Towards Process-driven Decision-making

Comparing viewpoints of 15 project managers within a civil engineering company.

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Abstract

Change in the decision-making style helps to deal with the dynamics in the construction industry. The aim of this thesis is to identify the drivers and barriers to achieve a process-driven decision-making style in the project management context. A single case study is conducted for a consultancy and engineering firm in which 15 project managers have been interviewed. The change management theory of Kotter (1995) has been used to analyse the transformation into a process-driven organization. This study shows that the transformation is difficult, which is mainly caused by three main barriers: (1) the lack of sense of urgency, as project managers do not consider a technical-driven approach as a problem, (2) a lack of a shared vision regarding process-driven decision-making and (3) the allowance that obstacles still exist, as project managers adapt their decision-making style to the client, contract type, and project organization. Further, the results show that the distinction between technical- and process-driven project managers has to be considered neither fully process-driven nor fully technical-driven, as project managers can apply different approaches to their projects.

Keywords– Process-driven, technical-driven, decision-making, dynamics, change management

1 Introduction

The construction industry is dealing with a high amount of uncertainties (Azari et al., 2011; Mulholland and Christian, 1999). Uncertainties, together with interdependencies, are seen as the main cause of project complexity, which is an explanation to the budget and time overruns in the construction industry (Dubois and Gadde, 2002; Wood and Ashton, 2009; Baccarini, 1996). Uncertainties are one of the sources that generate dynamics in a construction project (Love et al., 2002).

Despite the fact that scholars claim that project management is a static phenomenon, the dynamic nature of project management has been recognized in literature (Söderlund, 2011). Project managers face difficulties in dealing with dynamics (Fewings and Henjewele, 2019; Winch, 2009). To cope more efficiently with these dynamics, the construction industry has been compared with other industries such as the manufacturing industry (Gann, 1996; Cooper et al., 1998). These comparisons have been questioned by Winch (2003) and Markard (2011). Principles, that improve the ability to deal with dynamics include adopting a whole project view, having an adaptable planning, communicating clearly, being in control continuously, and improving learning through projects (Kagioglou et al., 2000; Love et al., 2002; Collyer and Warren, 2009). As Fewings and Henjewele (2019) and Winch (2009) address that project managers experience difficulties in dealing with dynamics, this research will focus on the practical implementation of these principles, as existing literature does not address this. The true nature of the project manager emerges as we zoom in on the decision-making of the project manager. As the success or failure of any organization depends on decision-making, this is probably the most important function of the manager (Ali, 1989). A more process-driven decision-making style helps to deal with dynamics (Kagioglou et al., 2000; Love et al., 2002; Collyer and Warren, 2009). Therefore, the goal of this research is to identify drivers and barriers to achieve a process-driven decision-making style in the project management context.

To achieve the goal of this study, a Dutch consultancy and engineering firm serves as the case of a single case study in which 15 project managers have been interviewed. The company, which provides services in the fields of water, infrastructure, environment and construction all over the world, prefers a so-called 'process-driven approach' over a 'technical-driven approach'. They experience the opposite as project managers make decisions in their projects largely based on the (technical) content of a project instead of focusing on the process. The main difference

between these two approaches is how the project manager deals with dynamics. The process-driven approach is more in line with the mentioned principles and considers the project environment to be dynamic. In contrast, the technical-driven approach assumes a more static environment, as the focus is primarily on the output rather than the whole project. When it comes to awareness of the scope, the difference between these two approaches is clearly visible to the company. With a process-driven approach, the project manager is aware of the scope at any point in the project, for example when extra work activities are executed. With the technical-driven approach, the project manager will realize that extra work is done at a later moment, which makes the discussion with the client about who is going to pay for these activities more difficult. To better deal with dynamics, the company wants to see a transformation towards a process-driven organization, where project managers make decisions based on a process-driven approach. The research aims to contribute to this transformation as a first step.

It is worth recognizing that it has not been demonstrated that the process-driven approach is actually better overall for the organization. The organization is struggling with how to position itself in the market, as other engineering and consultancy firms have developed their process-related capabilities over the last 25 years. Are they adapting to the current market or do they stay with their current technical-driven approach which brought them also successes? This issue is important for this research and will return, but the answer to this question is beyond the scope of the research.

This research will focus on the practical implementation of the principles to deal with dynamics, as a research gap exists on this topic. As the company wants to transform into a process-driven organization, literature on change management has been used as theoretical framework. Explanations about why the transformation effort towards a process-driven organization fails or succeeds, could be given by using the change management model of Kotter (1995).

To reach the goal of this research, the following research question should be answered: What are the drivers and barriers to achieve a process-driven decision-making style in the project management context?

Section 2 contains the theoretical framework. In section 3 the methodology of this research is provided. Section 4 describes the results and these findings will be compared with the existing literature in section 5. Thereafter, section 6 contains the conclusion. The limitations of this research and suggestions for future research are discussed in section 7.

2 Theoretical Framework

In this section, ideas about a process-driven organization are compared with existing literature. A theoretical framework is drawn up to gain insight into the concepts included in the research question. Section 2.1 discusses principles on how to deal with dynamics. These principles correspond most to process-driven decision-making as discussed in the company. In section 2.2, literature about change management and the model of Kotter (1995) is included.

2.1 Process-driven Decision-Making

Literature has introduced different views on project management over the years. The majority of publications have a static orientation (Söderlund, 2011), which is criticised for its shortcomings in practice (Koskela and Howell, 2002). A static approach would not be sufficient to cope with a dynamic environment like the construction industry has (Fewings and Henjewele, 2019). In literature, there have been a number of literature reviews on how to categorize dynamics (Demirel et al., 2017). Love et al. (2002) divided the sources of these dynamics into attended and unattended changes. Unattended changes can be subdivided into internal and external uncertainties. Dealing with these uncertainties is what project managers experience as difficult (Winch, 2009). Winch defines uncertainty as the lack of all the information required to make a decision at a given time.

In this framework, three different scholars have been reviewed to analyse how process-driven decision-making, discussed in the company, can be placed in literature. These three scholars were chosen as they adopted various approaches to better deal with dynamics and are covered in existing literature (300+ citations in Google Scholar). In the same way, as there is not one explicit theory of project management (Koskela and Howell, 2002), there is also no consensus about what is the best way to deal with dynamics.

First, Kagioglou et al. (2000) had a look at issues and deficiencies in the construction industry and provided possible solutions, which were based on manufacturing practices. Secondly, Love et al. (2002) used the theory of systems dynamics to better understand and deal with changes in construction projects. This theory assumes a subsystem, where project management can be considered as the planning, organising, controlling and coordination of project activities as a bridge between input and output. Finally, Collyer and Warren (2009) did not focus on construction projects, as they introduced project management approaches to deal with dynamics, in general. One of the observed consequences of dynamics that affect decision-making is that "decision-making had to be conducted more rapidly than the emergence of new changes" (p. 357), which is almost impossible. The following five characteristics were mentioned in the papers (see Table 1) and reflected the process-driven organization as discussed with the company:

Whole project view – In a dynamic environment, a more adaptive project management style is preferred, considering the project as a whole from beginning to end. The project is often only associated with the actual construction works, the product (Kagioglou

et al., 2000). For the company, which is a consultancy firm, this product is often the (technical) content, such as a design or calculation. Taking into account the whole lifecycle of a project is not only about focusing on products, but also on other aspects of the project, such as the client's objectives, and interests of the company (Collyer and Warren, 2009).

Planning – All three scholars were clear about this: in a dynamic environment, it is not possible to set up a project plan in the beginning and use this during the whole project, which can be seen as a static approach. This corresponds to the 'Generic Design and Construction Protocol' developed by (Cooper, 1994), which means that the executed work is reviewed at the end of each phase, and a plan is made about how the next phase can be executed to ensure progress.

Communication – The internal and external environments of construction projects are dynamic and relatively unstable (Love et al., 2002). Therefore it is not only communication with your client and external stakeholders, but also the communication in your team which is important for dealing with dynamics. Collyer and Warren (2009) address that more open and less formal communication would help you with this. Kagioglou et al. (2000) refer to this as stakeholder involvement and teamwork.

Control – To see if it is needed to adapt your project plan, not only good communication is needed, but it is also crucial for a project manager to check if you deviate from the plan (Love et al., 2002). 'Are we doing, what we had planned to do?' is a question that a project manager should continuously ask himself, which is associated with 'being in control'. Collyer and Warren (2009) address that there are different ways to control, as you can focus on input, process, or output. Focusing only on output would conflict with the 'whole project view', discussed earlier on.

Feedback – Kagioglou et al. (2000) acknowledge the importance of learning from projects. Both success and failure can offer important lessons for the future. Insufficient learning between projects would be associated with a technical-driven approach, which has been addressed in the company.

	Kagioglou et al. (2000)	Love et al. (2002)	Collyer & Warren (2009)
Whole project view	X		X
Planning	X	X	X
Communication	X	X	X
Control		X	X
Feedback	X		

Table 1: Principles to deal with dynamics.

The characteristics mentioned in these three papers correspond largely to the process-driven decision-making as discussed in the company. However, there were also mentioned characteristics which were not in line with this preferred decision-making. One of them is mentioned by Love et al. (2002), who addressed that to deal with the challenges of a dynamic environment, it could be made more static by resisting change. To what extent process-driven decision-making would improve dealing with dynamics is challenging to assess. De Meyer et al. (2002) indicated that handling uncertainties is still one of the most challenging parts of project management: "using decision milestones to anticipate outcomes still ends with budget and schedule overruns". Taking into account the advantages of the process-driven driven approach in combination with the dynamic environment, a process-driven approach is studied. The comparison with a more static approach is left out of the scope.

2.2 Change Management

As the company would like to see a transformation towards a process-driven organization, successful management of change is crucial (Gill, 2002). In general, management of change is needed for every organization in order to survive and succeed in a highly competitive and continuously evolving business environment (By, 2005). Organizations still experience difficulties with implementing change for years which is often expressed in numbers (Sirkin et al., 2005). However, it is not scientifically valid to express this failure rate in percentages (Hughes, 2011). One of the few literature reviews on change management discovered "a wide range of contradictory and confusing theories and approaches" (By, 2005, p. 370). In addition, he observed that most of these theories and approaches are not scientifically substantiated (By, 2005; Ten Have et al., 2016).

Lewin et al. (1946), who is seen as the founding father of change management, proposed a three-step model for a successful organizational change (Cummings et al., 2016). First, resistance should be removed (unfreeze), whereafter there can be sought for early wins and build momentum (move). As this is done, the change has to become a behavioural norm in your team (refreeze). This model of Lewin et al. (1946) has served as the basis for several theories in change management literature, including Kotter (1996), who elaborated this framework in more detail as he set up an 8-step model (Cummings et al., 2016; Adin, 2021). This became a classical change management model, that has gained immense popularity as his book *Leading Change* is a worldwide bestseller (Hughes, 2016). Interesting to note: for the first instance, Kotter (1996) emphasized the importance of following the 8 steps in a linear manner (see Table 2). Later, Kotter admitted that steps can overlap and activation of steps can happen simultaneously, as he observed in practice (Adin, 2021).

However, as change management theories have been criticized, there has also been discussion about the scientific validity of Kotter's (1996) model. His model is based on personal business experience and did not refer to any other scientific sources (Appelbaum et al., 2012), which he openly acknowledged (Hughes, 2016). Therefore it is striking that his work has also framed academic debate with over 5500 academic citations (Hughes, 2016). The lack of scientific research about change management could declare this (By, 2005).

1	Establish a sense of urgency.
2	Create a guiding coalition.
3	Develop a vision and strategy.
4	Communicate the change vision.
5	Empower broad-based action.
6	Generate short-term wins.
7	Consolidate gains and produce more change.
8	Anchor new approaches in the corporate culture.

Table 2: 8 steps of Kotter (1995).

The question that remains is: is it possible to use the framework of Kotter for this research? Appelbaum et al. (2012, p.764) who reviewed the 8 steps of Kotter (1996) in literature, "found support for most of the steps, although no formal studies were found covering the entire spectrum and structure of the model". As it is not scientifically proven that all 8 steps have to be completed for a successful organizational change, there will be made a distinction between the two works of Kotter. The model that is explained in the book published in 1996, is based on pitfalls experienced by Kotter (1995), which he published in the *Harvard Business Review*. These errors act as explanations for why transformation to a process-driven organization succeeds or fails. From now on, these will be referred to as the 8 factors of Kotter (1995), which are the following:

(1) Not establishing a great enough sense of urgency – If the critical mass in the organization does not experience the same urgency, the momentum for change will not get underway. People in the organization should have the feeling that a change is needed. A rule of thumb is that 75% of these people should be convinced to change.

(2) Not creating a powerful enough guiding coalition – A strong, steering coalition with the right composition, sufficient confidence and a common goal is able to successfully complete the transformation. Characteristics that a guiding coalition should possess are position power, expertise, credibility and leadership. This means that people higher in the organization also need to enounce the need for change, but only good management is not enough, as you also need leadership (Gill, 2002).

(3) Lacking a vision – An often made mistake is the lack of a clear picture of the future that is relatively easy to communicate. Rule of thumb: it should be possible to get a reaction that signifies understanding and interest in 5 minutes. The vision is intended to provide clarity, motivation and coordination. When there is too much discussion about subjects in the vision, it is difficult to successfully change.

(4) Undercommunicating the vision by a factor of ten – "In more successful transformation efforts, executives use all existing communication channels to broadcast the vision" (Kotter, 1995, p. 64). Conflicting behaviour of top management and employees that act as an example in the organization are considered as possible causes.

(5) Not removing obstacles to the new vision – People in the organization should be able to change, and therefore obstacles should be removed. In the beginning, it is important to focus especially on the larger obstacles as these hinder the transformation. Obstacles can be divided into four categories: structures, skills, systems and supervisors.

(6) Not systematically planning for and creating short-term wins – Short-term goals to meet and celebrate, help in keeping momentum. These are called 'quick wins'. People should get the feeling that their changed behaviour results in better outcomes. This link between results and transformation should be visible to the project manager.

(7) Declaring victory too soon – A situation where people think they are already there after the first results are visible is a crucial error in the transformation process. An explaining factor is the extent to which the environment is competitive. As a consequence organizations focus on faster, cheaper and client-focused delivery, which is at the expense of the transformation.

(8) Not anchoring changes in the corporation's culture – This factor corresponds to the refreezing step of Lewis (1947) and is often made after the transformation is almost done. Kotter (1995, p. 67) addresses this as "until new behaviours are rooted in social norms and shared values, they are subject to degradation as soon as the pressure for change is removed".

3 Methodology

To identify drivers and barriers to the transformation towards a process-driven organization, the case study method is applied. A case study is a research approach that is used to generate an in-depth, multi-faceted understanding of a complex issue in its real-life context (Crowe et al., 2011; Cousin, 2005). In this research, the complex issue is the decision-making of a project manager facing a setback in one of his or her projects. The project managers are employed by a consultancy and engineering firm with an annual turnover of around 160 million euros. They are placed in four departments in which they tackle the major civil engineering challenges that the world is facing today: infrastructure, coast and rivers, building environment and energy.

In this section, the methods for data collection and data analysis will be explained. Afterwards, the internal and external validation of the data will be discussed.

3.1 Data Collection

Semi-structured interviews will be the primary data collection method of this research. Interviews can be designed to ascertain subjective responses from persons regarding a particular situation they have experienced with rich, contextual descriptions, and are suitable

when subjective knowledge is lacking (McIntosh and Morse, 2015; Byrne, 2001). After the main data is gathered, a focus group is used to validate the results in the company and discuss the practical application of this research. In literature, there is some discussion about the level of detail of the data gathered by focus groups compared to one-to-one interviews (Guest et al., 2017). One of the benefits is that a wider range of views and ideas could be captured (Kitzinger, 1994).

Due to the multiple definitions of 'process' that are used in the company, the interview is structured by using cards. This makes it easier to analyse afterwards (Rowley et al., 2012). In this research, the main function of using cards is to explore the relative importance of the components and the relationship between them in the decision-making process. Kitzinger (1994, p. 107), who focused on using cards in focus groups, mentioned that "the final layout of the cards is not important – it is the process of getting there which is revealing". Brown (1980), conversely, acknowledged that interesting data can be found on how the cards were sorted. He developed the so-called 'Q-methodology'. This is a method that can be used for studying subjectivity. The interviewees are asked to rank a number of statements in the Q-sort, which is the main tool in Q-methodology. A subset of questions will be provided and is called the 'Q-sample'. The sorting of these questions has a quantitative character, but important to note is that results are "not to be found solely in this ranking, but as well (even more important) in the reflections of the individual as he or she sorts the actions in the context of a singular situation" according to Brown (1993, p. 101).

The methodology of this research consists of a quantitative and a qualitative part, and thus largely corresponds to the Q-methodology of Brown (1980). The main data will be collected from the qualitative part, as these will reflect the drivers and barriers to process-driven decision-making. However, the quantitative part will not be fully neglected as patterns and explanations can be found here. The methodology differs from the Q-methodology in the number of statements (Q-sample). Brown (2008) advised selecting a sample size of 30-60 statements, but a lower number was chosen as this was not realistic in a 1-hour interview because the interview is divided into three sections. These sections represent the variety of tasks of a project manager. Because it is not known if project managers have different views about the process-driven approach during a setback in a project, the following three situations were distinguished:

1. The project manager faces the setback. He or she is behind the computer desk.
2. The project manager has to go to the team.
3. The project manager has to go to the client.

The cards that are asked to be sorted are questions that are related to the process-driven and technical-driven approaches that are discussed in Section 2.1 and have been drawn up after the definitions were determined. For each situation, the respondent was asked to sort 8 cards in the order that would come first in their mind. Five test interviews have taken place to see if this amount of cards was appropriate and that cards were understandable for the interviewee. After these test interviews, it was decided to provide more context on the project case, as there were too many questions from the respondents. The interviewee has been asked to project his or her experiences as a project manager on the provided context. The cards and context can be found in Appendix 1. Cards were presented in random order. The following fill-in form was used:

Comes into your head first	Question	+2
Question	Question	+1
Question	Question	0
Question	Question	-1
Comes into your head last	Question	-2

Figure 1: Ranking sheet of this research.

The interview has been conducted with 15 project managers of the company. For the Q-methodology a sample size of between 12-40 people is appropriate (Webler et al., 2009). For qualitative studies, there is no magic number as the prevailing concept for the sample size is 'saturation' (Malterud et al., 2016; Baker and Edwards, 2012). The participants were purposively sampled (i.e. they are not randomly selected) and were selected from a representative list of project managers, which was provided by the company. In this list, three categories were set up between people who followed the Masterclass (Cat. 1), who would be potential participants for the Masterclass (Cat. 3) and the technical foreman who is not eligible for the Masterclass (Cat. 2). For the company, it would be interesting to see if there are differences between people who followed the masterclass or not. In addition, the researcher also looked at individual demographic characteristics that might play a role in the applied decision-making style. An overview of the respondents is provided in Table 3. It is noteworthy that all participants have been working for at least 9 years at the company. This was already visible on the list and was explained by the fact that people with no working experience in the company are not labelled as project managers.

The intention was to conduct interviews face-to-face. However, due to logistical reasons, it was not possible to meet every project manager physically in an office of the company. For these interviews, an online platform has been used. Interviews were recorded and transcribed. Furthermore, it is important to create a pleasant environment where the interviewee feels free to speak during the interview. "The quality of data often is dependent on the aptitude of the interviewer" (Byrne, 2001, p. 233). Sanders (1995) described this

environment as being a 'third culture man', where the researcher should take a position as an unsuspected witness. When mainly negative aspects are discussed, or when the project manager feels that he is not doing his job well, this environment is negatively influenced. Therefore, there is no right or wrong in sorting the cards.

The focus group is split into two sessions of 1 hour. Due to availability issues, there are only 4 people selected on the criteria that they would have something to say on the topic. This is a relatively low amount as focus groups are meant for 6-12 people (Ivanoff and Hultberg, 2006; Kitzinger, 1994). The first session contains an introduction to the research and there will be a discussion about if the participants share the problem definition and have already explanations for the existing situation. The second session focuses on presenting results, discussing the relevance for the company and figuring out what the company is going to do with these findings.

3.2 Data Analysis

The first step of data analysis is to investigate the attitude of the respondents towards technical- and process-driven decision-making. What style did they apply? As this research method is mainly based on the Q-methodology of Brown (1980), there was first looked at if common perspectives could be found in the quantitative part of this research: the cards. When people have a similar view on certain important and less important questions, there will be a high correlation between the Q-sorts (perspectives) of these people (Koops, 2017). A correlation is considered statistically significant if they are 2 to 2.5 times the standard error (Brown, 1993). The perspectives have been calculated with PQMethod (version 2.35). However, due to the small sample size, it was not possible to obtain common perspectives as more than a third of the respondents did not load on any of the significant factors ($p = 0.05$). Therefore, there is chosen for a qualitative analysis of the project manager's attitude towards technical- and process-driven decision-making.

To do this, the interviews had to be transcribed and coded. Transcripts have been coded with Atlas.ti software (version 22.1.5). To distinguish between technical-driven and process-driven responses, the researcher looked at whether the project manager addresses the possible causes of the problem or focuses only on the output. When the project manager first looks at how to go further with the project, his reply is considered as technical-driven. Responses, which are considered as process-driven, are more focused on where the problem is (i.e. the causes) before you can go further with the project. This explanation is closest to the first principle of process-driven decision-making (i.e. whole project view). For example, only focusing on the output: 'what has to be done to go to the client?' is labelled as technical-driven. This analysis has been done for the first two situations, as the third situation is already at the client. It is possible that a project manager applies two different approaches in the sorting.

When this categorization is made, the statements regarding drivers and barriers can be categorized in the theoretical framework of Kotter (1995) that has been used for this research. Before focusing on change management theories, the coding has been done with other frameworks such as barriers for lean implementation and the project management schools of Söderlund (2011). However, by following the empirical cycle, it became clear that the observed results can not be used to test the theory, also known as deduction (Lawson, 2005). Therefore, these theories were not appropriate for this research.

The sorting of the statements in the framework of Kotter (1995) depends already on the interpretation of the researcher. Subcategories have been made as there were different statements that could be linked to a factor of Kotter (1995). After all statements have been coded, the codes should be revised to make sure that the right codes have been carefully assigned to the statements. Some codes will merge or split and therefore a second revision of the statements would be needed. When this is done, the most important drivers and barriers can be identified. The principles most frequently mentioned in the interview are considered to be the main drivers or barriers for the project manager. To make conclusions in this research, the principle of social constructivism is used. The premise of social constructivism is that reality is constructed through human activity (Kim, 2001; Amineh and Asl, 2015). This means that what has been discussed by the people is considered as the reality, which is important to take into account in the discussion and conclusion.

When the main drivers and barriers were identified, the quantitative results were examined to see if they supported the qualitative findings. The demographic characteristics of the respondents are also taken into account to see if there is a relation between the characteristics, the motivations (i.e. statements) and the attitude towards process- and technical-driven decision-making. A one tailed t-test is executed in Excel, as the relation is considered significant if the p value is lower than 0.05.

3.3 Internal & External Validity

In this section, the internal and external validity of this research will be discussed.

Internal validity examines if the chosen research methodology allows trustworthy answers to the research question in this study (Andrade, 2018). With interviews, one of the threats regarding internal validity is that the respondents would not represent reality. Especially in social studies, where the interpretation and perception of the respondent are asked for, this is important to consider (Diefenbach, 2009). Therefore, "internal validity can only be assessed by how well the statements made by interviewees about perceptions and opinions are mirrored in the presentation of findings" (Diefenbach, 2009, p. 884). This corresponds to the social constructivism discussed in section 3.2, as

Respondent	Sex		Experience before		Years at organisation			Degree		Category (Masterclass)		
Nr.	Male	Female	Yes	No	1-9	10-19	20+	Bachelor's	Master's	Cat. 1	Cat 2.	Cat. 3
1	X		X		X			X				X
2		X	X			X			X			X
3	X		X			X			X	X		
4	X			X		X		X			X	
5	X		X			X			X		X	
6		X	X			X			X			X
7	X			X			X	X			X	
8		X	X			X		X				X
9	X			X			X		X	X		
10	X		X				X		X	X		
11	X			X			X	X			X	
12	X		X			X			X	X		
13		X		X			X		X			X
14	X		X			X		X				X
15	X			X		X		X			X	
Total	11	4	9	6	1	9	5	7	8	4	5	6
Percentage	73%	27%	60%	40%	7%	60%	33%	47%	53%	27%	33%	40%

Table 3: Demographic characteristics of respondents.

the perception and statements of the interviewee are considered as reality. Another threat with qualitative interviews is the subjectivity of the researcher. To limit the impact of these weaknesses, measures have been taken. First, there is chosen for a relatively large amount of interviews (Diefenbach, 2009). Secondly, by using cards, interview bias and involvement are reduced, as this structures the interview (Rowley et al., 2012). Thirdly, two different data collection methods have been selected to increase internal validity. To retrieve data from multiple sources, also known as data triangulation, internal validity increases (Meijer et al., 2002). With the focus group, the approach to reality can be enhanced as interview data can be validated.

External validity deals with the degree to which the findings of the study can be generalized to other contexts (Andrade, 2018). To generalize the statements of the respondents to the entire organisation is difficult, as not everyone at the company is a project manager. There are a wide variety of functions, such as draftsmen and engineers, which have different daily tasks. However, all employees do operate in a project environment and therefore this study can be used as an example. To make conclusions about the other project managers at the organisation, a representative sample has been selected (Diefenbach, 2009). Whether this research is generalizable to other organizations, care will need to be taken in terms of context, as this research was applied specifically to this company. As, other engineering firms do also have to deal with dynamics, and have the intention to change their behaviour, this research could also act as an example. Important to note is that for change management, there is not one theory that can be applied to guarantee a successful transformation. Focusing on the pitfalls makes a company more aware of why the transformation is struggling.

4 Results

In this chapter, the results of the research are presented. The 15 project managers that have been interviewed represent a variety where 6 project managers respond technical-driven, 5 process-driven and 4 do vary and use both approaches. There is no relation between this categorization and the demographic characteristics of the respondents. In section 4.1, the statements of the interviewees have been sorted in the 8-factor model of Kotter (1995). Quantitative insights that are related to the statements will also be presented in this section. It is good to note that the sorting is already based on the interpretation of the researcher. However, in doing so, the researcher minimized linking and explaining the results, which is part of the discussion in section 5. Section 4.2 presents the findings obtained in the focus group.

4.1 Interview Results

The 8-factor model of Kotter has been used to present the results. An overview of the barriers discussed in this chapter is given in Figure 2.

(1) Not establishing a great enough sense of urgency - Most project managers are aware that process errors are made. Difficult communication with the client or the fact that people in the team worked more than agreed upon beforehand, are examples that were given. However, this awareness is not yet acted upon. In general, the project managers that are interviewed do not have the overall sense of urgency to change towards a process-driven decision-making style. The interviewed project managers do not see the technical-driven approach as a problem. Furthermore, a technical-driven approach was seen as something that has brought success to the company, as the level of expertise is high. A part of the project managers are even convinced that this case would not take place at their premises: “this is something that won’t happen to

me because I see it coming". The people who attended the Masterclass took this attitude less often.

(2) Not creating a powerful enough guiding coalition - A small number of project managers observe the lack of a guiding coalition regarding process-driven decision-making. At the company you first have to focus on a technical field (an expertise) before you can start managing projects and develop your more process-driven approach. At the job interview, this has already been made clear. "Managing projects without technical knowledge, is not the way we do it at this organization", indicated one of the respondents. Another observation is that some people get the feeling that they are forced to make the step towards project management, with as a consequence that you get people at a position that they experience as difficult and rely on their technical expertise when managing their projects. The interviewees were not the people who feel they are being forced, but indicated that this occurs within the company.

(3) Lacking a vision - The third factor is a lack of vision and strategy regarding process-driven decision-making. This observation is made as in the company, there is no clear agreement on what project management should look like. Further, there is a dichotomy about the definition of 'process'. The definitions of the project managers differ between 'how to get results' and 'dealing with human interests'. But there are more differences observed which can be related to the vision: the position of the client and the interpretation of the case. First of all, for some project managers, the client is the most important and must be put at number one. A consequence is that these project managers look at the output first and lose sight of the whole project. These managers are mainly categorized as technical foreman (category 2). Other project managers acknowledge the importance of the client, but also admit that the interest of the company is at least as important as the client. The managers who followed the Masterclass (category 1) are largely represented in this group. It can also be seen in the sorting, as these managers put the card regarding 'compensation to the client' significantly lower ($p=0.027$). Most of these project managers also see the relation with the client as a business relationship. The second difference, is the interpretation of the case. The project managers were all presented the same case, but they see things differently. An example is a cost overrun of 10%, which is taken very seriously by one project manager and the other does not see this as a problem, which implies that there is no consensus. Yet, it is not the case that everything differs between project managers. There is consensus about the definition of the 'technical' content of a project. These are most often related with the things that have to be done: the calculations, designs or solutions. Further, all project managers are clear about the communication with colleagues, team members or the project director: "this should already be done, the sooner the better".

(4) Undercommunicating the vision by a factor ten - Despite the fact that there is no clear vision that can be communicated, project managers see communication as something that is crucial in the project and the company. Nevertheless, experience is also often referred to as motivation for a chosen approach. The decisions are mainly based on experience: "if you have more experience, you just feel it when you have to make appointments with the client". Internal courses or working with other colleagues was mentioned less often. Another observation that is categorized as undercommunication of the vision is that terminologies of 'scope-creep' and 'progressive insight of the client' were for most project managers unknown. From the 5 people who did not ask for any definition, 4 followed the Masterclass (category 1).

(5) Not removing obstacles to the new vision - The obstacles that were mentioned by the project manager, which influence the decision-making style are divided into the four categories mentioned in section 2.2. First, the structural obstacles will be discussed. The one which is mentioned most is that the project manager adapts his approach to the client. Some clients are close to the process and the corresponding agreements, while others are only interested in the output, as indicated by one of the respondents: "some clients are much more difficult than others. One client is very realistic and simply makes agreements about extra work easily and the other client is the personal guardian of the contract". The separation of technical- and process-driven activities depends often on how the client wants to see this. Related to the client, the interviewees also mentioned the contract type as a structural obstacle. Contracts on a cost-plus basis give project managers more space to figure things out. Lumpsum contracts are more focused on the price, which is provided as motivation for an output-oriented decision-making style. In general, the project managers do like the projects with more freedom. The third structural obstacle is the project organization. The separation of activities is influenced by the size of the project, according to the respondents. Larger projects have most often a project organization where activities are divided into so-called 'IPM roles'. The obstacles in the second and third category, skills and systems, are not considered as barriers. A small amount of the respondents acknowledge that the knowledge regarding process-driven decision-making can be improved. The same applies to the systems: there are a few project managers who see that project managers fulfil double roles or project directors who do not behave according to their roles. As a consequence, it is difficult to separate between technical- and process-driven activities. Finally, a larger obstacle experienced by the project managers is the difficulty to bring up a 'bad' message. This is not only external to the client (e.g. saying 'no' to a request of the client) but also internal to team members and project directors (e.g. criticizing their work). A variation is observed as there are also project managers who say that they do not have any difficulty with this part of project management.

(6) Not systematically planning for and creating short-term wins - Project managers do not get the

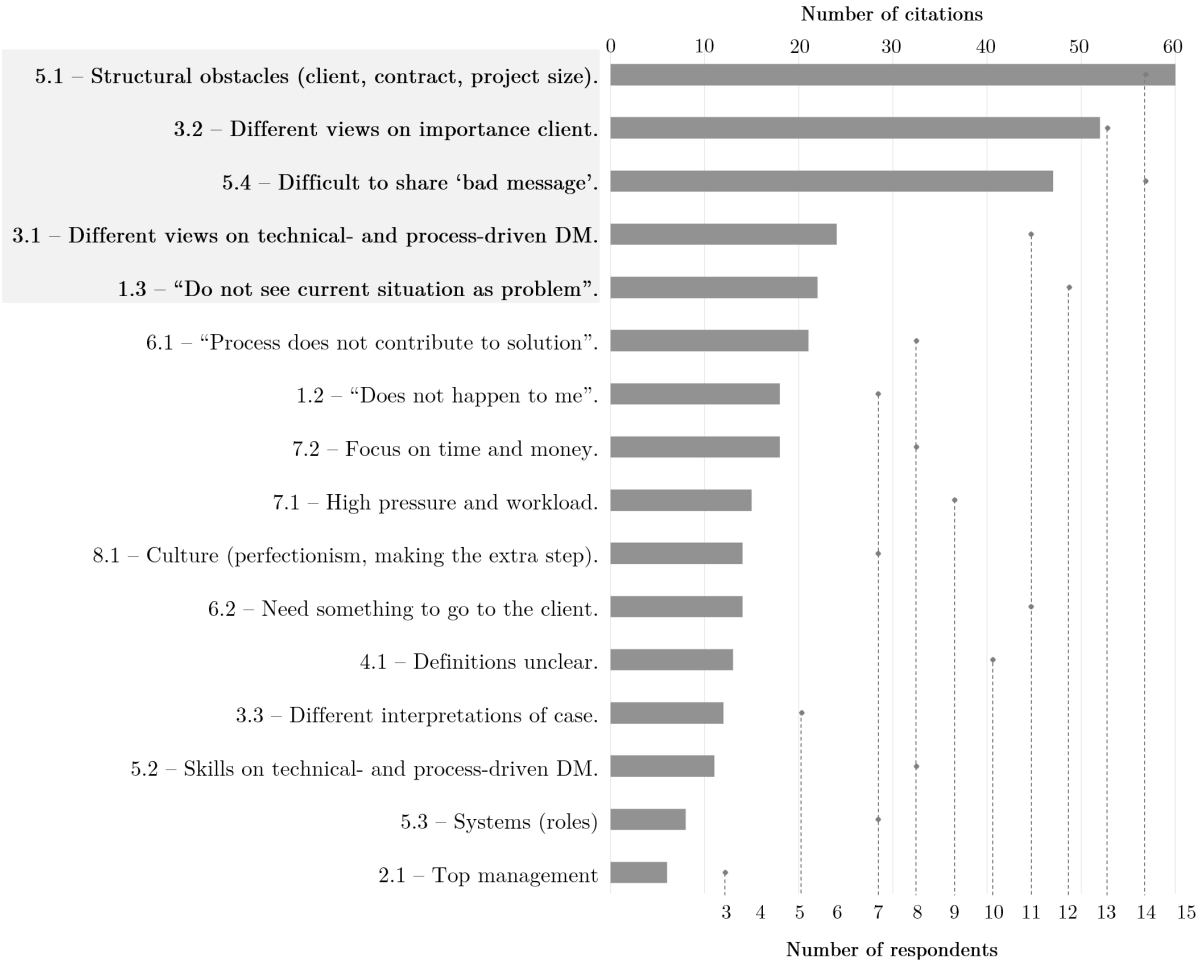

Figure 2: Overview barriers mentioned in interviews.

feeling that their changes lead to better results. They do not think that process questions help in this situation where they were confronted with a setback. They see a technical-driven response as the solution looking forward. This is often observed as 'you need something to go to the client'. The project managers with the process-driven response make less use of this argument. One of them experienced the following: "there was absolutely no point in talking about content, as the relationship was not good". However, as most of these managers do not experience the advantages of process-driven decision-making, there is a barrier.

(7) Declaring victory too soon - It is not necessarily the case that people think they are already there, as people still admit that due to the process aspects most mistakes are made. However, a factor in the long run, is the extent to which the company is focused on faster, cheaper and client-focused delivery. Several project managers have indicated that time and money are the most important project parameters and that this is one of the reasons that the project manager does not look at the causes because they have to meet a deadline. Another subcategory, but also related to the focus on time and money, is the pressure the project managers experience. 8 respondents indicate that project managers experience a high workload and that this is a motivation to focus exclusively on outputs.

(8) Not anchoring changes in the corporation's culture - The process-driven approach is not anchored in the culture. There are no specific statements concerned about a new culture. Statements about the existing culture are most related to the technical-driven approach. When people were asked about why they choose a technical-driven approach or did more work than was agreed, respondents said things like "this is in our culture".

4.2 Focus Group Results

In the first meeting of the focus group, the hypothesis that most project managers apply a technical-driven approach rather than a process-driven approach was immediately acknowledged by the focus group members. Like the project managers, they also see that most mistakes can be linked to the process, which could be even demonstrated with numbers. They also agreed that a process-driven decision-making style is preferable, but how big the problem really is in the

current situation, is difficult to assess, as possessing technical knowledge is also something that has brought success to the organisation. Further, the focus group admitted that it was not possible to make statements about all project managers, as there are also managers who apply different approaches in their projects.

The focus group indicated that the technical-driven behaviour of the project manager in the company is not that surprising and gave a number of explanations for this. These explanations largely correspond to the data of the interviewed project managers, which was not known during the focus group. They mentioned, among other things, that people are hired on their technical speciality. They see that the focus on technical expertise is rooted in the organizational culture and that in a situation where project managers feel a certain pressure, they go back to their behaviour in which they feel comfortable. In addition, something that should not be underestimated is that the employees of the company like the technical content and that they want to solve that puzzle. Further observations they made are that people have difficulty to bring a bad message and to change to the attitude of the client. For example, with a client who focuses more on the process, the project manager has difficulties to change his behaviour as "he always wants to solve the sum first".

As these explanations largely correspond to the results of the interviews, which were presented in the second session, these were not surprising for the focus group. For them, the most interesting observation was that the people who did not follow the Masterclass (i.e. categories 2 and 3) did have difficulty with either the term 'scope-creep' or 'progressive insights of the client'. The question they asked is: "why do we wait so long with teaching process awareness, as scope-creep is our biggest enemy". When a project manager starts at the company he gets plenty of internal courses, but apparently, these courses are focused on technical-driven project management, according to the focus group. As one of the members expresses: "it is not the intention to transform all project managers into process managers, they do not have to do it themselves, but it would already be very useful if they are aware of the situation". The focus group summarized this as 'being consciously incompetent'.

5 Discussion

In this chapter, the researcher's interpretation of the results is discussed, combined with a comparison to literature, in order to provide the consultancy and engineering firm with suitable advice.

5.1 Interpretation of the researcher

An overview of the barriers is given in Figure 2. As mentioned in the methodology: the barriers which are discussed most by the respondents represent the main barriers. These are sorted on the number of citations, together with the number of people, to prevent barriers are influenced by a minority of the respondents. The five largest barriers are marked grey and cover factors 1, 3 and 5 in the model of Kotter (1995). Since the focus group agrees with this, these are considered as the main barriers.

As mentioned in Section 4, the labelling of the citations is based on the interpretation of the researcher. Another important note is that the selection of the theoretical framework, which is used for this research, should also be regarded as his interpretation. According to the researcher, the principles on how to deal with dynamics most closely match the process-driven decision-making style described by the organization. This relation could be a point of discussion because, even for the organization, a process-driven decision-making style is not that clear as associated visions differ, which is shown by the 3rd factor of Kotter (1996). However, with this theoretical framework, we find ourselves in a play area where the process-driven organization operates. In this way, the principles on how to deal with dynamics of Kagioglou et al. (2000); Love et al. (2002); Collyer and Warren (2009) is used as a theoretical framework.

An interesting insight that is not considered as main barrier in this study is the lack of a guiding coalition. As the researcher thinks there is more to find, only one of the respondents explained this, and two other respondents mentioned it shortly. It is a crucial step at the beginning of a transformation, as discussed by Kotter (1995). Due to the fact that a sense of urgency and vision are missing, literature would suggest that the guiding coalition is also not there. The researcher picked, during the time that he was present at offices of the company, some sounds about directing towards a technical-driven attitude from the beginning. The employees are selected on their technical knowledge and not on their process and management skills. The focus group also brought this up. There could be more in this relationship but it is not proven with this research.

Due to the principle of social constructivism, it has been assumed that communication would not act as a barrier in the company, as most respondents would immediately discuss the situation with a colleague, team member or project director. This has been doubted by some people in the organisation, as people would be too proud to share problems with a colleague or client, but this can not be shown with this research. Respondents can say that the first thing they do is to communicate, but in practice, other things come around such as the high focus on output. The purpose of presenting a setback in the case was to come as close as possible to the real emotions of the project manager. However, the researcher did not get the feeling that all project managers were impressed by the situation, as some project managers distanced themselves from the case as 'this was not something that has happened to them'. Of course, it is possible that these project managers did not experience this kind of setback, or that it is indeed as simple as they explain, but this can be doubted as a different perception is coming from the company.

Further, the researcher noticed that the technical-driven approach is frequently associated with having knowledge of the technical content of a project. This technical knowledge does not have to be the problem, as people are convinced that this is needed to manage a project, which can be traced back to the current vision of the company. It is not the intention of the company to decrease the technical knowledge but it is about creating awareness that their projects act in a dynamic environment. To get project managers 'consciously incompetent' is already a big step in the transformation. It is important to get this message further into the organization, since people are afraid to let go their technical knowledge.

Regarding the transformation, it is not that everything is going wrong. The level of consciousness, about the fact that most problems can be related to the process, is high. As the communication is seen as good (despite the fact that this statement should be treated with care), these together are seen as the drivers in the transformation towards a process-driven organization. However, the number of barriers to the transformation is higher. As factors 6, 7 and 8 are not addressed enough by the respondents to consider as a main barrier, the company should focus on the three main barriers: not establishing enough sense of urgency, a lack of vision and not removing obstacles.

As there are barriers in the lack of sense of urgency, lack of shared vision, and allowing obstacles to persist, the researcher's recommendation is that as an organization you should first think about where you want to go in terms of process-driven project management. For a transformation to a process-driven organization, a strategic discussion will first have to take place in which agreements are made about what project management should look like. If the organization wants project managers to apply a process-driven approach, you will also have to be prepared that in certain situations the project manager does not adapt to the project. This willingness is not there yet, as the technical-driven approach has brought the organization a lot of success. At the moment there is a part of the people within the organization who envision a process-driven organization, but as long as this is not supported by a larger group, in the researcher's opinion, it is not possible to realize this transformation.

Despite the fact that the number of project managers who applied a process-driven approach to the case was about equal to the managers who chose a technical-driven approach, most respondents explained their reasons to choose for the latter style. This makes the analysis of the results more difficult, as project managers also refer to other projects or do not reflect their own behaviour. However, this also shows that the distinction between process- and technical-driven cannot be directly projected on the person as this distinction is neither fully process-driven nor fully technical-driven. A project manager is not completely technical- or process-driven and can use different approaches in his or her projects. This relationship is known as one of the yin-yang principles. The choice of the approach seems to be a personal matter, as the relation between statements and demographic characteristics is negligible. Therefore, a relationship could exist between personal characteristics and the preferred approach. However, this research did not show any relation with personal characteristics, which does not mean that there is no relation at all.

5.2 Comparison with literature

The placement of this research in the existing literature is difficult as there is no literature on the practical implementation of principles to deal with dynamics. Therefore the focus is on change management and the framework of Kotter (1995). Despite the fact that much has been written about change management, there is little scientific evidence on this topic (Ten Have et al., 2016; By, 2005).

Collyer and Warren (2009) address that dynamics occur in varying degrees in all projects, so a project is neither dynamic nor not dynamic. This corresponds to the character of the technical- and process-driven approach. A project manager or project can not be completely assigned to one of the two extremes. In addition, one approach may work for a project and another approach may be preferred for another project, as Dubois and Gadde (2002) already admitted that applying a centralized approach to decision-making is difficult due tot the dynamic character of the environment.

The 8-factor model of Kotter (1995), which is used as the framework for this research gives already an explanation of why anchoring new approaches in the corporate culture is not considered as main barrier. This factor takes place later when the new approach is largely visible in the organization. Lewin (1946) called this factor 'refreezing' and Kotter (1995) indicated that the other factors take place before this can be part of your new culture. The other 7 factors are related to the phases 'unfreeze' and 'move'. The link between the three main barriers obtained in the interviews and the literature is discussed below.

Not establishing a great enough sense of urgency - A main barrier that is observed in this research is that project managers do not see the need for change. This confirms the research of Armenakis et al. (1999), who argued that the first question members in the organization would ask is 'if change is really necessary' and concluded that this step is crucial in change management. Kotter (1995) admits that when change is the topic of conversation, a sense of urgency would increase, which is also seen by Ginsberg and Venkatraman (1995). In the company, communication is not the problem, as most managers share their ideas and problems with each other. However, when project managers discuss the use of the technical-driven approach and share these ideas, the observation is made that this worsens the sense of urgency. This contradicts the theory of Jansen (2004), who stated that discussion about change, whether negative or positive indicates

that change is progressing.

Lacking a vision - As Kotter (1996) expresses the importance of a clear vision to prevent confusion and movement in the wrong direction, this research shows that there is insufficient clearness about the vision regarding process-driven decision-making. How cards are analyzed and sorted by the respondents already shows confusion. Some project managers relate 'scope-creep' to process, whereas others see this as a technical-driven card. As project managers justify their technical-driven decision-making to the current vision, in which the company presents itself as a top-class engineering firm, creating a vision is considered as a crucial step in the transformation. In literature, this is confirmed by Whelan-Berry and Somerville (2010) who agree and define the vision as a key part of the change process. The theories of Paper et al. (2001) and Cole et al. (2006) question this, as they indicate that the implementation of the vision is much more important than the vision itself.

Not removing obstacles to the new vision - To remove obstacles regarding the transformation, Kotter (1996) zooms in on the perception that people should be able (i.e. empowerment) to remove these. This research shows that employees are not able to deal with the obstacles, as they still adapt their approaches to the client, contract and project organization. This problem is partly rooted in the project manager who has difficulty starting change (e.g. saying 'no' to the client). The structural obstacles and the attitude of the supervisor complicate this change, which confirms the theory of Klidas et al. (2007), who addresses that these two points are important to consider in change management.

6 Conclusion

In this research, the drivers and barriers to achieve a process-driven organization have been identified. 15 project managers of a consultancy and engineering firm have been interviewed. The project managers were asked to sort cards with questions that come up when facing a setback in their project. During and after the sorting, the project managers shared their views and thoughts on their chosen approach.

In general, the number of project managers who applied a technical-driven approach to the case was in balance with the managers who chose a process-driven approach. However, this response does not mean that project managers are less technical-driven than expected by the company, as this categorization is considered as neither fully technical-driven nor fully process-driven. Moreover, with this research, there has not been established a relation between the demographic characteristics of the respondents and their response towards technical- and process-driven decision-making. Most managers indicated that the setbacks in projects are largely caused by errors in the process, which shows that there is much work to do to achieve a process-driven organization. Together with the fact that project managers acknowledge the importance of internal and external communication, these are seen as the main drivers to transforming into a process-driven organization. Conversely, several barriers have been identified that make the transformation more difficult. There are three main barriers on which the company should focus. First, the current technical-driven approach is not seen as a problem. The sense of urgency to change is low. Secondly, there is also a lack of a shared vision regarding process-driven decision-making. The perceptions of the project manager mainly differ on the importance of the client, and what approaches are needed to manage the projects. The third attention point is the allowance that obstacles still exist. Project managers adapt their decision-making style to the client, contract type, and project organization. This category also includes that project managers have difficulty with bringing a bad message, which does not apply to all project managers. Overall, there is much work to be done to transform into a process-driven organization. The researcher's recommendation is that a strategic discussion should take place first in which agreements are made about what project management should look like for the organization. With this vision, a larger group of people can be reached, which would be necessary to transform into a process-driven organisation. This research does not only have to be applicable to this company but can also be used in a wider field in the construction industry. More organizations have to deal with these issues, as the construction industry is becoming more dynamic.

7 Limitations and future research

Despite finding a relation between participants of the Masterclass and being aware of process-related terms, the sample size is not large enough to make significant statements about the subgroups. For example, two women distinguished themselves from the rest of the project managers. However, the other two women, who were more on average, rejected this potentially interesting hypothesis. The research is limited to the subjective viewpoints of 15 respondents and a focus group at the organisation. These viewpoints, who differ from person to person, are therefore also difficult to generalize over other project managers. To do this, a larger sample size is recommended.

Further, doubts remain as to whether the project manager is reflecting reality. As a researcher, it could be possible that people sort cards or give different reasons than they would do in practice. This is a difficult part of taking qualitative interviews. A suggestion is to use observations as a research methodology. Observations are often used in the study of behaviour.

A suggestion by the focus group for further research is to analyse the attitude towards technical- and process-driven decision-making of project managers of

the client. One of the motivations behind the chosen approach was the attitude of the client. This will provide interesting insights and extend this research.

If the company chooses to teach awareness of process aspects to project managers earlier with internal courses, it might be interesting to carry out a similar study and compare the results. This should be done at a later moment and ensures that the study has a longitudinal character which is interesting for studying a transformation.

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8 Appendix

Description of the case - The project is a roundabout to be designed for Rijkswaterstaat. The project is in the phase between preliminary design (VO) and contract specification. It is a complex situation, in which it was initially estimated that the order for engineering will cost 100K euros. However, you find out during the project that this is not realistic any more. The costs will in any case increase by 10% (=10K). Furthermore, there are also doubts about the quality of the design, which have not yet been handed in. The submission of this design will also take place later than agreed with the client. It strikes you a bit. The parameters time, money and quality are all three in red.

Situation 1 - As a project manager, you are sitting at your computer and discover that several signals (time, money, quality) are in red. What question do you ask yourself first? And why?

1. Have I failed as a project manager? Then I have to solve this myself.
2. What will I still be able to present to the client?
3. How much work do we need to do to recover from this setback?
4. Do I have to discuss this with someone internally? Colleagues, team, project director?
5. Have we misjudged the assignment?
6. Could I have seen this coming sooner?
7. Do we actually still work in accordance with the original project plan or do we quietly deviate from it?
8. Is this part of the original assignment?

Situation 2 - As a project manager, you go to the next team meeting. What question do you ask yourself first? And why?

1. Did the team make calculation or (technical) analysis errors?
2. How can we improve possible calculation or (technical) analysis errors, that they don't happen again?
3. What did we finish and how much more do we need to do to get things done?
4. Do I have my capacity planning right and do the team members have enough time for the project?
5. Is cooperation/communication in the team good?
6. Do I still have to share the situation with my project director?
7. Have the team members not gone too far in their work?
8. Is it necessary to adjust the project plan? Or can we continue with the original plan?

Situation 3 - As a project manager, you have to go the client, who is dissatisfied with how things are going. The client is complaining about the quality, the extra costs and the delayed planning. What question do you ask yourself first? And why?

1. Is the critique of the client justified?
2. How much more do we need to do to limit (financial) damage?
3. How much extra can we do to meet the client's needs?
4. Are we waiting for information from the client?
5. Is this part of the original assignment?
6. Is cooperation/communication with the client good?
7. Does the client suspect the setback?
8. Should I not have approached the client sooner?