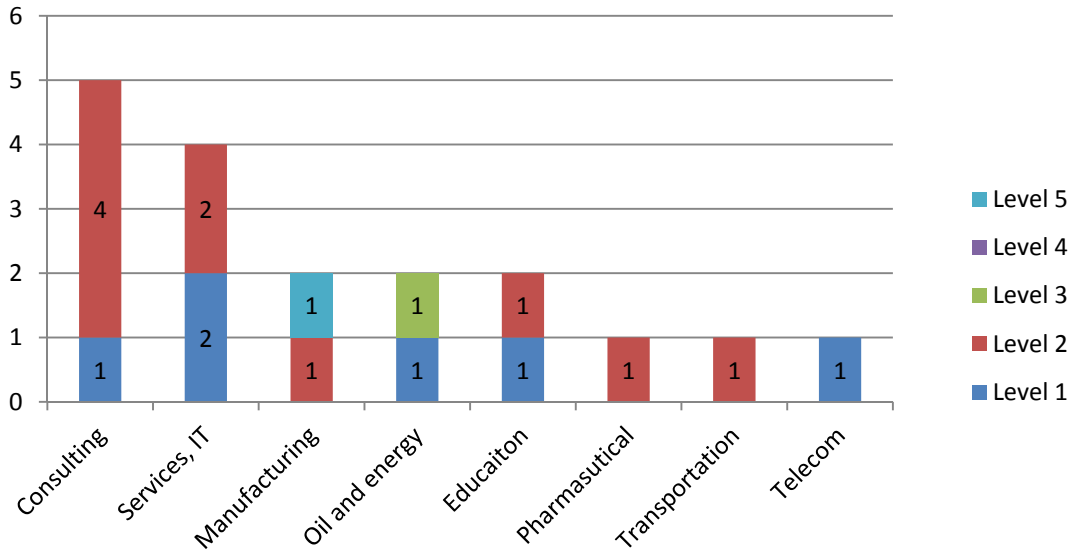


Figure 4.36: Respondent organizations project's process maturity level with respect to industry

Data shows that where the majority of respondents reported the importance of management, employees' involvement, and employees' understanding and expertise of process thinking for organizational performance improvement; then in those projects their perceived usefulness of process modeling is higher; figure 4.37.

Though we did not find the concrete data to confirm that either they gain the benefits of process modeling or not, but we were shared with their experiences about it. The perceived usefulness of process modeling is taken into account on the basis of accomplished tasks more easily and quickly with enhanced effectiveness. Outlier consultant-C17 strongly disagreed with the perceived usefulness of process modeling and made it conditional that *"if more importance is given to understand and resolve cultural differences, and organizations develop the ability to standardize practices used globally then it's worth to use process modeling otherwise it's the waste of resources"*.

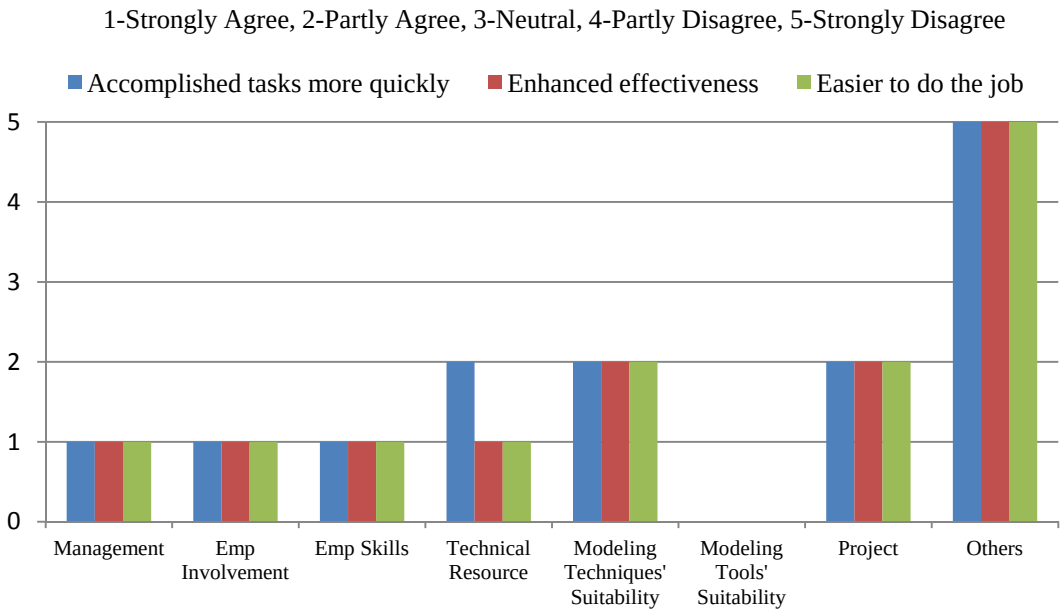


Figure 4.37: Perceived usefulness of process modeling vs. factors involved in process improvement

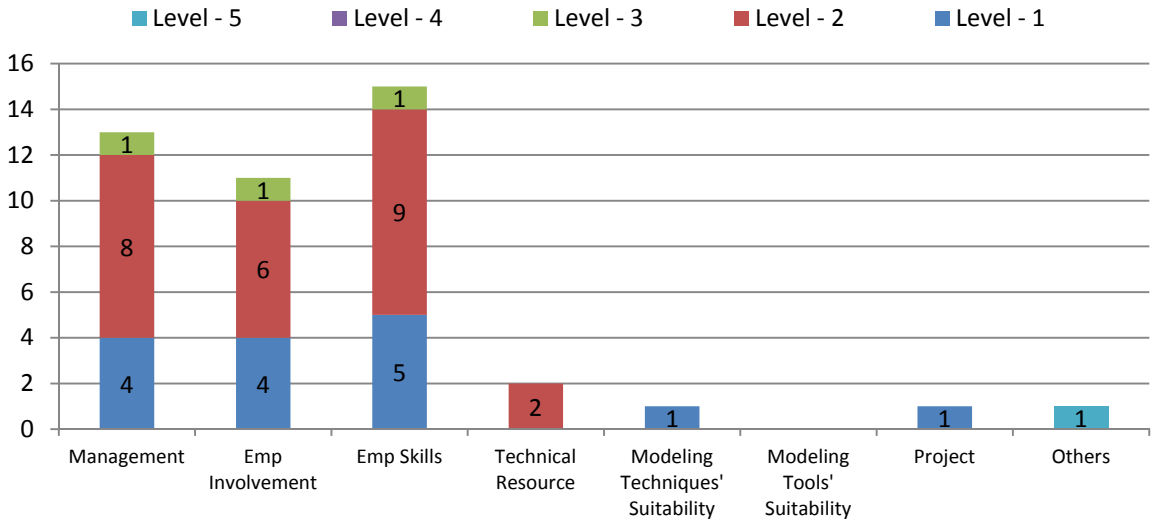


Figure 4.38: Process maturity vs. factors involved in process improvement – I

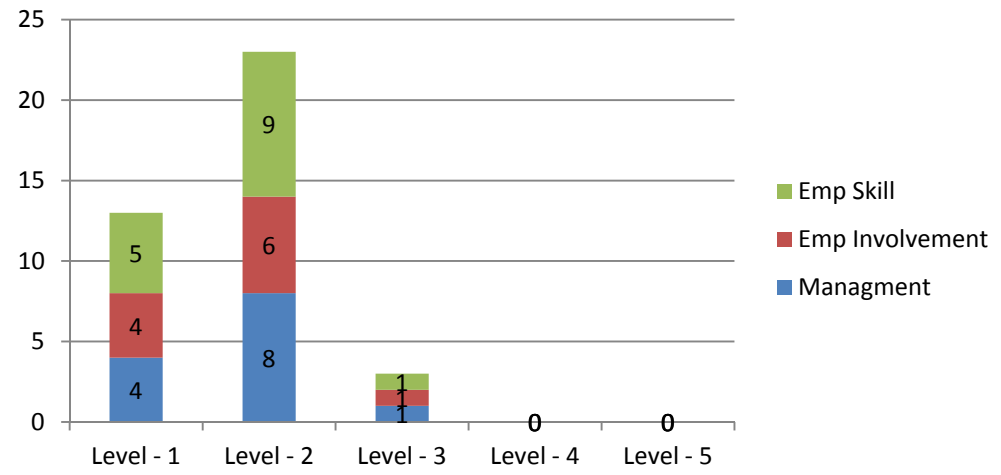


Figure 4.39: Process maturity vs. factors involved in process improvement – II

Research survey data suggests that in those organizations where the process maturity was reported at level-1 (no documentation) there the main purpose of the project was to "resolve business challenges", and having "process oriented business". But on the other hand, those organizations that were stated at process maturity level-2 (limited documentation) have diverse project purposes. Organizations who have highest process maturity level like in the data as level-3 (documented processes) and level-5 (goal achievement based process development) have project's purpose of "process oriented business", "standardize practices", and "quality assurance"; figure 4.40.

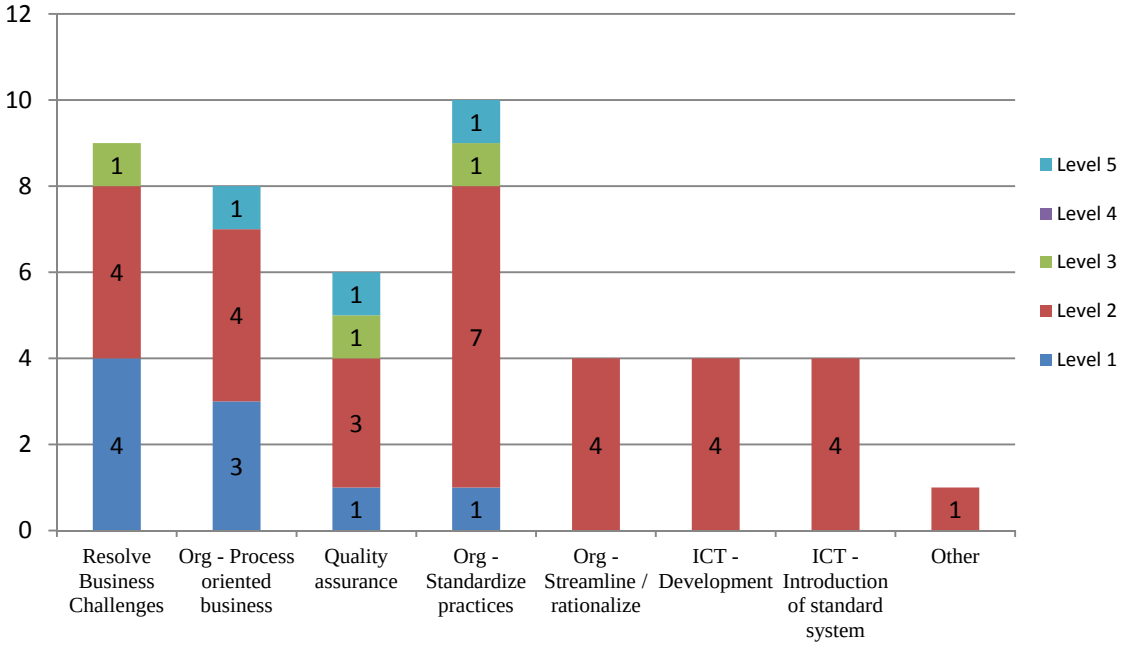


Figure 4.40: Purpose of the project with respect to process maturity level

It would be interesting to look at the data whether the decided purposes of both project and process modeling were achieved or not. We analyzed this while considering *project outcome* and its dimensions like: (1) goal achievement, (2) organizational impact, (3) process oriented impact, and (4) process modeling learning (*Eikebrokk et al. (2008)*).

For the *goal achievement*, we analyzed purpose of both projects and of designing graphical models with respect to likelihood of the project to complete its tasks faster than would otherwise have done (i.e. *accomplished tasks more quickly*). To capture *organizational change*, we looked at the data to find out, because of the project, whether the organization has *enhanced its effectiveness*. For *process oriented impact* on the organization; we analyzed that, because of project, whether process modeling made it *easier to carry out project work* which then leads to better description and standardization of processes for next projects. Data shows that process models are now used for quality assurance, training, and for further analysis and design, this fourth dimension of *project outcome* (i.e. process modeling learning / process use) has been shown in figure 4.32.

Survey data explains that in all of the purposes for both projects as well as for designing graphical models, majority of respondents were “strongly agreed” about accomplishing tasks more quickly; figure 4.41 and figure 4.42.

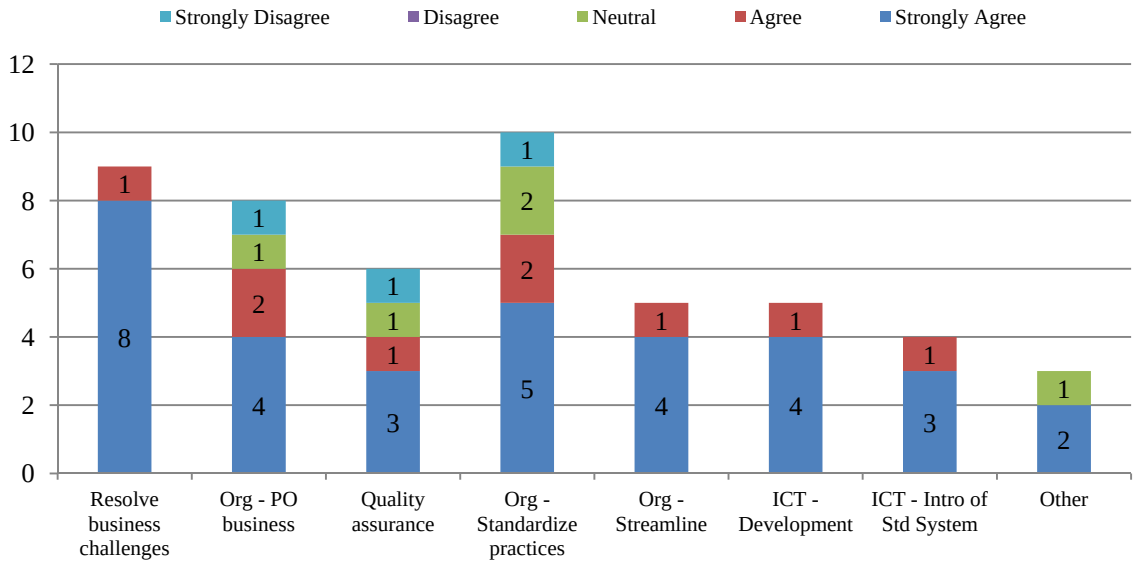


Figure 4.41: Purpose of the project vs. accomplish tasks more quickly

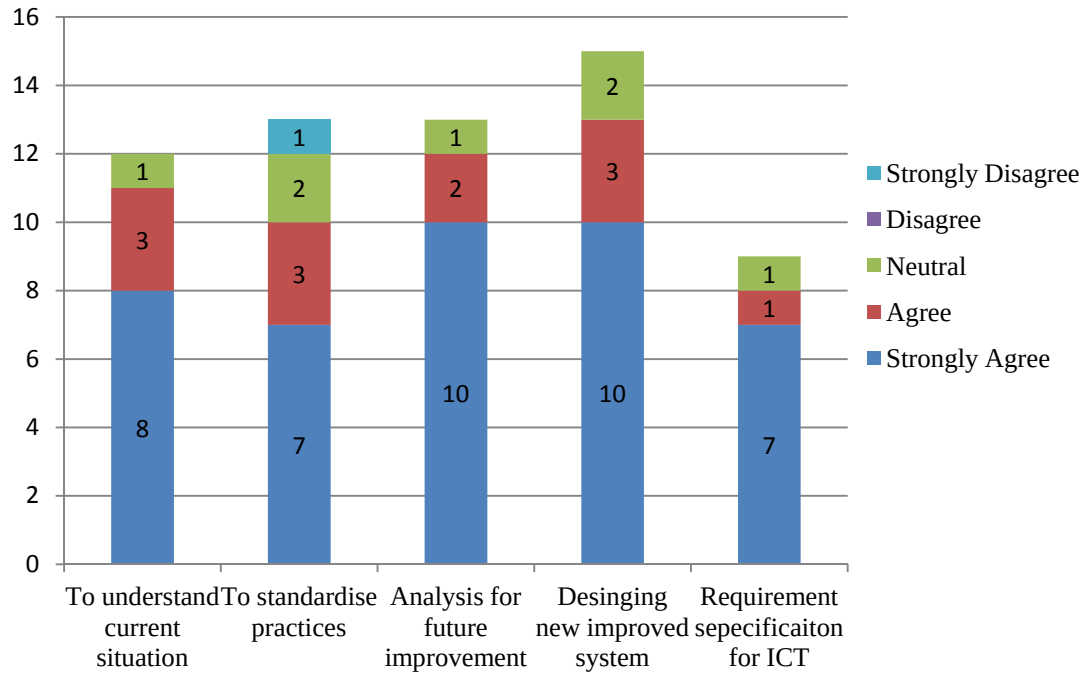


Figure 4.42: Purpose of designing graphical models vs. accomplish tasks more quickly

Most of the respondents of the survey were strongly agreed that because of the project, organization has enhanced its effectiveness against the purposes for both projects as well as for designing graphical models; figure 4.43 and figure 4.44.

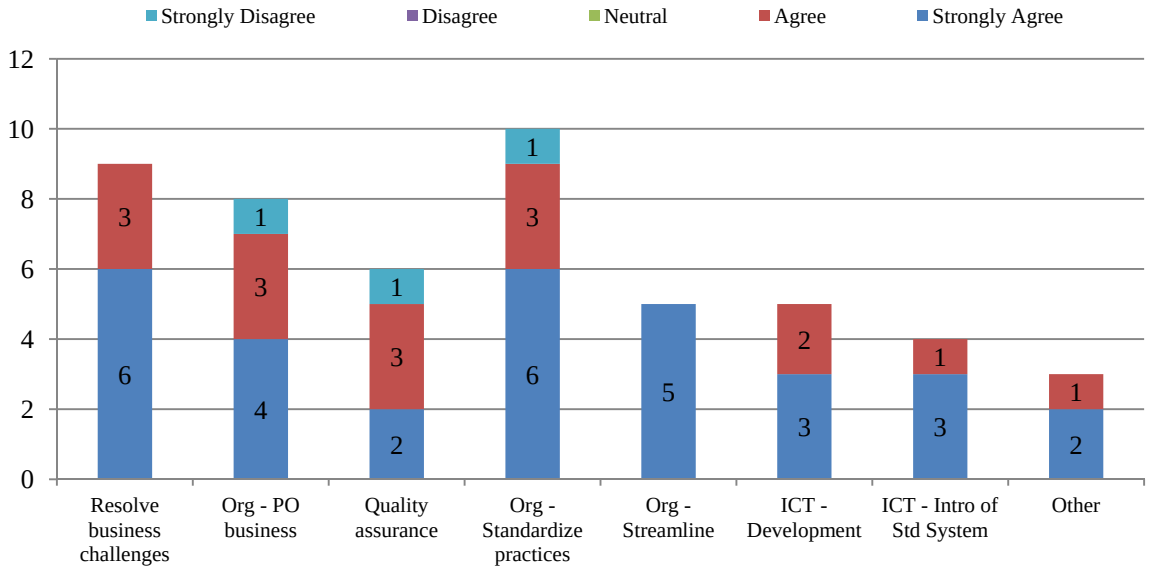


Figure 4.43: Purpose of the project vs. enhanced effectiveness of the organization

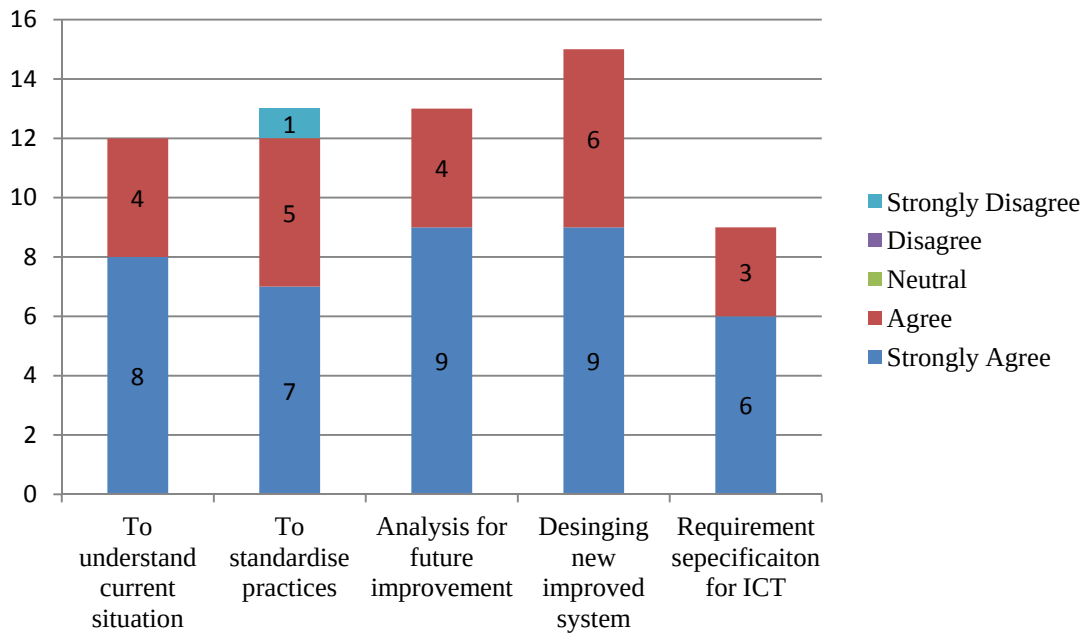


Figure 4.44: Purpose of designing graphical models vs. enhanced effectiveness of the organization

Data confirms that process modeling has brought *process oriented impacts* in the organizations. We analyzed it while comparing purposes of projects and of designing graphical models with the usefulness of process modeling that, *it makes easier to carry out project work*. Most of the respondents strongly agreed with the usefulness of the process modeling; figure 4.45 and figure 4.46.

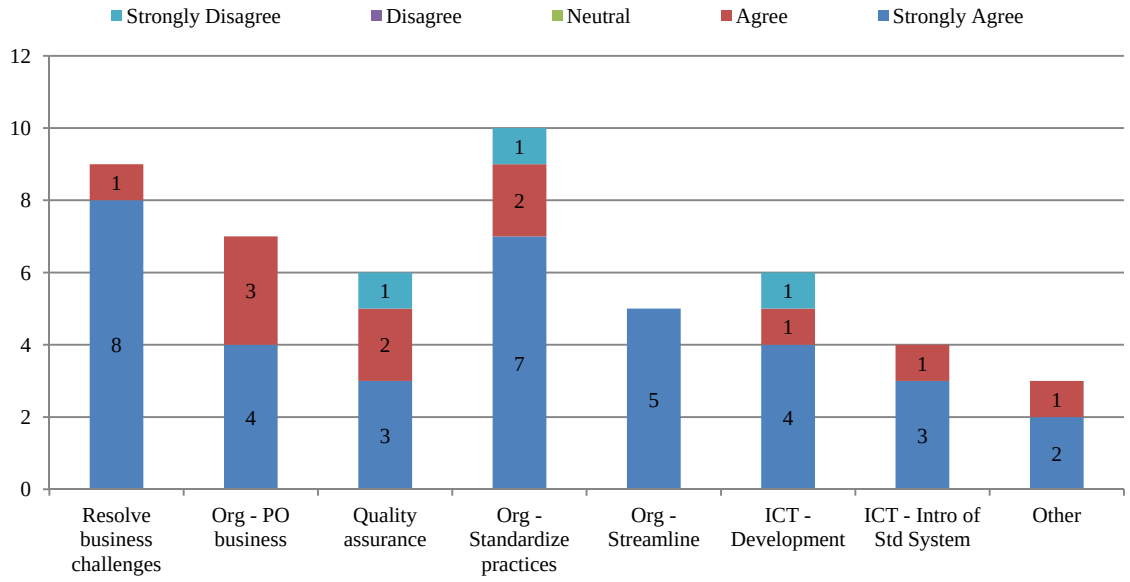


Figure 4.45: Purpose of the project vs. ease to carry out project work

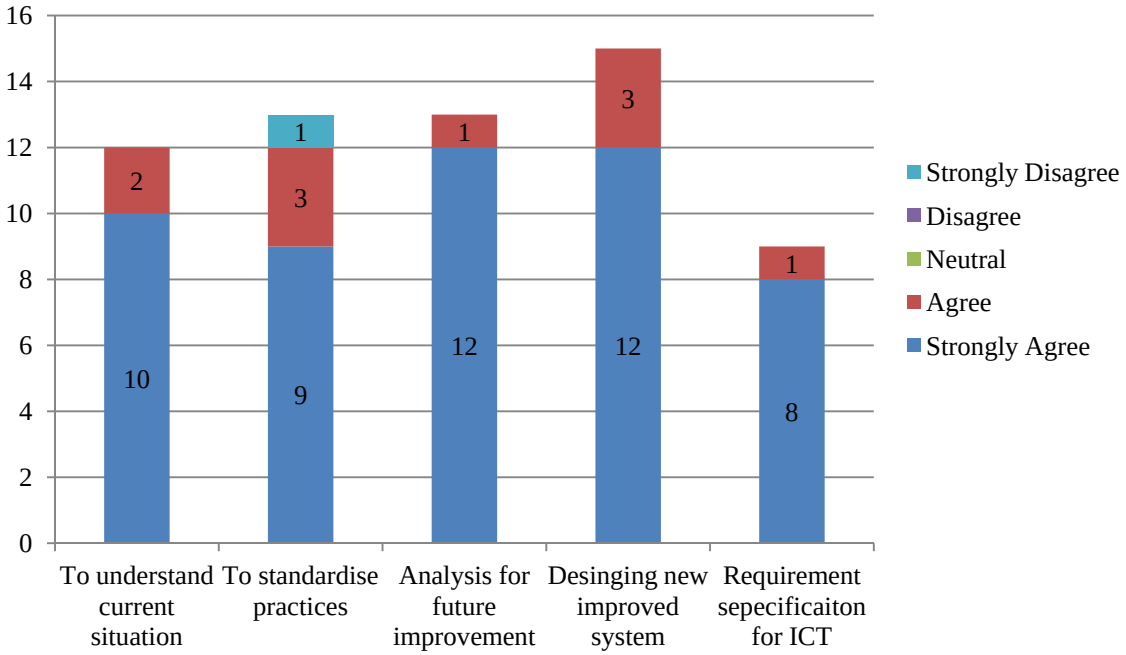


Figure 4.46: Purpose of designing graphical models vs. ease to carry out project work

Based on the available data, we selected graphical analysis to find out the relationship between our suggested three variables (*outsourcing/consulting*, *career opportunities*, and *team work*) with *project outcome* in the *PMP model*. *Project outcome* is being measured in terms of three variables like; *goal achievement*, *organizational change*, and *process oriented impact (Eikebrokk et al., 2008)*. Results showed that *outsourcing/consulting* and *team work* are positively related to *project outcome*. In addition, we did not find any positive impact of the third variable *career opportunities* on *project outcome*; detailed analysis is given below.

Majority of those organizations who used *consultancy services* in efforts to model processes were strongly agree that *accomplishment of tasks in a project where process modeling is used become more quicker – goal achievement*; figure 4.47.

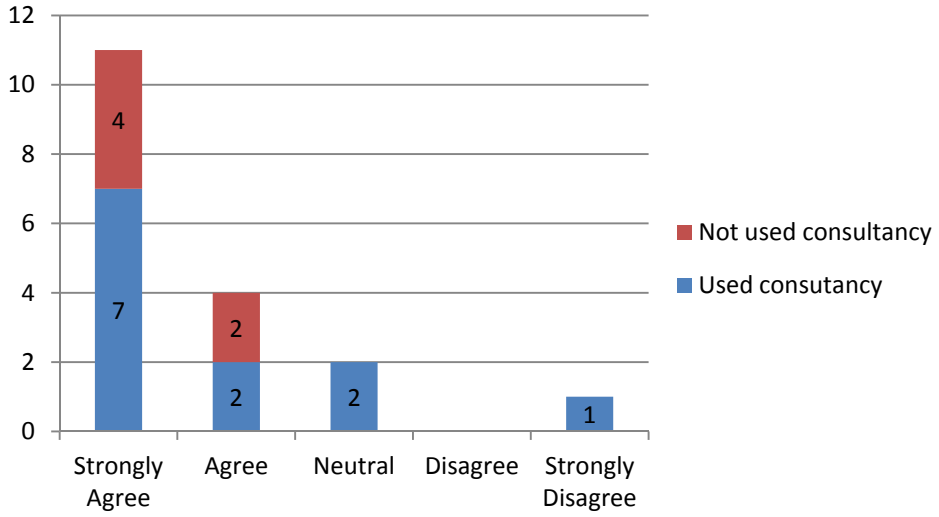


Figure 4.47: Accomplish tasks more quickly vs. use of consultancy resources

To see the *organizational change* because of *consultancy service*, we compared the results of those organizations that used *consultancy* resources with those who did not. Though almost double of those organizations that used *consultancy* services were strongly agree to state increase in *organizational effectiveness*, but generally, both of the responding organizations were either agree or strongly agree while arguing that use of process modeling enhanced the *effectiveness of the organization – organizational change*; figure 4.48.

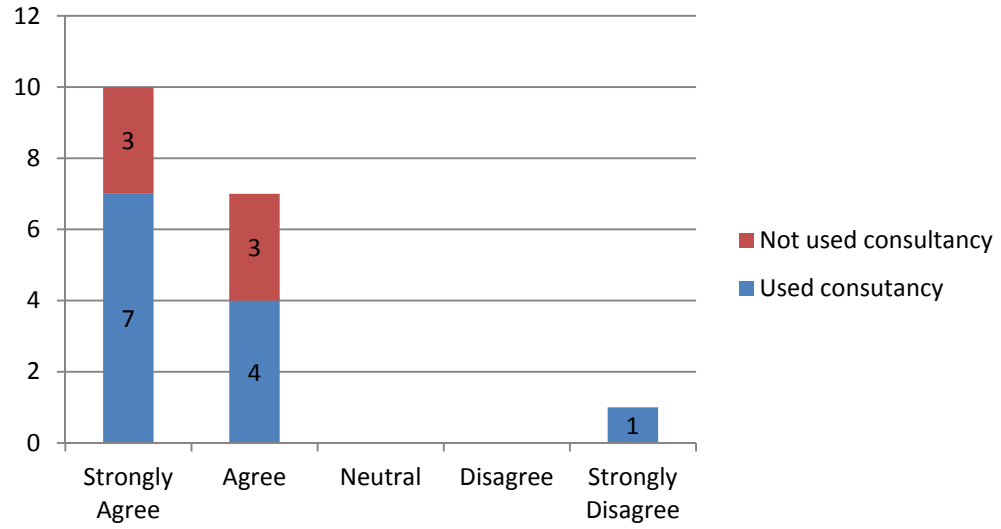


Figure 4.48: Enhanced effectiveness of the organization vs. use of consultancy resources

To analyze the *process oriented impact*, we compared the use of *consultancy resources* by organizations with their perception about process modeling that it makes *easier to carry out project work*. Both groups were either agreed or strongly agreed with the usefulness of process modeling. But again double of the organizations that did not use *consultancy* resources and almost all of the organizations that used *consultancy* resources were strongly agree to state that process modeling make it *easier to do the job – process oriented impact*; figure 4.49.

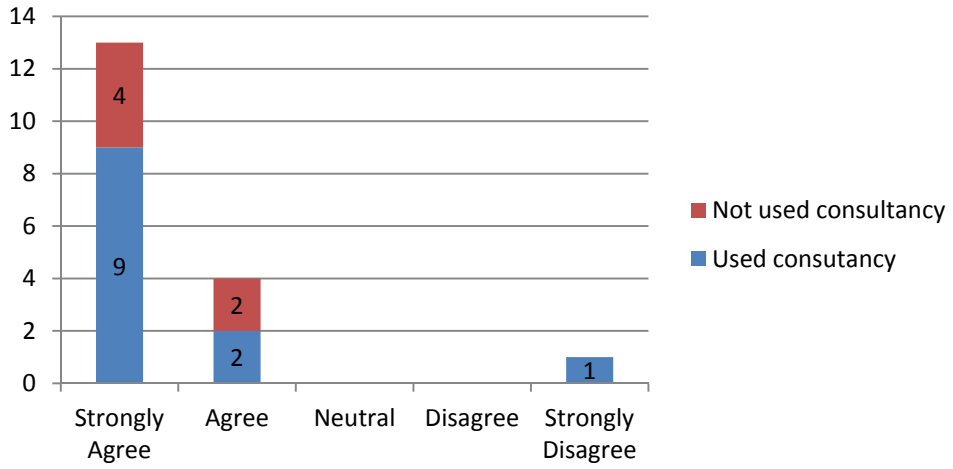


Figure 4.49: Ease to carry out project work vs. use of consultancy resources

Majority of the organizations that worked in *teams* or individual were strongly agreed that process modeling gives the advantage of *accomplishing tasks more quickly – goal achievement*; figure 4.50.

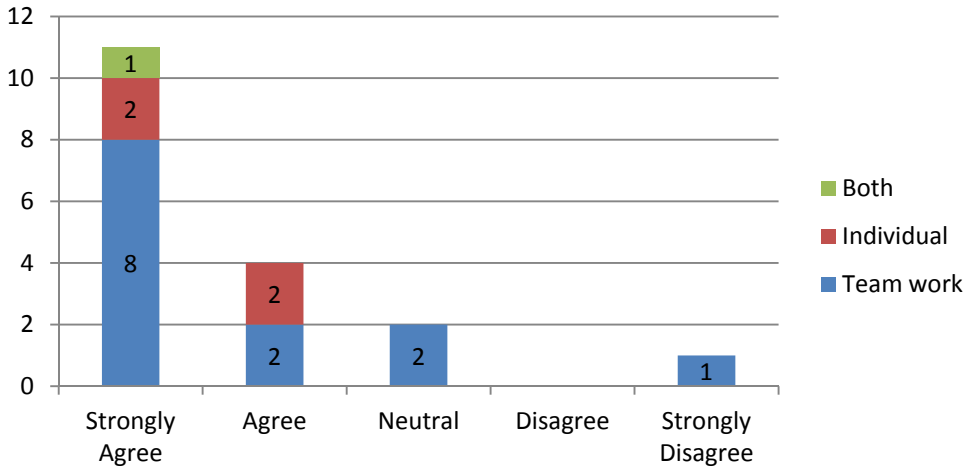


Figure 4.50: Accomplish tasks more quickly vs. team work

To analyze the change in organization because of working in *teams* or individual for process modeling, we compared the *team work* and individual work with the *perceived organizations' enhanced effectiveness*. Majority of respondents who worked in *teams* were strongly agreed but most of those who worked individually were agreed that process modeling enhanced the *effectiveness of the organization – organizational change*; figure 4.51.

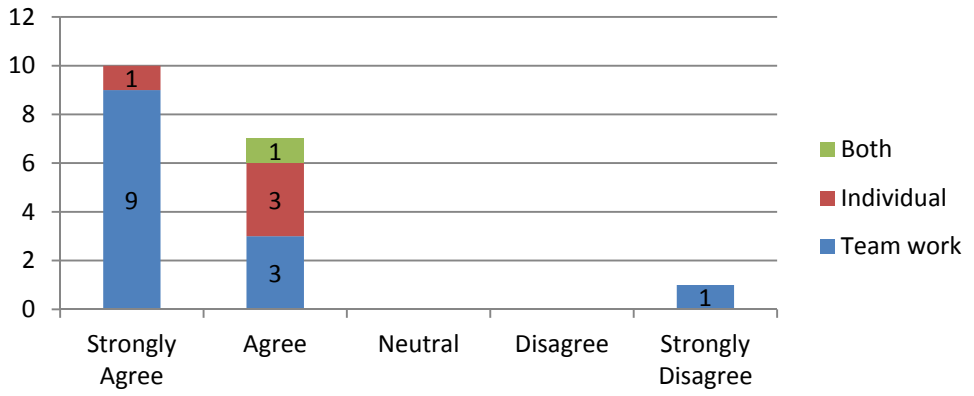


Figure 4.51: Enhanced effectiveness of the organization vs. team work

To see the *process oriented impact* due to the process modeling based on *team work* or individual work. We compared the *usefulness of process modeling – ease to do project work* - with those respondents who worked either in teams or individual. Here also data showed that almost all of those who worked in *teams* are strongly agreed and half of those who worked individually are agreed to state the *ease to do the project work because of process modeling – process oriented impact*; figure 4.52.

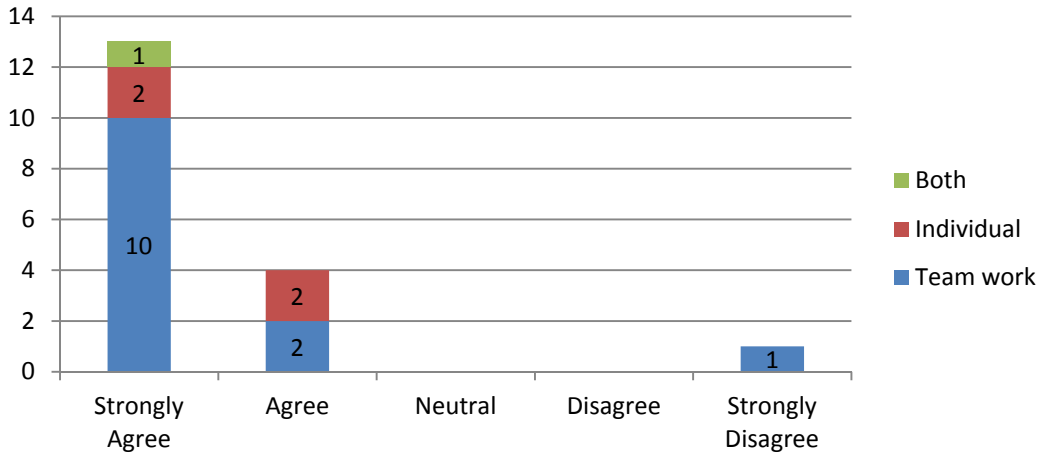


Figure 4.52: Ease to carry out project work vs. team work

Only 3 respondents were strongly agreed that when *career opportunities* are offered then *accomplishment of tasks in a project where process modeling is used become quicker – goal achievement*; figure 4.53. This is very week relationship but on the other hand when *career opportunities* are not offered then majority of the respondents were either strongly agreed or agreed that accomplishment of tasks in a project where process modeling is used become quicker. It means that offering *career opportunities* do not have any positive impact on *task accomplishments*.

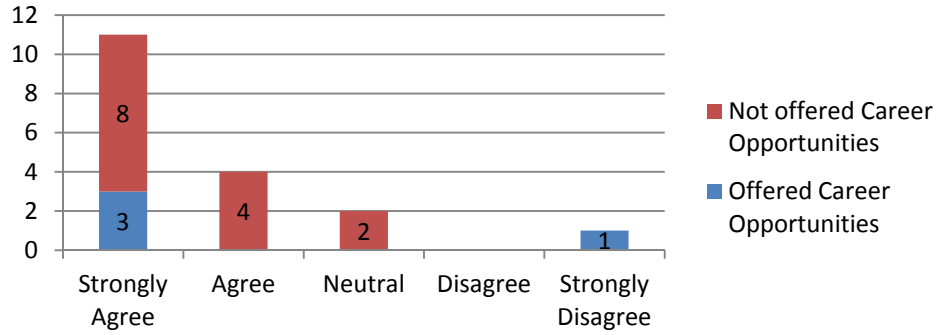


Figure 4.53: Accomplish tasks more quickly vs. Career Opportunities

To analyze the *change in organization* because of any offered *career opportunities* for process modeling, we compared the "offered *career opportunities*" and "not offered *career opportunities*" with the *perceived organizations' enhanced effectiveness*. Majority of respondents who reported "no *career opportunities*" were either strongly agreed or agreed but only three respondents who reported "*career opportunities*" were strongly agreed that process modeling enhanced the *effectiveness of the organization* without any offered career opportunities – *organizational change*; figure 4.54. It shows that offering *career opportunities* do not have any considerable positive impact on *enhanced effectiveness of the organization*.

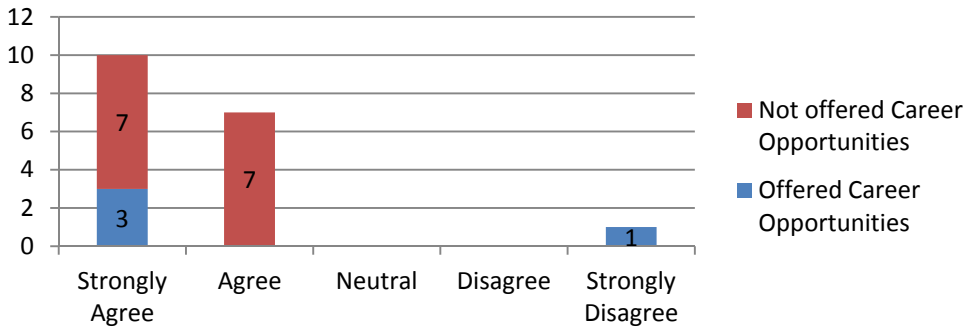


Figure 4.54: Enhanced effectiveness of the organization vs. Career Opportunities

To see the *process oriented impact* due to the process modeling based on any "offered *career opportunities*". We compared the *usefulness of process modeling – ease to do project work* - with those respondents who reported importance of "offered *career opportunities*" with those who stated "no offered *career opportunities*".

Here also data showed that almost all of those who reported "no *career opportunities*" are either strongly agreed or agreed to state the *ease to do the project work* because of process modeling without any "offered *career opportunities*" – *process oriented impact*; figure 4.55. It shows that offering *career opportunities* do not have any considerable positive impact on *ease to carry out project work*.

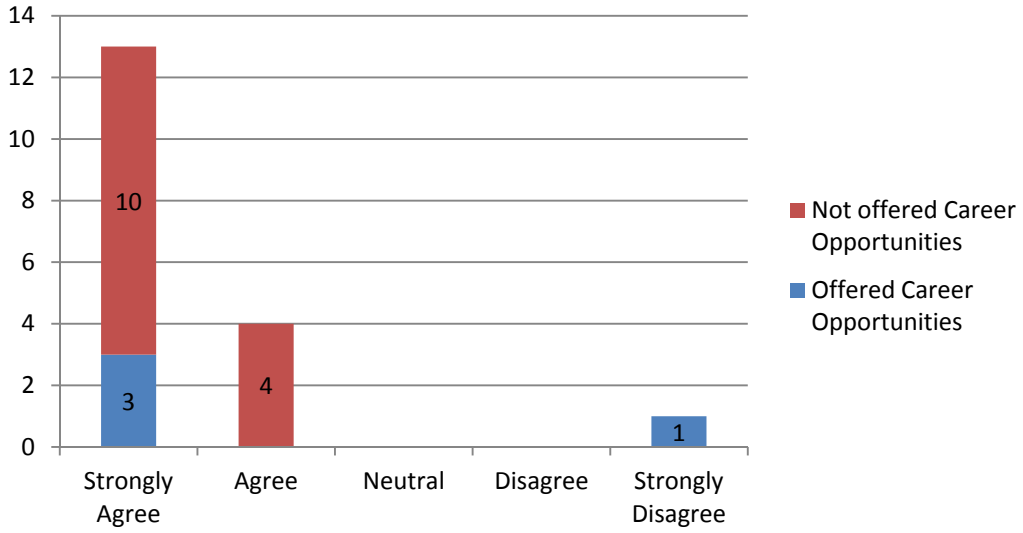


Figure 4.55: Ease to carry out project work vs. Career opportunities

To make more understanding of the respondents' opinion about downsides of process modeling, we divided the respondents into two categories – those who used the contracted resources in efforts to model processes against those who did not. We also included consultants as well in this part of analysis to see whether their opinion about downsides of process modeling differs from non consultants; figure 4.56.

We did not limit the respondents to select only from our stated downsides of process modeling but were encouraged to mention any other, if they have. Two respondents of the survey said their own opinion for process modeling downsides.

Respondent-AQ5 criticized that *"not everyone agrees on its upsides and it's difficult to keep attention to models after they are done and publish"*. Respondent-AQ explained the risk of process modeling that *"if process models are not made available for the users and not maintained properly then they are of no use at all"*.

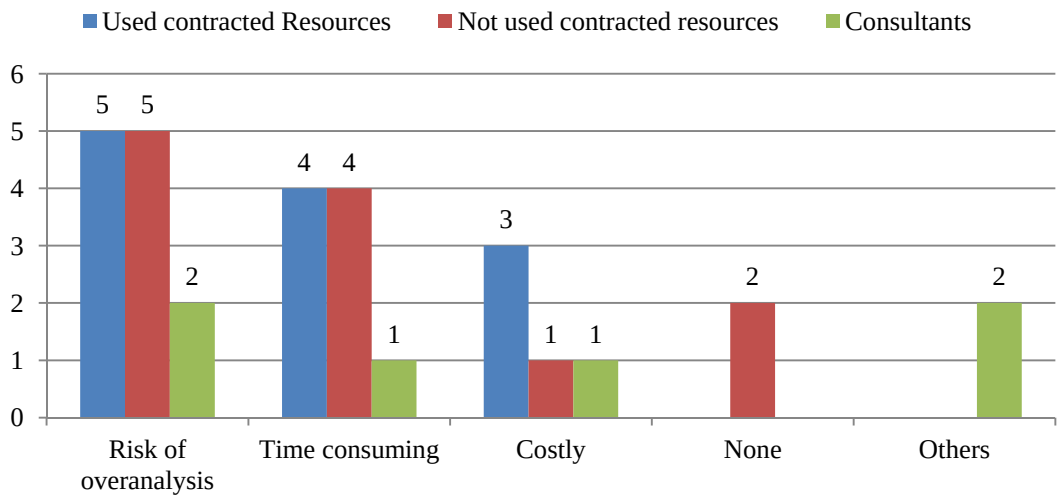


Figure 4.56: Contracted Resources vs. downsides of process modeling

4.3. Respondents' Own Reflections

Here in this part of the chapter, we will explain respondents' opinion, reflections, their understanding of the projects, and what they think about BPM practices and its' future in Norway.

More than 94% of the respondents argued that countering to any change is an important concern for their organization. If organization cannot handle any change then it would result into serious consequences. But because of BPM approach, organizations can easily accommodate changes. Automation enhanced the effectiveness. Respondents stated that BPM had a positive impact not only on organizational performance but also make it easier for them to do the job quickly.

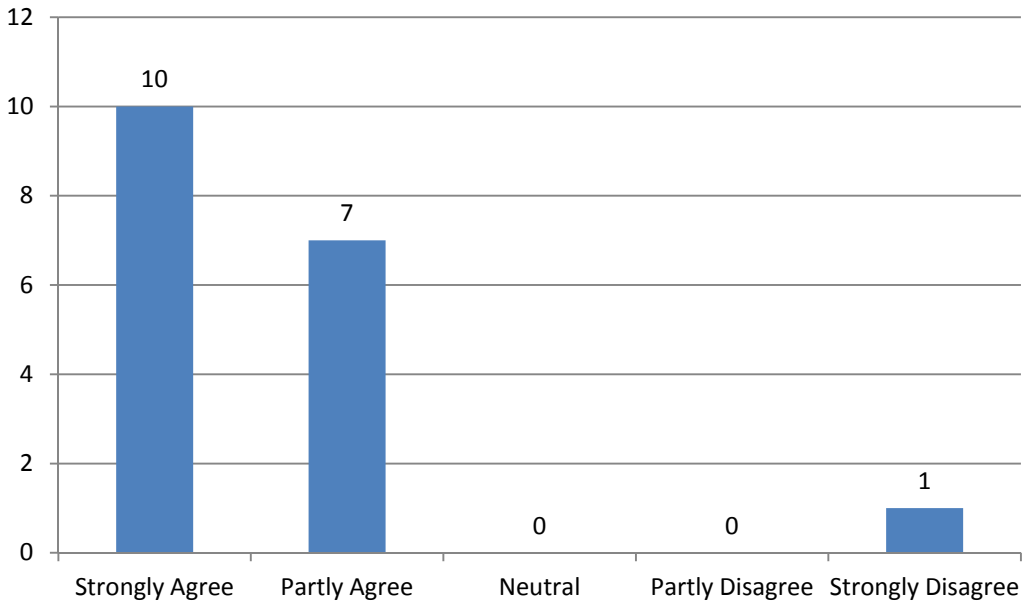


Figure 4.57: Positive impact of BPM on organization's effectiveness with respect to automation

10 respondents argued that their organization's processes are currently at the second level of process maturity, but both management and employees are becoming aware of the opportunities that BPM offers to improve process maturity. 16 respondents (88.89%) stated their opinion that their organization's interest in BPM would increase over the upcoming next 12 months. This finding supports that

BPM is increasingly becoming a part of conventional management opinion in Norway.

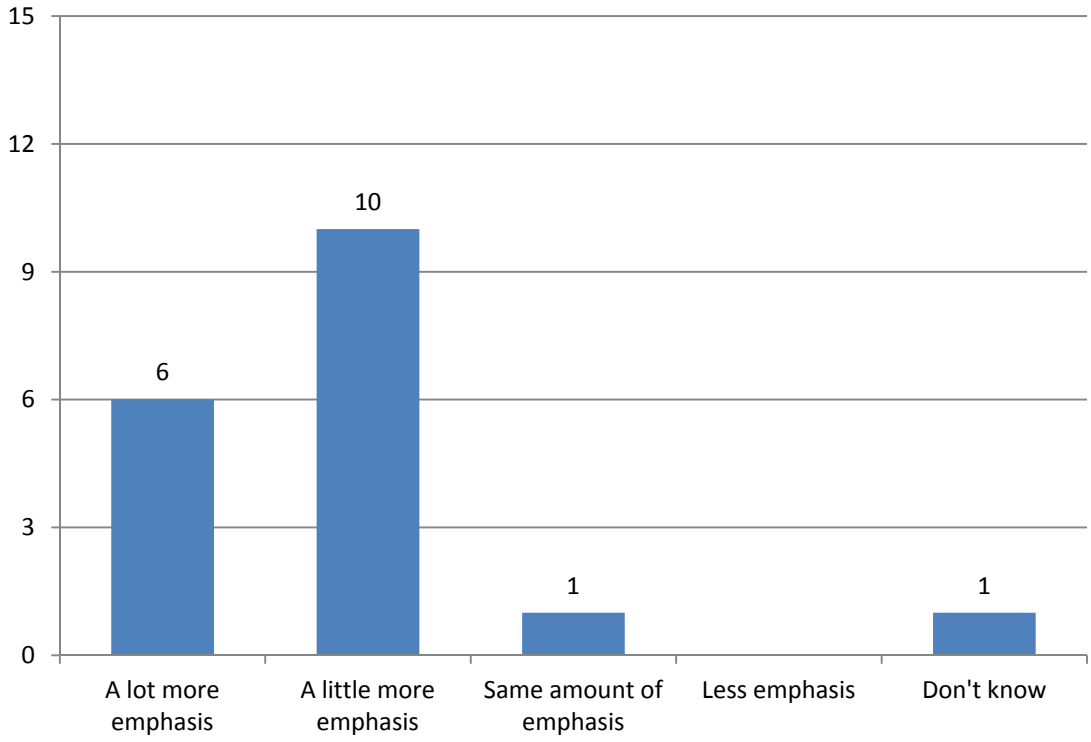


Figure 4.58: Respondent opinion about their organizations' interest in BPM over the next 12 months

During the interviews, almost all of the respondents stated that BPM should be considered as management level concern. Respondent-C16 stated that *"BPM is becoming a significant consideration at management level and at least one deliberate initiative in this field is in progress"*. Respondent C-15 supported the importance of management involvement and argued that *"lack of management support means that organization is not receiving the full benefits that BPM can offer"*.

Respondent AJ-17 identified few barriers to process improvement work. He explained that *"there are different ways of working which make harder to standardize work processes used globally. Working culture is not only different at country level but at organizational level as well. Before introducing BPM, organizations consist of functional units having their own objectives and*

performance standards. This may increase efficiency but on the other hand it negates collaborative working, and in the long run it could result into less efficiency and processes become wedged. And not only this, introduction of cross-functional practices like BPM can lead to resistance from employees responsible for existing systems".

After interviewing all the respondents, it's difficult to find consensus among respondents as to who has main responsibility for process improvement. According to different respondents, this may be shared by business management, operations, quality, IT, or in some cases established process management units.

5. Discussion and Conclusion

This research work has added three more variables to the *Process Modeling Practice (PMP) Model (Eikebrokk et al., 2008),* and they are tested empirically along with other variables in a study of Norwegian model-based process-change projects. Because of the insufficient theories and instruments on process modeling practices especially in Norway based organizations and projects, our research has been exploratory in nature, though we have supported our research with the existing literature.

All over Norway, professionals from different industries were contacted; private organizations had the highest number of respondents as compared to public sector organizations. Possible reasons are: (1) private organizations are more interested to welcome change than public organizations, (2) easier to find contacts from private sector. Representatives from major industries responded for this research, *Consulting* and *Services* industries had higher numbers of responses. Our research is to know the BPM trends in Norway, so after knowing this research idea, many consulting and service organizations were interested to know the trends in the market to make their further plans accordingly. Our first contact was from Bergen. Through *Snowballing and Purposive sampling techniques*, more relevant representatives in Bergen were interviewed. Unfortunately, we could not find more responses due to time and availability of the respondents, but at least we found one respondent from different positions which could be important in process development.

While conducting this research, we found few women respondents. This encouraged us to explore the reasons behind it, so we started with the question why in Norway women are not there in some technical or in computer science fields (specifically in our BPM research area). According to *Statistics Norway (2010)* report, women are in the majority in general studies but men mostly go for vocational studies. In health and social care, design, arts and craft, nine out of ten are women, while men dominate in building, construction, electricity, and electronics fields. The report claimed that this difference in subject selection in

upper secondary education is reflected in the gender gap in the labor market as well.

In the Norwegian labor market, there are 48% of women and 19% of men in the public sector. Although more women are going for university level education than men, still their career paths are quite traditional. Figure 5.1 explains that typical women professions are teachers in kindergartens, primary and secondary schools, nurses, cleaners, and secretaries. Less than 10% people in computer science are women. *(Statistics Norway, Labor force survey, 2010)*

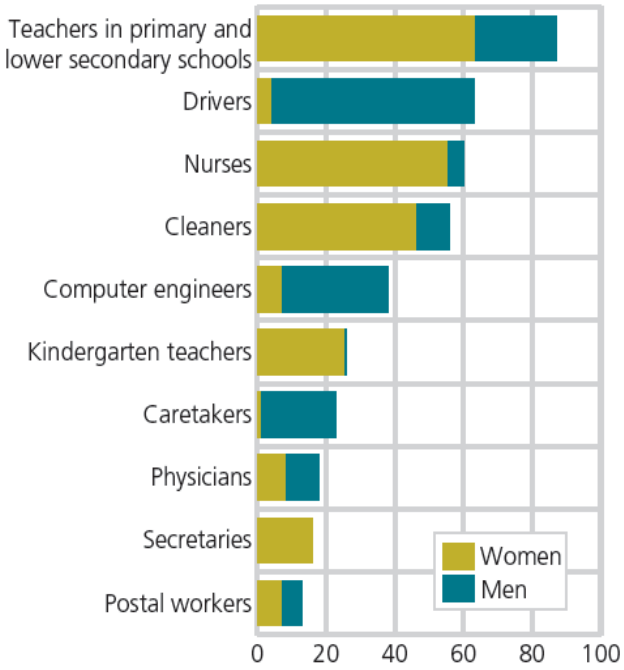


Figure 5.1: Female and male employment in selected occupations, 15-74 years 2008. *(Statics Norway, Labor force survey, 2010)*

Respondents criticized that BPM has not been offered at Norwegian universities as a study discipline. A majority of the respondents' professional affiliation or background was IT or business. Through self-study, practical experience and trainings they became familiar with BPM.

Generally, 56% of the respondents stated that their organization's processes currently have limited documentation (process maturity level-2). In Norway, it seems that more than ever before, organizations are gradually realizing the advantages that BPM provides to improve their process maturity. Respondents

shared their opinion about BPM while comparing the importance given to BPM by organizations since they started working in process improvements projects. 16 of the survey respondents anticipated that their organization's interest in process modeling for process improvement over the next 12 months will increase. This finding shows that BPM is becoming one of higher management's priorities. Only one organization is reported at higher maturity level-5 (i.e. goal-achievement based process development). This process maturity level was mentioned by Consultant-C17. It stands out because of (1) a previous study where none of the respondent organizations were at level-5 (*Eikebrokk et al., 2008),* (2) a current study where no one else reported his organization at level-5 and (3) at international or national level (Norwegian context) there are few examples of higher process maturity level.

In 2013, CMMI Institute published a report named "Maturity Profile Report"; it tracks CMMI adoption trends among organizations. And it also includes the distribution of appraisals and numbers of appraisals across the world. This profile report was compiled with data related to appraisal results reported to the CMMI Institute from the beginning of 2007 till the end of June 2013. 88 countries reported appraisals, and most of them were from Asia and North America; figure 5.2 and figure 5.3.

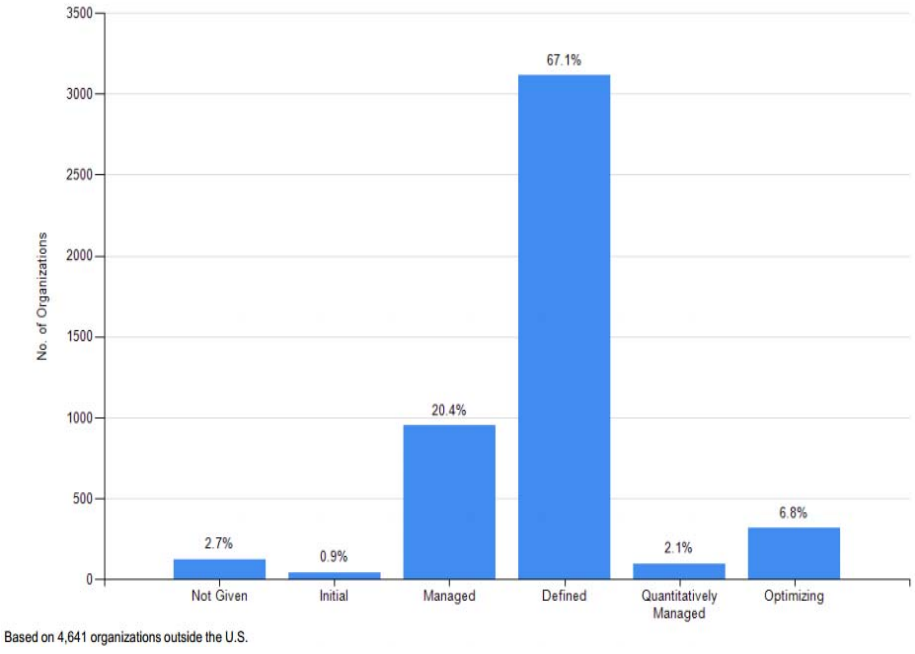
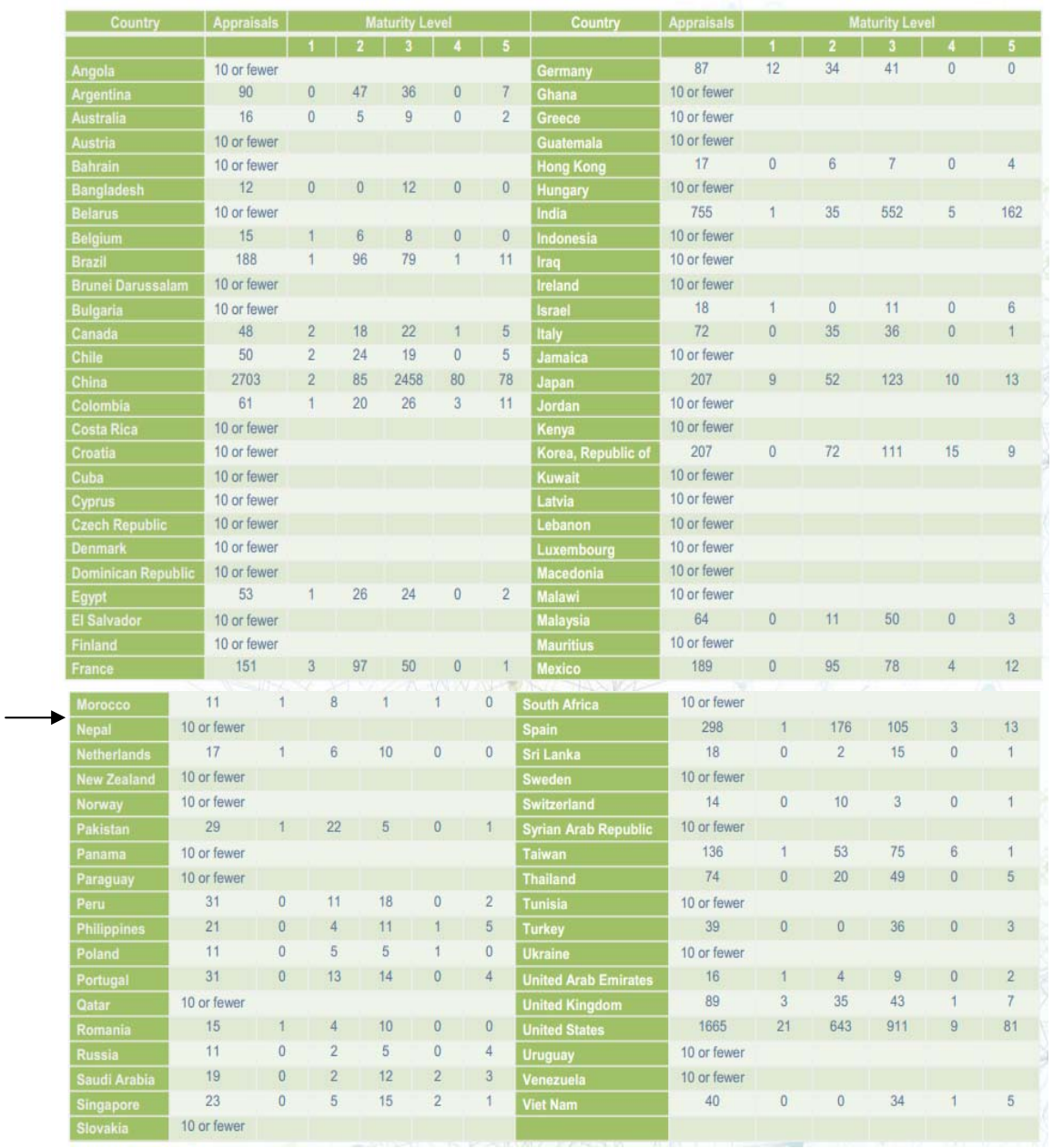


Figure 5.2: Process Maturity Profile by all responding organizations outside the U.S. *(CMMI Institute, 2013)*



Country	Appraisals	Maturity Level					Country	Appraisals	Maturity Level				
		1	2	3	4	5			1	2	3	4	5
Angola	10 or fewer						Germany	87	12	34	41	0	0
Argentina	90	0	47	36	0	7	Ghana	10 or fewer					
Australia	16	0	5	9	0	2	Greece	10 or fewer					
Austria	10 or fewer						Guatemala	10 or fewer					
Bahrain	10 or fewer						Hong Kong	17	0	6	7	0	4
Bangladesh	12	0	0	12	0	0	Hungary	10 or fewer					
Belarus	10 or fewer						India	755	1	35	552	5	162
Belgium	15	1	6	8	0	0	Indonesia	10 or fewer					
Brazil	188	1	96	79	1	11	Iraq	10 or fewer					
Brunei Darussalam	10 or fewer						Ireland	10 or fewer					
Bulgaria	10 or fewer						Israel	18	1	0	11	0	6
Canada	48	2	18	22	1	5	Italy	72	0	35	36	0	1
Chile	50	2	24	19	0	5	Jamaica	10 or fewer					
China	2703	2	85	2458	80	78	Japan	207	9	52	123	10	13
Colombia	61	1	20	26	3	11	Jordan	10 or fewer					
Costa Rica	10 or fewer						Kenya	10 or fewer					
Croatia	10 or fewer						Korea, Republic of	207	0	72	111	15	9
Cuba	10 or fewer						Kuwait	10 or fewer					
Cyprus	10 or fewer						Latvia	10 or fewer					
Czech Republic	10 or fewer						Lebanon	10 or fewer					
Denmark	10 or fewer						Luxembourg	10 or fewer					
Dominican Republic	10 or fewer						Macedonia	10 or fewer					
Egypt	53	1	26	24	0	2	Malawi	10 or fewer					
El Salvador	10 or fewer						Malaysia	64	0	11	50	0	3
Finland	10 or fewer						Mauritius	10 or fewer					
France	151	3	97	50	0	1	Mexico	189	0	95	78	4	12
Morocco	11	1	8	1	1	0	South Africa	10 or fewer					
Nepal	10 or fewer						Spain	298	1	176	105	3	13
Netherlands	17	1	6	10	0	0	Sri Lanka	18	0	2	15	0	1
New Zealand	10 or fewer						Sweden	10 or fewer					
Norway	10 or fewer						Switzerland	14	0	10	3	0	1
Pakistan	29	1	22	5	0	1	Syrian Arab Republic	10 or fewer					
Panama	10 or fewer						Taiwan	136	1	53	75	6	1
Paraguay	10 or fewer						Thailand	74	0	20	49	0	5
Peru	31	0	11	18	0	2	Tunisia	10 or fewer					
Philippines	21	0	4	11	1	5	Turkey	39	0	0	36	0	3
Poland	11	0	5	5	1	0	Ukraine	10 or fewer					
Portugal	31	0	13	14	0	4	United Arab Emirates	16	1	4	9	0	2
Qatar	10 or fewer						United Kingdom	89	3	35	43	1	7
Romania	15	1	4	10	0	0	United States	1665	21	643	911	9	81
Russia	11	0	2	5	0	4	Uruguay	10 or fewer					
Saudi Arabia	19	0	2	12	2	3	Venezuela	10 or fewer					
Singapore	23	0	5	15	2	1	Viet Nam	40	0	0	34	1	5
Slovakia	10 or fewer												

Figure 5.3: Number of appraisals and maturity levels by country. *(CMMI Institute, 2013)*

Respondents of the survey reported that the focus of BPM was to bring improvements at organizational level e.g., to make the organization process oriented, to standardize practices, and to streamline/rationalize. They also stated quality assurance as one of the main purposes of the project-s where process modeling was included.

Employee participation was not imposed by management in process modeling works, perhaps it was encouraging from the leadership and mostly team

work. Half of the respondents stated that there was a methodology (i.e. a collection of methods, techniques, and tools) for process modeling before the project started. Generally, in Norway, organizations have established practices of publishing their process models and process descriptions before the projects started.

All the respondents were engaged in some activities to develop graphical models for the processes, and the main purpose of designing models of the existing processes was to improve them, standardize practices for quality assurance perspective, and analysis for future improvements. Apart from others, commonly used process modeling techniques are *Swimlane diagrams*. Drawing tools, specially, *MS Visio* is mostly been used in Norway.

A majority of the respondents stated *activities* and *roles* as one of the main properties of the processes which were taken into account while modeling the processes. Data shows that management, representatives for the working of the process on a daily basis, process owners, resource persons from IT, and external consultants (if hired) are main participants in the efforts to develop process models. Process owners and representatives for the working of the process on a daily basis are the most important because they can influence the processes so it's important to consider them along with management. Half of the respondents stated the importance of including IT people in process modeling while realizing that they are responsible not only to do programming job.

Generally, process modeling is done in teams (minimum of 2-3 people); grey sheets, brown papers, flip cards, white boards are more convenient to draw models. Usually, on average, a process modeling session takes less than 9 days. Data shows that for the process improvement projects; validation of process models (i.e. to ensure that the model really represents the current situation) is gained through process modeling participants' personal experiences and team discussions. Methodology and participants' competence levels are reported to be important success criteria for process modeling.

Survey data suggests that *team work* is positively related to *project outcome*. Most of the respondents reported that in team work tasks are accomplished more quickly – *goal achievement*. They also stated that *team work* enhances effectiveness

of the organization – *organizational change*. And it's easy to carry out project work while working in teams – *process oriented impact*.

Employees' understanding/expertise of the process thinking, their involvement, and management willingness and ability to engage are reported as the most important challenges to process improvement. Organizational culture (e.g., management involvement), level of detail in models, and globally practiced modeling techniques and tools encourage employees and reduce resistance. Data shows that mostly process descriptions and models are reused for further analysis and design, for training of new employees, and for quality improvements.

Majority of the respondents strongly agreed that the use of process models make it possible for the project to achieve goals while completing its tasks faster than they could otherwise have done (i.e. accomplish tasks more quickly). And to bring change at organizational level – process modeling, gave the project better results than they otherwise would have received (i.e. enhanced effectiveness). To have *process oriented impact* – process modeling use in projects made it easier for them to carry out project work (i.e. make it easier to do the job).

Most of the respondents stated that organizations do not offer any direct *career opportunities* for those who adopt process modeling. Though only *career opportunities* cannot be attractive for employees but job satisfaction also counts. BPM reduces manual workflows, better control towards unplanned changes, and makes the environment for the employees to accomplish tasks more quickly and effectively; these can be considered as benefits in terms of improving job satisfaction. Perhaps, *Career opportunities* do not have considerable positive impact on *project outcome*. Possible justifications can be: (1) low content validity of the instrument, or (2) *process modeling* can certainly be used effectively by organizations with or without offering *career opportunities* to the employees, or (3) most organizations have already offered the maximum opportunities within each project (or within the organization) from past process change projects, resulting in no further career opportunities in the organization.

Employees' satisfaction is an appealing hidden benefit from process improvement. Employees' positive experience seldom results in business cases for further investments in new process improvement initiatives. Though, turning manual workflows into automated processes makes it simpler and easier for employees to work efficiently while decreasing the need for ad-hoc involvement. These are clear benefits not only in terms of enhancing productivity but also in terms of improving employees' job satisfaction. Organizations should value ease of use of new improved systems and withholding valuable employees.

One third of the respondent organizations in Norway are using contracted resources in efforts to model processes. Results show that our proposed variable *outsourcing* is positively related to *project outcome*. Half of the respondents either strongly agreed or agreed that use of consultancy resources helps to accomplish tasks more quickly – *goal achievement*, more than half reported that it helps in enhancing effectiveness of the organization – *organizational change*, and again more than half stated that because of the use of consultancy resources it's easy to carry out project work – *process oriented impact*.

Based on our qualitative survey data while using **grounded theory approach**, we may develop a theory that in the *a priori PMP Model, outsourcing/consulting* and *team work* are positively related to *project outcome*. But the third proposed dimension of *modeling process* i.e. *career opportunities* for employees does not have any positive impact on *project outcome*.

Based on the interviewees' perceptions and experiences, we can propose a hypothesis that management willingness is very much important to have higher process maturity in the organization. In our future research, this hypothesis could be a base for theory development. Survey data showed that there seemed to be a positive relationship between process maturity and management willingness to take initiatives for performance improvement. 13 respondents stated that management willingness and ability to engage in BPM for process improvement is very important; figure 4.31. We made a graph to find out the prevailing process maturity levels in those projects where there was management support against those where there was either no or less management support; figure 5.4. The only organizations or cases where we identify the documented processes they all have management

support. And the organizations with poor management support have no or limited documentation.

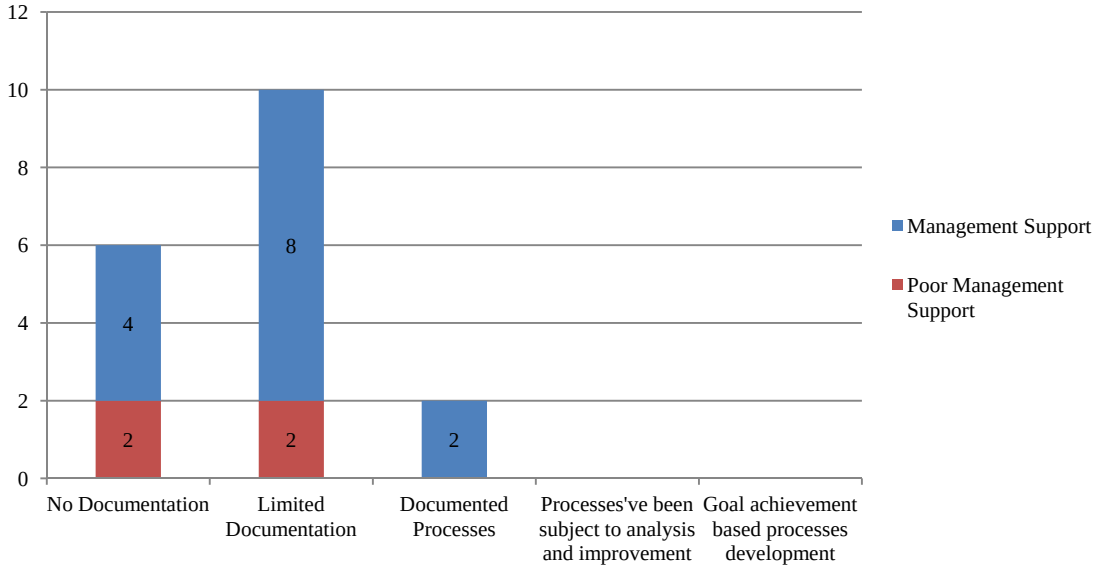


Figure 5.4: Relationship between Management Support and Process Maturity Level

The benefits of process modeling differ from project to project, depending not only on the organization's goals and objectives but also on its level of process maturity. All of the respondents reported a positive impact of *process modeling* on an organization's effectiveness with respect to automation. The whole data collection process and analysis gives us the opportunity to state another hypothesis that the organization's ability to deliver high performance can be achieved by ensuring a higher process maturity level. It seems to us that the higher performance delivery is a long term process which can gradually be achieved through higher process maturity.

Almost all of the respondents who had introduced BPM initiatives, or worked in those projects where BPM was used, reported that BPM has a positive impact on organization's effectiveness with respect to automation. The data highlighted some barriers or perceived downsides of BPM which must be overcome in order to achieve a successful implementation of BPM, particularly: (1) diverse organizational working culture, (2) fragmented budget, (3) perception of BPM as an IT people job, (4) resistance of BPM form those who are using existing system, (5)

lack of willingness both from management and employees to handle the system change coupled with BPM implementations, (6) risk of over analysis, (7) implementation cost and (8) time consumption.

In order to overcome these barriers, management support and a clear vision towards new improved processes are needed. Organizations should also be interested to change their old practices in order to welcome changes. BPM also needs to address diverse organizational working cultures. To overcome this barrier, management willingness at the organizational level is necessary. It is important for management to spotlight future business outcomes because of BPM rather than being hindered by the existing tools and technologies. From the data, it seems that, for the long term success, management involvement and support at a strategic level is crucial.

Process improvements need to be achieved by a mutual team work of both IT and business representatives. Business representatives should focus on making process designs, identifying effects and outcomes; and IT people are needed to provide the infrastructure, systems, and integration skills. BPM provides the common platform for both business and IT people to work collaboratively and to make those decisions together. It also removes the communication barriers that conventional tools and methods are inclined to build up.

In addition to the differences in *modeling process* dimensions, *PMP model* and *PM-Success model (Bandara et al. 2006)* confirms the importance of management willingness and support. Our dependent variable in the *PMP model*, i.e. *project outcome* resembles the *PM-Success model's success measure*s *(Bandara et al. 2006)*. The *PM-Success model (Bandara et al. 2006)* addresses differently the *modeling methodology*, *modeling language* and *modeling tools*. However, current study and the last study *(Eikebrokk et al. 2008)* did not address such detailed dimensions of *model process* having an impact on *project outcome*.

We can confirm the **reliability** of the research and conduct it again under certain conditions (e.g., with no long time span involved and no intervention of some uncontrollable events) and averaging the results would give nearly the similar outcomes.

As mentioned earlier that our research data showed that there is positive relationship among the two dimensions *(i.e. outsourcing/consultancy and team work)* of *process modeling*, the independent variables, and the *project outcome*, the dependent variable. And the third dimension *(i.e. career opportunities)*, independent variable, does not have any positive impact on *project outcome*. By using the word relationship, we meant that the independent variable *(process modeling)* leads to a change in the dependent variable *(project outcome)*. The idea that *process modeling* changes *project outcome* is important because **internal validity** is about being able to justify that *process modeling* actually changed *project outcome*. We highlight the word actually because there are many different reasons that can make it difficult to know whether these three dimensions of *process modeling* changes *project outcome*. Based on our data, it seems that these dimensions (in our case *outsourcing/consultancy* and *team work*) changes *project outcome*. But we cannot say with certainty that our respondents actually support this. This reflects the fact that there are some threats to internal validity that can undermine our results *(Trochim, 2006)*. Possible threats could be: our sample size was small and secondly the respondents differ along wide range of factors like age, gender, specially experience and skills. This could be overcome in future to make different groups and respondents are assigned randomly. Third threat to interval validity could be maturation, which means that a natural process (could be good or bad experiences in a project) that leads the respondents to change their opinion *(Trochim, 2006)*.

We have ensured **content validity** by comprehensive review of available literature *[please go to section 2]*. As mentioned in section 2.3, theories describing process modeling practices in Norwegian (Scandinavian, in general) context are scarce; there is a risk that key aspects are not adequately represented in the current literature. We used the *conventional qualitative content analysis (Hsieh and Shannon, 2005)*, in which categories are derived from the raw data. And this is the approach used for grounded theory development *(Zhang and Wildemuth, 2009)*.

To analyze the *process modeling* and project purposes, we considered *project outcome* with its dimensions: *goal achievement*, *organizational impact*, *process oriented impact* and *process modeling learning (Eikebrokk et al., 2008)*.

We analyzed the data and made categories according to *project outcome* dimensions. For the *goal achievement*, we analyzed purposes of both project and of designing graphical models with respect to likelihood of the project to complete its tasks faster than would otherwise have done (i.e. *accomplished tasks more quickly*). For the next dimension of *organizational change*, we looked at the data to find out, whether the organization has enhanced its *effectiveness*. For *process oriented impact* on the organization; we analyzed that, because of project, whether *process modeling* made it *easier to carry out project work* which then leads to better description and standardization of processes for the next projects. To capture the fourth dimension of *project outcome* (i.e. *process modeling learning / process use*), data showed that process models were used for *quality assurance*, *training*, and for *further analysis and design*.

As all the respondents were form Norway. To address **external validity** of the study we considered two questions: is really Norway that typical and can our findings be relevant for other Scandinavian countries? Previous studies about Norwegian organizations have shown that there is, for example, a tendency to middle up or bottom up initiatives compared to, for example, Anglo-Saxon traditions which seems to be more top down initiatives *(Eikebrokk et al., 2008)*. Usually, in qualitative studies, we cannot generalize much *(Bryman, 2008)*. Based on the assumption that our sample of 18 organizations is a fair or representative sample; we can argue that to some extent it is typical of Norway. In many aspects Norway is very similar to Sweden and Denmark *(Scandinavian Tourist Boards, 2014*; *Nordic Council, 2014*; and *NORDREGIO, 2014)*; therefore the findings from this study could be relevant for Scandinavian countries as well.

6. Limitations and Future Research Directions

This study has some methodological limitations. Sample size was small, the sampling techniques were *snowballing* and *purposive*; and the response rate was low. Though many organizations were contacted, we did not get as many responses as we were expecting. Time and budget could play a big role in the future to get more respondents.

What's the consequence of the way that we have selected organizations? Is it mainly the interested organizations or probably the sample which has at least one very interested person? Is it true that all Norwegian companies have at least one interested person? Probably not. Respondents form private organizations were more interested to participate in this research. Unfortunately, we could not find more respondents due to time and availability of the respondents.

We suggested three dimensions of *modeling process (i.e. outsourcing/consulting, team work and career opportunities)* with the mindset that all three are important and have notable impact on *project outcome*. But data showed that *career opportunities* do not have any positive impact on *project outcome*. In this study, we limit the *career opportunities* in terms of salary. In future studies, bonuses and job designation could be considered as *career opportunities* to observe any change in our findings.

We faced some limitations to claim the generalizability of our research. First, usually it's perceived among people, that in most of the cases Norway is similar to Sweden and Denmark but can we claim this for our research area as well. Further studies could be conducted with the responding organization from these countries as well. Secondly, we assumed that sample of 18 organizations is large enough to represent Norway. Third, it is quite hard to sample across all times to generalize to, for example, next year.

Given that we have small sampling size, it could reasonably be argued that some information about our research in Norwegian context is a lot better than none

at all, provided the limitations of our findings in terms of their generalizability is valued. And of course, in future, this study can be conducted with large sample size at different times to be sure to claim its generalizability.

Our analysis shows that the outcome of model-based process-change projects is explained by a combination of social (i.e. *team work*) and organizational (i.e. *Management support*) factors. However, this study cannot exclude the importance of other not addressed dimensions of *modeling process*. For example, further studies should investigate the effects of *resources* on *project outcome*, i.e., whether sufficient budget, human resources and time were available throughout the project work.

The survey instrument needs to be further validated and refined with data from other perspectives as well. The scope and quality of the measurements for our research dimensions need to be improved in further research work. In the future with large sample size, correlation analysis may possibly be used and supplemented by second generation statistical analysis, using Structural Equation Modeling (SEM).

Further studies are needed to improve external validity. The Norwegian market is growing, which offers more opportunities for non-Norwegians to come and work here; and also Norwegian organizations have to collaborate with other organizations outside of Norway. The problem arises, how to resolve the working cultural differences. So, cross cultural aspects of process development and process modeling will become gradually more important in the Norwegian economy, for example, when coordinated process change is required within some international organizations which combine a management driven, top down approach in some national sub-offices with a more bottom up or middle up approach somewhere else.

The significance of *employee participation* could not be validated in the study by *Eikebrokk et al. (2008*). We considered somehow similar dimensions called *teamwork*, *outsourcing*, and *career opportunities.* Our data showed that *teamwork* and *outsourcing* are positively related with *project outcome* but the importance of *career opportunities* could not be validated with respect to *project outcome*.

We mentioned earlier that (in chapter 5), we may argue that we developed a theory, that in the *a priori PMP Model*, *outsourcing/consultancy* and *team work* are positively related to *project outcome* but not the *career opportunities*. We also proposed two hypotheses that management willingness is important to have higher process maturity in the organizations. And second hypothesis is that the organization's ability to deliver high performance (in a long run) can gradually be achieved by ensuring a higher process maturity level. In future research, we can confirm the theory with large sample size and by using statistical analysis. Our suggested hypothesis could be tested in future to develop a theory.

Further studies should seek to increase content validity of *process modeling* variable in the *PMP model* by including more dimensions, for example, (1) *Return on Investment (ROI)*, (2) *customer self-service*, (3) *service delivery*, (4) *risk management* – beneficial impact on project outcome, (5) *cost efficiency*, (5) *available resources* – represent both manpower and time and (6) *quality* – defined as how ambitious are the modelers about their models.. Further studies may also seek to increase research instrument reliability and validity by considering some of the *PM-Success Model*'s *success measures* (*Bandara et al. 2006*).

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Appendix – I: Questionnaire

Research on Business Process Modeling Practices in Norway

Study of Norway based companies and projects

Version for interview

Purpose of the research project:

- Little availability of formal knowledge of the practices that exist about the processes, methods, techniques, tools for analysis, design, and management of processes in Norway.
- For the master thesis in the area of Business Process thinking and Modeling at UiB. Theme of the project includes the following:
    1. To increase the understanding of how businesses in Norway are working with their processes.
    2. Seek to clarify the practices used in process-oriented organizations and projects in Norway
    3. What methods, techniques and tools used to model processes?
    4. To identify needs and success criteria for methods, techniques and tools for process development and modeling.
    5. What are the challenges for process development and process modeling?

Part – 1: Background Questions

A. Personal Information

Some initial questions about you and about the business.

1. Gender

Male	Female

2. Age

Under 30	30 - 50	Over 50

3. What is your position in the company?

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4. What has been your role in the current or in the last project and in the process modeling work?

---

5. Professional affiliation/background?

Industry professional	IT	Organization/CEO/Staff	Other

6. How long have you been working on documenting and improving processes?

---

7. What has been your main source of knowledge of process thinking and process modeling?

Self-study / Practical experience	Training	University/college degree

B. Operations

8. What type of business is this?

Private	Public

9. What industry is in this business?

Manufacturing	Retail	Trade	Services	Banking/Finance Insurance	IT	Other
Other:						

10. How many employees are there in the unit that the project is completed?

---

11. What level of maturity will say that business was on before the project started with the following scale?

1. The processes are not named or documented	
2. Processes are documented but practice varied (limited documentation)	
3. The processes are documented and practices are standardized (following the documentation)	
4. The processes have been subject to analysis and improvement	
5. The processes have goals, goal achievement is monitored and processes are developed on the basis of goal achievement	
6. Others *(please specify)*	

C. Initiatives / Project

12. What is/was the main purpose of the project where the process modeling is/was included?

"A lot of purpose", "Better control.", "What is being done.", "Get the list.", "No external pressure."

Resolve business challenge	ICT project		Organizational			Quality assurance	Other
	Development	Introduction of standard system	Process-oriented business	Standardize practices	Streamline / rationalize	Introduce or process orientation	

13. Has there been a goal that employees should participate in the modeling work?

No	Yes

14. Did the business have a methodology (collection of methods, techniques, tools) for process modeling before this project started? Which?

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15. Have you used contracted resources in efforts to model processes? For what (role)?

No	Yes
To what?	

16. Did the business had an established practice of publishing (books/intranet) of their process models and process descriptions before this project started?

No	Yes

Part – 2: Modeling of the process – purpose, techniques, and tools

Explanation: here we are interested whether the organization has designed graphical models of the process (es), what was the purpose of creating models, and the techniques and tools used in the preparation.

17. Have you developed graphical models of the process (es)?

No	Yes

18. What has been the purpose of designing graphical models?

To understand the current situation in business	
Document the process and standardize practices (QA perspective)	
Analysis for future improvement	
Designing a new improved process	
Requirements specification for ICT solution	
Other (please specify)	

19. Which technique (s) used to model processes?

Value Chain	Flowcharts – Informal (not defined notations)	Flowcharts – Formal (defined notations)	Flowcharts – Swimlane diagrams	IDEF0/3	UML (activity diagram, sequence diagram, use case)	RAD	Action Workflow	Wall Graph	EPC / ARIS	Other (BPMN)

20. Which tool was used to model processes?

Others – MS PowerPoint, Excel, Word	Drawing Tools – MS Visio, Corel Draw etc.	Modeling Tools – Business Analysis, ARIS, System Architect etc.	Workflow System – Staffware, FileNet etc.

Part – 3: Modeling of the process – implementation

Explanation: Here we are interested in knowing how the work of preparing models and process descriptions have been completed and who has participated?

21. Which properties of the processes were modeled? (Any copy of the model and any process description).

---

22. Who participated in the effort to develop process models? (List below is a checklist)

Management	Representatives for the working of the process on a daily basis	Process owner	Resource persons from the IT side	External parties	External consultant	Other

23. Are the models designed through group work or interviews (one person modeled after the information is obtained from various informants separately)?

Group work	Interviews / individual

By group:

How much time set aside and used in a modeling session?	Who participated (roles in project / business)?	What resources are used (whiteboard, flipchart, computer with projectors)?	Used a clear division of roles (facilitator, model, informants)?

24. Were there any measures to validate the process models, i.e. to ensure that the model really represents the current situation?

No	Yes

25. What is perceived as success criteria for process modeling?

Techniques	Tools	Method (implementation and management of the work)	The competence of the participants	Other

26. Does the company offer any career opportunities for those who adopt process modeling?

No	Yes

Part – 4: Challenges

Explanation: Here we are interested in knowing what you experienced as the most important challenges of the project related to the work of processes (in general).

27. What you experienced as the most important challenges to the work process (select the three most important)?

1. Management's willingness and ability to engage	
2. Involvement of employees	
3. The employee's understanding / expertise of process thinking	
4. Technical resources and expertise to translate process design for necessary IT support	
5. Suitability of modeling techniques	
6. Suitability of modeling tools	
7. Project	
8. Other (please specify)	

Part – 5: Re-use

Explanation: Here we are interested in knowing how the process descriptions and models are used and managed after they were made and used the first time (their original conditions).

28. How to use Process models now after they have been prepared and used for its primary purpose?

Not used	Included in local documentation for further analysis and design	Part of a quality	Training of new employees

Part – 6: Perceived usefulness

Explanation: Some questions about how useful process modeling has been for the project.

29. Use of process models made it possible for the project to complete its tasks faster than you would otherwise have done (i.e. accomplish tasks more quickly)

Totally Agree	Partly Agree	Neither Agree nor Disagree	Partly Disagree	Strongly Disagree

30. Use of process models gave the project a better result than we otherwise would have received (i.e. enhanced effectiveness)

Totally Agree	Partly Agree	Neither Agree nor Disagree	Partly Disagree	Strongly Disagree

31. Use of process models made it easier for you to carry out project work (i.e. make it easier to do the job)

Totally Agree	Partly Agree	Neither Agree nor Disagree	Partly Disagree	Strongly Disagree

32. Is there any downside of process modeling?

Risk of over analysis	Time consuming	Costly	Other