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A systematic comparison of three organizational design theories

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NIJMEGEN SCHOOL OF MANAGEMENT MASTER THESIS IN BUSINESS ADMINISTRATION ORGANIZATIONAL DESIGN & DEVELOPMENT From the outset, we are forced to recognize that the question of organizational design does not admit a simple answer. There is no mechanistic "how to do" recipe.¹

¹ Quote from; Hax & Majluf, 1981: Organizational Design: A Survey and an Approach, p.418

PRE-TEXT

During my study at the Radboud University, finishing my bachelor business administration, I had developed quite a bit of interest in the way organizations work and especially the way organizations are (or should be) structured. Choosing a master study was a piece of cake, because the master Organizational Design & Development was a perfect match with my interests. During the master study I became more and more familiar with organizational design concepts and theories and I developed quite a bit of interest for these theories, because I had the feeling that these theories tried to tell (or explain) people how to design organizational structures.. And even though, they usually offered some useful insights, the knowledge gained was not always satisfactory, because it did not give the feeling; 'Alright, now we know how to design organizational structures.' Especially, because I had the feeling many concepts in these theories were very abstract. However, this feeling was taken away to a certain extent when we had to study the work of Ulbo de Sitter. His work, on the other hand, was amazingly concrete and detailed, it formed an inspiration for me to find more about the usefulness of organizational design theories and the useful insights they may or may not have to offer. It did not surprise me that the work of De Sitter was important during our study at the Radboud University, but I had the feeling that there was much more out there in the 'jungle' that is: the literature field of organizational design.

With this in mind and when my supervisor, dr. LJ Lekkerkerk, offered the idea of doing a literature review I opted to go through with the idea and set myself to the task to dive into the literature to realize this idea in the master thesis project. Doing a literature study was certainly not the easiest way of writing a master thesis, working through literature can be quite demotivating at some points. It took a lot of time, effort and motivation (which was lacking on some occasions) to finish the project. For that I am glad that the project is finally finished. I am also quite satisfied with the knowledge that I gained working through the literature.

I want to offer my gratitude and thankfulness to Dr. LJ Lekkerkerk, who did an amazing job helping me through the process of writing the master thesis. He was always there to help me, in good times as well as in difficult periods. He guided me, by channelizing my ideas into logical concepts, creating an overview of the work to be done and by excellent feedback and remarks. I want to thank Dr. Moorkamp for the useful remarks to finish the master thesis project. I would like to give a special shout out to Dr. Jan Achterbergh. I have had the privilege to attend to his wonderful, enjoyable and informative lectures, for which I am grateful! I also want to offer my thankfulness to my fellow student Marlon Voppel, who has supported me and helped me by commenting on the writing style and English in this paper. Last but not least, my gratefulness goes out to my family who has always supported me and given me the backup to finish the master thesis project.

ABSTRACT

Organizational design theories claim to be genuinely relevant and useful for the design of the organizational structure. This study sets out to analyse the usefulness of three organizational design theories, by reviewing the useful insights they might have to offer toward the purpose of designing organizational structures. In order to be able to critically assess these theories, a framework is needed by which the theories can be analysed. This study starts by developing a theoretical framework, which includes the necessary requirements to critically assess organizational design theories. The study is then followed with a thorough assessment, by systematically reviewing three pre-selected organizational design theories, using the theoretical framework. The three selected theories have a different organizational design approach. The findings of the analysis of the theories does not only result in an overview of the organizational design theories, it also results in some interesting comparative results. The overview and results are not only beneficial for academic scholars, but also for managers or designers in practice, who may not easily find and select the most useful guidelines these design theories offer to support the task of designing organizational structures.

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1. INTRODUCTION

1.1 Introduction

An adequate organizational structure is essential for organizations to be able to maintain viability in the rapidly changing environment of the modern day business environment. The literature about organizational design is extensive. 'In the diverse literature on organizational design, at least one proposition has gained widespread acceptance: the many formal and informal structures, systems, and processes that make up an organization's design affect one another' (W. Rivkin & Siggelkow, 2003, p. 290). Moreover, Rivkin & Siggelkow (2009) point out that the literature is unified in what is perceived as the central challenge of organizational design: to divide the tasks of a firm into manageable, specialized jobs, yet coordinate the tasks so that the firm reaps the benefits of harmonious action. The challenge can be addressed in two primary issues; how to perform the division of labour and how to coordinate the resulting tasks (Hax & Majluf, 1981).

This challenge has been addressed many times in existing literature and extensive research resulted in the development of several organizational design approaches and theories, such as; the contingency approach (Burton & Obel), the information processing view (Galbraith), the classical theory (Weber), the configurational approach (Mintzberg), the decision-making theory (March & Simon), the sociotechnical approach (De Sitter), business process re-engineering (Hammer & Davenport) etc. However, the question of designing an organizational structure does not adhere to a simple answer. There is no simple mechanistic 'how to do' recipe. Yet, the theories and approaches offer some valuable insights and in most cases they lead to broad guidelines that support the task of structuring an organization. Organizational design theories have in common that they all genuinely claim to be relevant for the design of an organization (Hax & Majluf, 1981, p. 418).

1.2 Research purpose

One may look at several ways of designing an organization. As Achterbergh & Vriens (2009) point out the organizational infrastructure consists of three parts: The division of work, human resources and technology. The division of work is the most basic and relevant part of the infrastructure. 'These structures function as a point of departure for thinking about the design of systems for human resources management and technology' (Achterbergh & Vriens, 2009, p. 22). Therefore, the logical order of designing the infrastructure is to begin with the structure before moving on to HR-systems and technology. This paper will not focus on theories and/or approaches aimed at designing the complete infrastructure but rather focus on theories aimed at designing the structure (division of labour and coordination). The main purpose of this paper is to review existing organizational design approaches, to discover their strengths and weaknesses, to find out which guidelines they provide

for supporting the design of an organizational structure, and to point out what they can learn from each other. This will not only lead to an overview of (some) existing organizational design theories, but also an understanding about the essence of these theories, to a certain extent find out about their usefulness as design theories and how they might be complementary to one another. This study will not only be beneficial for academic scholars, but also for managers in practice who may not be able to find and select the most useful principles and/or guidelines that some design theories are offering to support the task of designing an organizational structure.

Moreover, as a student of the master Organizational Design & Development (ODD) at the Radboud University, several organizational design theories have been object of study. Furthermore, the modern sociotechnical approach of Ulbo de Sitter, is argued to be the most explicit and detailed design theory in the field of organizational design. Therefore, De Sitter's theory is usually claimed as being the better organizational design approach when compared to other available organizational design approaches. Especially considering that De Sitter's work is mostly available in Dutch and for that reason is less known than works from for example: Thompson (1967), Gailbraith (1973) or Mintzberg (1983) (Achterbergh & Vriens, 2009, p. 228). An interesting question that rises and logically follows, is whether there is any base for this claim to be right when one compares De Sitter's work with other important works in the field of organizational design theories, but will also explore whether there is any base for this claim by comparing De Sitter's approach with two major organizational design approaches. Why and which organizational design approaches are chosen will be explained in section 3.4.

1.3 Objective and research question

Hence, the goal of this paper is to:

'Critically review a selected set of organizational design approaches, by relating and comparing the findings from these design approaches.'

The main question that will be addressed in this paper:

'How do three major organizational design approaches relate and compare to one another and which useful insights do they provide with regard to the structure of an organization?'

This question will be addressed in order to gain a better understanding of three major design approaches obtained from literature in the field of organizational design, to articulate which useful insights and or potential shortcomings may come forward from these approaches and to gain comparative results by comparing the three organizational design approaches. The main question results in the following central questions to be answered throughout this research:

- What criteria are relevant for assessing structural organizational design theories?

- What useful insights do the organizational design theories have to offer in view of the set of assessment criteria?

- What can be learned by comparing the results of the analyses of the three organizational design theories?

Chapter two is dedicated to the first central question. The first three sections of chapter four will be dedicated to the second question. The third question, the results, will be discussed in the fourth section of chapter four.

So, in order to be able to derive at an answer on the main question, the three organizational design approaches will be reviewed systematically. To be able to critically and systematically review and compare the selected set of organizational design theories, a theoretical framework is needed by which the theories can be analysed. Basically, one can not just simply critically review, compare or analyse design theories without a formal, theoretical framework which has the required elements to decide whether an organizational design theory fulfils the needed, essential requirements to be a useful theory for the design of organizational structures. Systematically reviewing the organizational design approaches, by using a theoretical framework, will not only gain knowledge about the useful insights the design approaches have to offer, but also yield comparative results.

Academics in the field of organizational design and organizational development could learn from the systematic comparison offered in this paper by analysing three organizational design theories, which are different approaches in the literature field of organizational design. The knowledge this paper provides is however not only beneficial for academics, practitioners in the field of organizational design or designers in practice may not easily be able to find and select the most useful insights or guidelines organizational design theories have to offer. This paper attempts to help designers in practice by creating an overview and conducting a systematic comparison on these organizational design theories, by conducting an analysis on the useful insights the theories claim to offer.

1.4 Outline

In chapter two the ingredients (input) for the theoretical framework and the framework itself for analysing structural organizational design theories will be presented. This will be followed by a schematic overview of the essential requirements and a schematic overview of the research. In chapter three the methodological choices will be explained. First an argument will be made for the literature review, then the methodology will be discussed. The chapter is followed by an argumentation about the choice for the selected necessary requirements in the framework. The fourth section will argue why three particular organizational design theories from three different design approaches are selected as object of study. The chapter is concluded by listing the literature that will be used to systematically review the organizational design theories. Chapter four is divided in four sections, the first three sections are each dedicated to review one organizational design theory in light of the necessary requirements. The fourth section of chapter four summarizes the results in a schematic overview and presents the comparative results. Chapter five presents the conclusions, provides an answer on the main question, states the recommendations and concludes with a brief reflection.

2. THEORETICAL FRAMEWORK

2.1 Introduction

Modern day business environments are changing. 'Business environments, like physical environments, change over time. Indeed, in recent times, it seems as though the pace of change has accelerated exponentially. To survive and prosper in this rapidly changing climate, organizations must be ready to adapt' (Kennerly, Neely, & Adams, 2003, p. 37). Generally this translates to organizations having to deal with higher quality norms, maintaining accessibility and being more effective and efficient (Van Wezel, 2013; De Sitter, 1994). To ensure and maintain viability, organizations should deal properly with these challenges and make sure the structure of the organization is adequate enough to meet the demands of these challenges. Therefore, organizations dealing with these challenges might be opting to use organizational design theories which claim to be relevant and useful for the design of the organizational structure. In order to find out whether organizational design theories are useful and relevant to the design of an adequate organizational structure a formal, theoretical framework is needed which outlines the necessary requirements for a theory to be useful.

What is generally common amongst organizational design theories is that they agree that structure follows strategy. Design 'is concerned with how things ought to be, with devising structures to attain goals' (Baligh, Burton, & Obel, 1996, p. 1648). As Hax & Majluf point out: 'a proper organizational structure should recognize the strategic positioning of the firm, as well as facilitate its operational efficiency' (Hax & Majluf, 1981, p. 420). Therefore a basic principle for organizational design is that the structure thus should facilitate the development and implementation of long term strategic goals of the organization. Generally, the primary goal of an organization is to ensure and maintain viability. In this research viability is defined as 'being able to maintain a separate existence' (Achterbergh & Vriens, 2011, p. 428; Wezel, 2013). Since the organizational structure plays a vital role in attaining viability and since organizational design theories claim to be useful for the design of such structures, it is necessary to look at elements that make a up for a good and complete organizational design theory. In the next section, the ingredients for these elements will be discussed, in the following section the theoretical framework (the elements themselves) will be presented, followed by an overview of the essential requirements and a schematic overview of the research.

2.2 Ingredients necessary requirements

In previous literature review works on organizational design theories, such as the work of Van Laar (2010), Van Wezel (2013) and Christis & Soepenberg (2014), the theoretical framework to analyse existing organizational design theories was based upon metatheory, which, at its core, is aimed to analyse theories. A definition of metatheory is: 'Metatheory is primarily the study of theory, including the development of overarching combinations of theory, as well as the development and application of theorems for analysis that reveal underlying assumptions about theory and theorizing' (Wallis, 2010, p. 78). The metatheory has an ordering and evaluating character based on criteria and guidelines which enable the assessment and evaluation of theories. The criteria and guidelines focus on concepts, relations between concepts and elements associated with designing and building design theories (Van Wezel, 2013). The metatheory in the work of Van Laar and Van Wezel, to assess organizational design theories, is based upon the work of two authors: 'An Introduction to Cybernetics' by Ashby (1958) and 'The Sciences of The Artificial' by Simon (1996). The integration of these two works resulted in a metatheory that provides five common, general characteristics to evaluate organizational design theories. These five criteria, in this paper defined as necessary requirements, are deemed relevant for the aim of this paper to assess design theories. However, the criteria based on this metatheory (as presented in the work of Van Laar and Van Wezel) can be complemented by additional requirements, which are extracted from literature in the field of organizational design, this allows for a more critical assessment of organizational design theories.

The necessary requirements extracted from literature and previous reviews of organizational design theories lack an important dimension concerning the design of organizational structures. A deliberate change in the structure of the organization, which is part of an organizational change, has a functional dimension. The functional dimension signifies the conduction of a diagnosis previous to the design of the structure. The goal of the diagnosis is to analyse the problems and the causes of these problems with regards to the organizational structure to attain the goals of the organization. Beer & Nohria (2000) argue that it is fundamental to get decision makers to work together effectively to diagnose problems and decide what changes to pursue. So, an accurate diagnosis is needed to derive at an appropriate structural design to change the existing organizational structure. A structural design is followed by an implementation phase, the goal of the implementation-step is to actually implement the design. This refers to the implementation of changes according to the design plan or proposal. When the implementation of the design proposal(s) has been carried out, the changes can be evaluated. The goal of the evaluation is to determine whether the implemented changes in the structure have had the desired effect. Evaluation can also be done on the designing process itself, to analyse if the designing process has been carried out efficiently. When evaluation has been done the cycle can be repeated. This cycle, which is a functional dimension of the process of changing the organizational structure is known as the D-D-I-E cycle. Diagnosis | Design | Implementation | Evaluation (Vennix, 2010, p. 286). This paper primarily focuses on the design phase of the DDIE cycle, however bringing about actual change implies a designer would have to go through the DDIE cycle.

Therefore, an interesting question is whether organizational design theories offer additional insights to help with both the diagnosis and the implementation phase of changing an organizational structure. Thus, in addition to the necessary requirements based upon the metatheory of previous reviews and literature in the field of organizational design, two more requirements will be specified with regard to the diagnosing and implementing phases of changing the organizational structure. The complete set of necessary requirements, is the theoretical framework in this paper and will be used to compare, relate and analyse organizational design theories, will be presented in the next section.

2.3 Necessary requirements

This section will present the theoretical framework, the sub-sections will present the essential requirements. The sub-sections are divided in a logical order, starting with diagnosis, moving on to design to end with implementation.

2.3.1 Diagnosis

According to de Leeuw (1986), designing organizational structures consists of analysis, design of the structure and implementation. The analysis phase he refers to is the same step as the diagnosis part of the functional dimension mentioned earlier. According to De Sitter (1994), the structural parameters in his work can be used in three ways: 1) As an organized framework based on practice and theory that gives insights with regards to effects that can be expected from the configurations of the structural parameter characteristics, 2) As a tool to analyse a given structure, 3) As a tool to design a structure. This numeration about the usage of structural parameters is an important and logical one when it comes to the functional step of diagnosing, because it identifies the need and the importance of diagnosing the structure before designing it. He goes as far as listing a wide range of potential structural problems, which he refers to as bottlenecks in the functional structure (De Sitter, 1994). Since it is crucial and logical to diagnose a given (present) organizational structure before designing a plan or proposal to change that structure, the first essential requirement in this framework is the insights an organizational design theory provides concerning the functional step of diagnosing a given structure.

2.3.2 Design

The design phase of changing organizational structures contains eight essential requirements in this theoretical framework. Five essential requirements are based upon previous reviews, three requirements are derived from relevant literature in the field of organizational design.

2.3.2.1 Essential variables

Organizations show particular behaviour, that could be described in terms of the flow values of certain variables. The variables that require special attention and are closely tied to the survival of organizations are so-called essential variables (Achterbergh & Vriens, 2011, p. 428). Viability is secured as long as these variables stay within certain limits. The specification of the essential variables and their norms is of such importance to the realization of organizational goals and maintaining viability that it is classified as the first necessary requirement in the designing phase of changing organizational structures. In other words, the second essential requirement in this framework is that an organizational design theory should specify a set of essential variables and norms and argue why they have been specified.

2.3.2.2 Capacity to adapt

Which essential variables and norm values are relevant for an organization is dependent upon the specific situation and concrete environment in practice. However a norm that could be specified a priori is that organizations should have the capability to realize their goals and if necessary, when the relevant environment is changing, adapt their goals. This implies that an organization should continuously and effectively be capable to set out goals and realize them in an efficient way (Van Laar, 2010, p. 15). Thus, the norm value of at least one of the essential variables has to be about flexibility or the capacity to adapt. The capacity to adapt is therefore the third necessary requirement in this theoretical framework.

2.3.2.3 Structural parameters

The essential variables are the desired effect of organizational structures, the following requirement focuses on how to achieve the desired effect. In other terms, how to build the structure in such a way that the desired effect on the essential variables can be realized. Any organizational design theory that does not mention principles or guidelines as to how to build an organizational structure does not live up to the claim that it is relevant for the design of organizational structures. However, since design theories have different approaches to this challenge, principles or guidelines as a requirement may yet be too abstractly defined for the purpose of this research to critically review design theories.

A terminology is needed for those characteristics that have an impact and influence on the essential variables to stay within or move away from their norms. These are the so called 'structural

parameters'.² The parameters can have different values and this will in turn have an influence on the behaviour of the essential variables (Achterbergh & Vriens, 2009, p. 41). Broadly a classification of two classes of parameters could be made. The first consists of parameters that have a negative influence and move the value of the essential variables away from their norms. These could be called disturbances, because they have a negative input on the behaviour of the system. The second type consists of parameters that have a positive influence and stimulate the behaviour of essential variables to stay within their norms. These may be called regulations and have the purpose of preventing the occurrence of disturbances and dealing with them (Achterbergh & Vriens, 2009, pp. 34-39). Therefore, the fourth requirement for an organizational design theory is to specify structural parameters which have an (positive and/or negative) influence on the essential variables.

2.3.2.4 Regulation by design

According to Ashby (1958), adaptation can be realized by two forms of regulation. Strategic regulation and design regulation. Strategic regulation can be related to the aforementioned second necessary requirement and has to do with changing goals and thereby the norms of the essential variables. When a designer is tasked with the design of an organizational structure an important feature is regulation by design, because it focuses on the design of a mechanism that ensures the necessary regulatory potential is provided. This encompasses a regulation table with regulation actions which ensures actual regulation can take place whenever disturbances occur. Given a goal and a set of essential variables, the designer thinks about possible disturbances that could influence the realization of the goal. In addition to this, a designer should keep in mind the design of measures to deal with these possible disturbances (Achterbergh & Vriens, 2009, pp. 56-58). The importance of regulation by design is that the design itself can be object of change and thereby is important to realize adaptability. The important feature of regulation by design will therefore be used as the fifth necessary requirement.

2.3.2.5 Hierarchy

'The structure of the division of labour is at the same time a structure of power relations' (Christis & Soepenberg, 2014, p. 2). An organization is usually decomposed in subsystems, for example; divisions, business units, departments, teams etc.. These units normally have a manager who is in charge and has a certain degree of authority. This exists in virtually every organization, the main purpose of such a hierarchy is to have a decision-making system in place that tries to achieve coordination. It is a necessity to have a well coordinated decision-making system in organizations, since the complexity of organizations and the decision problems exceeds the cognitive capacity of a

² In the literature, both the terms 'structural parameters' and 'design parameters' are being used. There is no actual difference between these two terminologies, however this study will stick with the term structural parameters to prevent any confusion with the term 'design principles'.

single decision maker and thereby makes it a difficult task to achieve coordinated action (Rivkin & Siggelkow, 2003). The units in an organization can be interconnected and interdependent, especially in a functionally concentrated organization, where potentially all primary tasks are coupled to all customer orders. To improve hierarchy in these type of organizations, horizontal and vertical decentralization could be improved by decoupling units from other units and give them the power to function in a quasi-autonomous manner (Mintzberg, 1983). Hierarchy, especially vertical hierarchy, plays an important role in achieving coordination and thereby makes an important feature which should not be neglected by organizational design theories. That raises the question; what do organizational design theories have to tell us about the hierarchy in organizations? Therefore, hierarchy is the sixth necessary requirement in this theoretical framework.

2.3.2.6 Link between parameters and variables

As aforementioned organizational design theories should specify essential variables and structural parameters. Since the structural parameters ought to have an influence on the essential variables, it is inevitable that there is a causal and/or a conceptual / logical relation between them. Describing this relationship is of uttermost importance since it usually transmits into the design strategy that should be adopted. If the link between the structural parameters and the essential variables is missing in an organizational design theory it would make the theory incomplete. The relationship between variables and parameters should be that a theory gives an explanation why changes in values of parameters causes changes in values of essential variables (Van Laar, 2010, p.19; OD course, 2015). Therefore the seventh necessary requirement is describing the causal or conceptual relationship between the behaviour of essential variables (2.3.2.1) and structure related parameters (2.3.2.3).

2.3.2.7 Design principles

If the aim of organizational design theories is to be useful for the design of organizational structures, they should provide a set of rules or a set of propositions that can help designing a structure in practice. The theory should not only theoretically explain what an ideal or adequate structure should look like, but also answer the question how this should be done. According to de Sitter (1994) the organizational structure can be defined as 'the grouping and coupling of transformations into tasks and the resulting relations between these tasks relative to orders.' In other terms, the organizational structure can be seen as networks of related tasks. However, a distinction of two types of tasks can be made: operational and regulatory tasks. The result of these two types of tasks is that an organizational structure consists of a production structure and a control structure. The production structure is the defining and coupling of tasks in which realization of the primary organizational

process is central. The tasks and groups of tasks in the production structure have to be regulated. A network of tasks dedicated to dealing with disturbances and to ensure having regulatory potential can be defined as the control structure (Achterberg & Vriens, 2009, p. 234-236). A design theory therefore should not only offer a set of propositions aimed at the production structure or how the primary process should be realized, but also relate to the control structure and or the way regulation can be given shape in an organization. The eight necessary requirement in this theoretical framework is that an organizational design theory offers a set of design principles or design rules with regards to the design of the production and control structure as to realize an adequate organizational structure.

2.3.2.8 Design precedence rules

For a designer with the task to work out an adequate organizational structure, it is not only important to know which steps should be taken and which underlying strategies in terms of organizational design are important. It is also important to know in what order steps are to be taken in the process of design to increase the probability of a good design (Van Laar, 2010, p.21; OD course, 2015). Steps could be taken on different levels, such as: 1) Macro level, which is the organizational level. 2) Meso level, which is on the level of divisions, business units, departments, teams etc.. 3) And micro level, which is on the job-level (primarily tasks). An organizational design theory could (for example; Thompson, 1967 and Mintzberg, 1983) propose to start designing on micro level, then on meso level and in the end on macro level. But the reverse could also be the case, theories could (for example; De Sitter, 1994 and Lean, 2003) emphasize to start on the macro level, set out goals and work from there to meso level to conclude on micro level. This is an important difference to be noted since some organizational design theories prefer to work bottom up and some theories prefer to work top down. De Sitter (1994) however argues that the production structure should be designed top down and the control structure bottom up. An organizational design theory is required to more or less explicitly specify its design precedence rules: a set of propositions which make clear in what order steps have to be taken to arrive at an adequate organizational structure. Therefore, the ninth necessary requirement in this theoretical framework is that an organizational design theory should specify a set of design precedence rules.

2.3.3 Implementation

Designing organizational structures is not only the choice of a specific structure. It is also improving and governing (by having a focused influence on) the structure. This implies that the structure has to be designed in such a way that effective governance can be achieved. This school of thought about structuring organizations emphasizes that change and design are intertwined. In traditional thinking about organizations, the essential question used to be: What is an effective organization? However this was insufficient in reality for most organizations, because practice has shown that explaining how a desired organization and an effective organizational structure should look like did not selfevidently result in achieving a better organization and an improved structure (De Leeuw, 1986). The design and change processes are two interrelated, parallel running processes which together form a process of organizational improvement. According to De Leeuw (1986), the stream of literature on organizational design therefore added the implementation phase to the process of organizational design. This is a crucial functional step, in which a lot of organizations fail to be successful. No matter how great an organizational design proposal or plan is, if it is not implemented successfully, the chances are substantial that the desired effect of the structural change will not be achieved. Therefore, the last and final necessary requirement is whether an organizational design theory provides insights concerning the implementation phase in the design process.

2.4 Overview necessary requirements

The more explicit and detailed a design theory fulfils the set of necessary requirements in this framework the higher its usefulness is valued. This paper does not claim this set of requirements to be perfect, nor could one say it is a final and complete list since one could always argue why certain elements should be added or left out in such a list. However, these requirements are based upon previous literature, reviews and the incorporation of the D-D-I-E cycle. This set of requirements is assumed to be applicable to any organizational design theory which claims to be relevant and useful for the design of organizational structures. It is not a simple task to select and point out requirements from previous literature works and combine them into one favourable set of requirements for the purpose of reviewing a selected set of organizational design theories. The reason is that the requirements selected should not be too abstractly defined, yet at the same time should not be defined too explicit, since they should be applicable to organizational design theories in general and at the same time make it possible to properly and critically review these organizational design theories. For an overview, the necessary requirements are listed in the next table:

Organizational design theories:	Organizational design approaches
Necessary requirements for a design	Organizational design approaches
theory to be useful:	
1 Diagnosis	
2 Design	
2.1 Specify a set of essential	
variables and norms	
2.2 Capacity to adapt	
2.3 Specify structural parameters	
which have an influence on	
essential variables	
2.4 Regulation by design	
2.5 Hierarchy	
2.6 Causal or conceptual	
relationship between the	
behaviour of essential variables	
and structure related parameters	
2.7 Design principles	
2.8 Design precedence rules	
3 Implementation	

Figure 1: Overview requirements org. design theories.

2.5 Schematic overview of the research project

To conclude this chapter, a conceptual overview of this study is presented below in a schematic representation. The idea behind the model (and this study) is that three organizational design theories will be analysed by reviewing and comparing their approaches by using the necessary requirements from the conceptual framework. The framework itself is based upon three components, called ingredients framework in this study, because they form the input for the framework.

Figure 2: Overview research project





3. METHODOLOGY

3.1 Literature review

In the existing literature in the field of organizational design one may find academics which have tried to integrate design theories that come forth from the same point of perspective, for example: Baligh, Burton and Obel (1996) have tried to do this for contingency approaches, Christis (2011) and Christis & Soepenberg (2014) have tried to integrate the sociotechnical design theory with Lean, Achterberg & Vriens (2010, 2011) have tried to relate De Sitter's theory with Beer's viable system model etc.. However, few studies attempted to critically review organizational design theories from different perspectives. This study does an attempt to fill in this gap in the literature, especially since it is considered to be very useful to have decent reviews on important theories from different perspectives. This could contribute to existing literature as well as be a useful way for academics and practitioners in the field of organizational design to have an overview and critical assessment of organizational design theories.

The research conducted in this study is not empirical, because theories are not regarded as empirical objects. This study is rather a conceptual, comparative research on existing theories. The objects of study are organizational design theories, which do not necessarily fall in the category of macro theory, neither can they be labelled as micro theory. The term meso theory would be more fitting, since organizational design theories do not study societies (macro) nor do they study individuals (micro), they are aimed at studying organizations, which are an intermediate level of study between macro and micro level (Babbie, 2013). Theory can be defined as 'an ordered set of assertions about a generic behaviour or structure assumed to hold throughout a significantly broad range of specific instances' (Wacker, 1998, p. 364; Sutherland, 1976: 9). Organizations can be defined as 'whenever the pursuit of an objective requires the realization of a task that calls for the joint effort of two or more individuals' (Hax & Majluf, 1981, p. 417). Major components of organizations are:

- Organizations are composed of individuals and groups of people
- Seeking the achievements of shared objectives,
- Through division of labour
- Integrated by information-bound decision processes
- Continuous through time.

(Hax & Majluf, 1981, pp. 417-418; Galbraith, 1977)

Design is concerned with the division of labour and the coordination of the resulting tasks. So, organizational design is concerned with defining the structure of organizations. Considering these definitions, organizational design theories should at least be capable of explaining the concepts and relationships that make up the structure in organizations and give insights on how to design such structures. A literature review is the correct choice of study to assess whether design theories live up to that task³, because this method of study allows to assess, compare and relate the organizational design theories.

There are many definitions and purposes of a literature review, one of such definitions is: 'An interpretation and synthesis of published research' (Murray, 2002, p. 101; Merriam, 1988). Doing a literature review has a purpose in two senses; on the first level it is to learn about the literature, in this case design theories, in the course of writing about it and on the second level reviewing design theories plays a central role in the thesis argument (Murray, 2002). The purpose on the second level translates to understanding and synthesizing theories, relating the theories and their ideas, identifying relationships between these ideas, discovering important, relevant variables and gaining new insights (Hart, 1998).

3.2 Methodology

In general, research can be subdivided in theoretical and applied researches. This research is obviously theoretical. Theoretical research can be described as research and findings of existing literature to develop new ideas by analysing existing theories and explanations (Dubin, 1969). Vennix (2010) argues that the purpose of theoretical research is to generate knowledge, for example to improve theories. He further argues that the idea behind theoretical research is to move the boundary of our knowledge and to gather that knowledge because of the knowledge itself, without directly meaning to practically use that knowledge (Vennix, 2010, pp. 58,146). Verschuren & Doorewaard (2010) presented an overview of different types of research in their work:



Figure 2.1 Types of theory-oriented and practice-oriented research

Figure 3: Types of research (Verschuren & Doorewaard, 2010, p. 41).

³ What is meant by task here is: The claim that organizational design theories are relevant and useful for the design of organizational structures.

This research project is a theory-oriented research in which theories are reviewed, which contributes to: 1) assessing the organizational design theories, and 2) comparing the organizational design theories. In this sense the research is partly contributing to both 'theory testing' and 'theory development', which are the two types of theory-oriented research distinguished in Verschuren & Doorewaard's work (see figure 3).

Verschuren & Doorewaard (2010) provide a method to subdivide the research framework into indentifiable components with central questions. The first part focuses on the sources the researcher needs in order to establish the research perspective. The second part focuses on the analysis of the data. The third part focuses on a comparison of the results of the analysis. This research applies this method, the three parts each have a central question, which are provided in the first chapter (as well as the section(s) to answer the central questions). The process of writing the research has been done in an iterative way. This means that several parts of the research have been reflected, reconsidered, readjusted, refined and/or reformulated. This iterative approach is often the case for a qualitative study (Bryman, 2008). Also, as mentioned in the previous section, the subject in this research is the assessment of organizational design theories. Organizational design theories are part of a literature stream that are not only a descriptive and explanatory science but also a design discipline. 'Design-oriented research' is concerned with investigating:

- 'the problems that cause firms to redesign structures and processes;
- design alternatives and methods of comparing them;
- the process of design: strategies, methods, and power relations; and
- the impacts of implementation.' (De Sitter, Den Hertog, & Dankbaar, 1997, p. 526)

Since this paper is involved in the literature stream that is organization science but also a design discipline in itself, this paper is explorative in nature and concerning the aforementioned bullet points regarding design-oriented research is primarily aimed at the second bullet point: 'design alternatives and methods of comparing them', because this paper compares three organizational design approaches.

The only way to conduct the research is to do an explorative literature study in which the analyses will lead to comparative, evaluative and developing results. Examining the following table the type of research conducted in this paper falls into the first category, an exploratory type of research.

Table 3.2 Goals of research

Туре	Goal
Exploratory	 to satisfy curiosity, provide better understanding or for general interest; to examine the feasibility of further study by indicating what might be relevant to study in more depth; to provide illumination on a process or problem. Questions focus on the how, what, when and where. Studies tend to be small scale and often informal in structure, for example, illuminative evaluation.
Descriptive	 to understand a common or uncommon social phenomenon by observing the detail of the elements that make it a phenomenon in order to provide an empirical basis for valid argument. Questions focus on the how and what. Studies tend to be small scale and qualitative, for example, ethnomethodological research.
Explanatory	 to explain the cause or non-occurrence of a phenomenon; to show causal connections and relationships between variables of the types 'if A then B'; to suggest reasons for events and make recommendations for change. Questions focus on the why and aim to uncover laws and regularities of a universal nature. Studies can be large or small scale and are often based on hypothetico-deductivism and associated quantitative data.

Figure 4: Types and goals of research (Hart, 1998, p. 47).

The research in this paper has an exploratory and evaluative character and the goals as mentioned by Hart (1998) for exploratory type of research can be recognized, since the research will contribute to provide a better understanding of three organizational design approaches; the theories of De Sitter, Galbraith and Burton & Obel (the selection of these theories will be discussed in 3.4). Also, these theories will be analysed by using the presented framework in chapter two, which is a contribution in itself, since it contains elements as to what makes an organizational design theory relevant, useful and complete. Finally, the comparative, evaluating and developing results will also examine the feasibility of further study. In short, this research focuses on the 'what' and 'how' of organizational design theories. For the sake of the consistency of this study, the approaches are to be analysed in the same fashion.

The next section will argue why the necessary requirements have been specified in the theoretical framework, because the theoretical framework is the core of this research and will be used to review and compare the works of De Sitter, Galbraith and Burton & Obel. After that, in the following section, the selection of the authors will be argued.

3.3 The selection of necessary requirements

Since the norm that will be used to compare and review organizational design theories is the theoretical framework as provided in chapter two, it is logical to reason and argue why the choice was made to include ten necessary requirements. The selection of the requirements was made upon relevant existing literature based upon: The masterthesis of Van Laar (2010), masterthesis of Van Wezel (2013), Achterbergh & Vriens (2009, 2011), Rivkin & Siggelkow (2009), de Sitter (1994), Mintzberg (1983), Christis & Soepenberg (2014), Ashby (1958), (Simon, 1996), Baligh, Burton & Obel

(1996), De Leeuw (1986), Vennix (2010), Beer & Nohria (2000), Hax & Majluf (1981) and Womack & Jones (2003). Also, knowledge gained in the Organizational Design course (Radboud University, 2015) was used to select the most appropriate, useful and valuable criteria that surfaced from the literature.

From the literature, five basic and general criteria for the purpose of evaluating organizational design theories can be identified. Five general criteria are: essential variables, parameters, the link between parameters and essential variables, design principles and design precedence rules. However, to have an even more critical selection of criteria, which have been defined as necessary requirements in this theoretical framework, three additional criteria were extracted from the literature: capacity to adapt, design regulation and hierarchy. The reason for this is that the additional requirements allow for a more specific and critical evaluation of the organizational design theories. For example, the third necessary requirement that has been specified in the theoretical framework is the 'capacity to adapt'. This requirement can be seen as a sub-requirement of the second general requirement essential variables. This also applies to the fifth necessary requirement which can be seen as a specific sub-requirement of the structural parameters, since regulation by design could actually be one of the structural parameters. But even if it is not described as a structural parameter, the important feature of regulation by design, which allows the design of the organizational structure to change the structure itself is deemed necessary and should thus not be neglected by organizational design theories. Finally, hierarchy has also been added into the list of necessary requirements and this requirement can be seen as a specific sub-requirement of structural parameters as well. Having hierarchy in an organization is inevitable to have a decision-making system in place and achieve coordination. Therefore, it is logical and deemed necessary that an organizational design theory gives insights about the way the hierarchy should be allocated throughout the organization. In addition to the three additional criteria, which were extracted from literature, two more criteria were added to be able to have a more complete framework. As was explained in chapter two, a change in an organizational structure always has a functional dimension. Therefore, the logical and wellconsidered choice was made to incorporate requirements concerning the diagnosis and implementation phases in the process of organizational design. These additional requirements alongside the general requirements are synthesized into a more complete theoretical framework and allow for a more specific and critical evaluation of organizational design theories.

3.4 The selection of organizational design theories

This research paper is a master thesis project which has a limit in terms of the amount of hours or time available to finish the project. Therefore the selection of three organizational design theories was first of all based upon the assumption that more design theories would not be feasible. The

organizational design theories which are selected cover a considerable area in the field of organizational design, since the theories selected are basically three different approaches / perspectives. De Sitter obviously has been selected since his work is being claimed as being the better theory in the field of organizational design at the Radboud University. His theory, the lowlands sociotechnical system design approach, is a system theoretical approach. The decision was made to select two major theories which are based on other perspectives rather than from the same perspective. So that; 1) Not only one part of the extensive literature in the field of organizational design is covered, but rather a bigger part is brought together in this literature review 2) Theories from different perspectives ought to have bigger differences than theories from the same perspective 3) Theories from different perspectives might have more to learn from each other than theories from the same perspective 4) It is assumed that there is not one perfect approach or theory in the field of organizational design and thus comparing theories from different perspectives ought to bring better and more complete results. Therefore, the decision was made to include one theory from each of the following three perspectives: a system theoretical perspective, an information processing view and a contingency approach. The selected organizational design theories address the same challenge with a different approach. Finally, the theories selected ought to be major theories from important authors which claim to be relevant and useful for the design of organizational structures.

Other organizational design theories, such as the configurational approach of Mintzberg (1983), and a more technological approach, such as the work of Thompson (1967), were considered as well. However, these theories were left out, because they already have been object of study in a review at the Radboud University and were not feasible to adopt in this paper due to time constraints.

3.5 Literature for analysis

Existing literature is the data in this study, because organizational design theories are the objects of study. The selected literature includes the main works of the authors, backed-up by some additional books and/or articles. A short overview of the literature that is part of analysis for each approach (main works are cursively marked):

The work of De Sitter:

- Synergetisch produceren (1994) by De Sitter
- From Complex Organizations with Simple Jobs to Simple Organizations with Complex Jobs (1997) by De Sitter, Den Hertog & Dankbaar
- Chapter 7 & 8 in: Organizations: Social systems conducting experiments (2009) by Vriens & Achterbergh
- Cybernetically sound organizational structures 1: de Sitter's design theory (2011) by Achterbergh & Vriens
- Cybernetically sound organizational structures 2: Relating de Sitter's design theory to Beer's viable systems model (2011) by Vriens & Achterbergh

The work of Galbraith:

- Designing Complex Organizations (1973) by Galbraith
- Organization design: an information processing view (1974) by Galbraith
- Organization Design (1977) by Galbraith
- Designing Organizations: An Executive Guide to Strategy, Structure and Process (1995) by Galbraith
- Designing Organizations: An Executive Guide to Strategy, Structure, and Process –New and Revised– (2002) by Galbraith
- The Future of Organization Design (2012) by Galbraith

The work of Burton & Obel:

- Organizational Consultant: Creating a Useable Theory for Organizational Design (1996) by Baligh, Burton & Obel
- Strategic Organizational Diagnosis and Design Third Edition– (2004) by Burton & Obel
- Organizational Design: A step-by-step approach –Third Edition– (2015) by Burton, Obel & Hakonsson

4. ORGANIZATIONAL DESIGN APPROACHES

In this chapter, three major organizational design theories will be assessed using the theoretical framework as presented in chapter two. The first section will present the lowlands sociotechnical system design approach (LSTSD) by Ulbo De Sitter, the second section will be devoted to the information processing view of Galbraith, the third section is dedicated to the contingency approach of Burton & Obel. The last and final section in this chapter presents an overview of the comparative results.

4.1 The lowlands sociotechnical system design approach by De Sitter.

This section will briefly introduce the LSTSD approach of Ulbo De Sitter, followed by a review indicating the strong points, useful insights and potential shortcomings using the essential requirements as listed in the theoretical framework (chapter 2).

De Sitter is the founder of the modern sociotechnical approach. In his work he explicitly uses cybernetics to formulate rules and principles for the design of viable organizational structures. De Sitter was quite convinced that the traditional sociotechnical approach was correct in its practice, because it was aimed at transforming the structure itself rather than adapting workers to existing technology or to Tayloristic structures. However, De Sitter was dissatisfied with the conceptual and theoretical foundation of the traditional sociotechnical design approach and the design tools it offered (Christis, 2011; Christis & Soepenberg, 2014). Inspired particularly by Ashby's theory (1958), De Sitter reformulated the traditional sociotechnical design approach system theoretically. His aim was to specify how a designer should structure the division of labour in such a way that organizations maintain viability (Achterbergh & Vriens, 2009; Christis & Soepenberg, 2014). One of the major changes is that De Sitter replaced the traditional distinction and combination of a social and a technical subsystem into a distinction between subsystems and aspect systems, because purely social or technical aspect-systems simply do not exist and relations between social and technical aspects can only be studied within subsystems. The focus should be on how the system's structure relates to input-output functions, which have both social and technical dimensions

(Christis & Soepenberg, 2014; De Sitter, Den Hertog, & Dankbaar, 1997).

According to De Sitter et al. (1997), organizations which are confronted with increasing uncertainty and complexity have to invest in organizational redesign in order to survive. Two basic options are: Increasing internal complexity to restore the fit with the environment. In this option more staff functions are needed to coordinate the actual work process, which is organized on the basis of Taylorist principles. The second option, on the contrary, tries to restore the fit with the environment (external complexity) by reducing internal control and coordination needs. This option promotes less staff, less bureacracy and better jobs (De Sitter et al., 1997, p. 498). The first option is described as 'complex organizations and simple jobs', the second option as 'simple organizations and complex jobs'. De Sitter's theory evolves around the second option.

'Sociotechnical theory explains how a specific architecture determines the opportunities for coordination, adaptation, and innovation of system-internal and external functions' (De Sitter et al., 1997, p. 506). The architecture consists of all system elements involved in different aspect- and subsystems which are tied and coupled together. Organizational design is concerned with changing the architecture.

4.1.1 Diagnosis

According to De Sitter, you need criteria to evaluate production systems. The criteria with which production systems can be evaluated are the functional requirements. The functional requirements are the conditions a system should meet in order to fulfil exchange processes with the environment. When a production system fulfils the functional requirements (essential variables), the organization can maintain its viability. According to De Sitter, flexibility and controllability in time would be sufficient to use as criteria when judging organizations, however these criteria are too abstract. That is why De Sitter argues that an organization can be evaluated in terms of realizing productive flexibility, productive controllability, productive innovation potential and productive quality of labour. This type of evaluation is needed to know what an organization structure ought to realize. For practicable criteria as to diagnose what an organizational structure ought to realize, the internal functional requirements in the work of De Sitter can be used (see 4.1.2.1) (De Sitter, 1994, pp. 41-42).

In order to evaluate a present organizational structure, not what it should realize but how it should realize the functional requirements, the structural parameters in the work of De Sitter can be used. Because the structural parameters have an influence on the functional requirements. As De Sitter argues in his work, the parameters can be used in three ways (see 2.3.1). One of which is to use the design parameters as a tool to analyse a present structure. The structural parameters in De Sitter's work can have different values which makes them applicable as in terms of performing a diagnosis on an organizational structure. In his work he argues which values on the parameters are problematic and which values the parameters should have (see 4.1.2.3) as to design an adequate organizational structure which attenuates and amplifies as much as possible and optimizes controllability. De Sitter argues in his work about problematic organizational structures. He extensively explains the causes and provides examples as to why certain organizational structures, such as a functional concentrated structure and a line structure, are problematic. He even goes as far as providing a list of potential bottlenecks which could be the consequences of a structural problem (Sitter, 1994, p. 67).

De Sitter points out that when these bottlenecks are recognized in a present structure they can only be solved by structural measures. These problematic structures and potential bottlenecks are very practical in the sense that they can be recognized by designers in practice when analysing organizational structures. They are useful for the performance of a diagnosis as to find out why a present organizational structure should be changed / improved.

De Sitter's work does offer criteria for the performance of a diagnosis, both in terms of what an organizational structure should realize and how the structure should be designed. His work is also useful for recognizing structural problems as to realize whether a re-design should be considered. However, De Sitter does not provide any steps or handouts as to how a diagnosis should be performed.

4.1.2 Design

This section will comprehensively review the design elements in the LSTSD approach of De Sitter. Each sub-section discusses one necessary requirement.

4.1.2.1 Essential variables

In the sociotechnical design approach the system-internal and external functions are translated into functional requirements. The functional requirements are based upon three classes of relevant organizational variables proposed by De Sitter, which organizations should keep in check in order to survive: Quality of organization, Quality of work, Quality of working relations (Achterbergh & Vriens, paper 1, 2011). See table below:

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7 Specific Design Principles: de Sitter's Organizational Structures

External functional requirements		Internal functional requirements	
Quality of	order flexibility	Short production-cycle time	
organization		Sufficient product variations	
_		Variable mix of products	
	control over order realization	Reliable production and production time	
		Effective control of quality	
	potential for innovation	Strategic product development	
	-	Short innovation time	
Quality of work	low levels of absenteeism	Controllable stress-conditions;	
	low levels of personnel turnover	Opportunities to (1) be involved, (2) learn, and (3) develop	
Quality of working relations	Effective communication	Shared responsibility participation in communication	

 Table 7.3 External and internal functional requirements (adapted from De Sitter 1994, p. 42)

Figure 5: External and internal functional requirements (Achterbergh & Vriens, 2009, p. 242; Sitter L., 1994, p. 42).

The variables are separated in external and internal functional requirements. The external functional requirements are the variables an organization should fulfil to be able to maintain viability. De Sitter argues that the viability of organizations will be threatened if organizations can not reach appropriate levels on the external requirements. The external functional requirements are translated into internal functional requirements, which means an organization should strive to fulfil the internal requirements to satisfy the external requirements accordingly. According to De Sitter (1994), adequacy of an organizational structure can be evaluated as to what extent it is able to meet all the functional requirements at the same time. The external requirements come down to:

- Flexibility (=flexible = fast = efficient)
- Controllability (=precise = reliable = effective)
- Potential for innovation (creative renewal & improvement)
- Quality of work (Human Resources Mobilisation) (De Sitter, 1994, p. 42)

According to De Sitter it is about productive flexibility, productive controllability, productive innovation capacity and productive quality of work, productivity can not be realised per external requirement, but has to be realized in mutual cohesion. That is why the functional requirements have to be realised at the same time in their cohesion. The interrelatedness of the requirements is determined by the structure. The requirements resulted in three relevant organizational variables, which are three types of quality norms; The quality of organization is defined by De Sitter as the potential to effectively and efficiently realize and adapt the organization's goals. The quality of work refers to the personnel's relations to their job; dealing with work related stress and enhancing job's meaningfulness. The quality of working relations refers to the degree of effective communication in organizations (Achterbergh & Vriens, 2009; Achterbergh & Vriens, 2011; De Sitter, 1994).

Assessing De Sitter's work clearly shows that the functional requirements are the essential variables in the LSTSD approach. In his approach he also specifies norms for his set of essential variables by translating the external functional requirements into internal functional requirements. These norms should be fulfilled in order to be able to satisfy the essential variables. De Sitter also clearly argues as to why the essential variables have been specified. According to De Sitter, organizations should keep the essential variables in check in order to survive (maintain viability). He also points out that all the requirements should be met at the same time in mutual cohesion. In sum, De Sitter's approach has a set of very well categorized, specified and explained essential variables, which is a strong point in his work and provides useful insights.

4.1.2.2 Capacity to adapt

The second necessary requirement in the theoretical framework is the capacity to adapt, more to the point, the norm value of at least one of the essential variables has to be about flexibility or the capacity to adapt. One of the classes of functional requirements in De Sitter's work is specified as 'Quality of Organization'. This category is about the capability of organizations to effectively and efficiently realize and adapt the goals defining their identity (Vriens & Achterbergh, 2011). The first variable is about flexibility, which is translated to three internal requirements. So, the norm value of at least one of the essential variables in De Sitter's theory is about flexibility. Which is translated into:

- short production-cycle time
- with sufficient product variations
- to deliver in varying volumes
- in a variable mix (of products)
 (De Sitter, 1994, p. 45)

This is also evident by De Sitter's argumentation that the functional requirements all have to be met at the same time in order to, amongst others, achieve productive flexiblity. Moreover, potential for innovation is also a contributor in the organization's capacity to adapt. With regards to potential for innovation, De Sitter (1994) argues that the market changes and an organization should keep up with the changes or preferably be one step ahead.

Observing the set of essential variables in De Sitter's approach shows one of his variables is about flexibility and / or the capacity to adapt, which results in atleast one of the norm values to be about flexibility

4.1.2.3 Structural parameters

The third requirement is that an organizational design theory specifies structural parameters which have an influence on the essential variables. According to De Sitter, an organizational structure can be defined as: 'The grouping and coupling of transformations into tasks and the resulting relations between these tasks relative to orders' (Achterbergh & Vriens, 2009, p. 240). Since the structural parameters in his theory capture relevant characteristics of the organizational structure, the parameters are primarily focused on the network(s) of transformations and tasks in an organization. This is quite logical since De Sitter focuses a lot on divisions of labour in his work. De Sitter et al. (1997), suggest that designers should know the basic structural parameters, how they are related to organizational deficiencies and which parameters are involved in design questions and why. The art of designing the division of labour (organizational structure) is, by decomposition of transformations

(both regulatory and performance transformations) and the composition of the resulting subtransformations, to get to a good 'network of regulatory and performance tasks'

(Achterbergh & Vriens, 2009).

According to De Sitter (1994), this means that there is a 'production structure' as well as a 'control structure'.

- production structure: the grouping and coupling of performance functions.
- control structure: the allocation and coupling of control functions.

(De Sitter et al., 1997, p. 507).

The production structure refers to the grouping and coupling of operational transformations into tasks in their relation to orders and the control structure refers to the grouping and coupling of regulatory transformations into tasks in relation to the production structure. (Achterbergh & Vriens, 2009, pp. 240-241; De Sitter, 1994, pp. 93-100) The structural parameters are the core aspects⁴ characterizing the production and the control structure (Sitter, 1994). De Sitter describes seven structural parameters in his work:

- Parameter 1: Functional concentration. The degree to which grouped and allocated operational tasks are related to all order types. A high functional concentration means that all tasks are connected to all order types. A low functional concentration is when every order (production-flow) is connected with tasks that can realize the particular order (type).
- Parameter 2: The degree of differentiation of operational transformations. De Sitter makes a distinction in three types of operational activities: preparation, supporting and making. When these activities are divided to specific tasks the parameter has a high value. When tasks contain all these activities the parameter has a low value.
- Parameter 3: The degree of specialization of operational tasks. This is the same as vertical decomposition, in which tasks are split up into smaller sub-tasks. High specialization means that operational transformations become more specialized and are split in separate tasks. Low specialization and thus a lower value on this parameter can be realized when sub-transformations are integrated into one task.
- Parameter 4: The degree of separation between operational and regulatory tasks. This refers
 to the degree of separation between the operational and the regulatory part of
 organizational activities. When they are assigned to different tasks the separation is high and
 the parameter value is high as well. A low separation means that the activities are assigned
 to the same tasks by which a low value on this parameter can be achieved.

⁴ The structural (design) parameters are also referred to as dimensions and characteristics in the works of respectively: De Sitter, Den Hertog, & Dankbaar, 1997, p. 506 & Achterbergh & Vriens, 2009, p. 247

- Parameter 5: Control differentiation. The degree to which the three levels of regulation, strategic regulation, design regulation and operational regulation, are grouped into different tasks (high value). When all three levels of regulation are grouped into the same tasks, there is a low value on this parameter.
- Parameter 6: Division of control functions. According to De Sitter the control of tasks has three activities: monitoring, assessing and acting. When these three dimensions of control are performed in separate tasks there is a high value on this parameter. When the reverse is the case, the parameter has a low value.
- Parameter 7: Control specialization. The level of specialization of regulatory activities. This is
 vertical decomposition of regulatory tasks, in which the regulatory tasks are split up into
 smaller sub-tasks. A high value on this parameter means a high degree of split sub-tasks. A
 low value on the parameter is realized when regulatory sub-tasks are integrated into one
 task.

(De Sitter, 1994;De Sitter et al., 1997; Achterbergh & Vriens, 2009; Achterbergh & Vriens, 2011)

The first parameter, functional concentration, is argued to be the most important one, because this parameter can be a source of a lot of disturbances and limits the freedom of choice with regards to the other parameters (De Sitter et al., 1997). The uniqueness in the set of parameters in De Sitter's work is that the parameters are relevant for attenuation and amplification (controllability) and are used to describe both the production as well as the control structure. The first three parameters are about the production structure, the fourth parameter is about the separation of the production and the control structure and the last three parameters are about the control structure. Different values on the parameters has specific effects on the controllability and the functional requirements (essential variables).

One could argue about the completeness in the set of parameters in his work, because it is entirely focused on transformations and tasks. One may wonder about centralization, formalization, communication and / or information processing etc.. Yet, the specified structural parameters in De Sitter's theory are explicit, unique, well explained and give valuable insights about the structure and the effect on controllability and the essential variables.

4.1.2.4 Regulation by design

The concept of controllability plays an important role in De Sitter's theory. For this is the reason that De Sitter argues that the basic sociotechnical question is to improve a system's 'controllability', which according to him is 'the ability to achieve a range of objectives'. This ability should be attained by improving the system's generic capacity to control, to design the structure in such a way that it increases the potential to regulate and minimizes the chances on disturbances (De Sitter, Den Hertog & Dankbaar, 1997; Achterbergh & Vriens, 2009).

Regulation can be defined as 'blocking the flow of variety from disturbances to essential variables' (Achterbergh & Vriens, 2009, p. 54). According to De Sitter, required regulation is triggered by external variation and system-internal variation. Which means there are external (environmental) disturbances impinging on the organizational structure, but the structure itself can also be a source of disturbances. These disturbances, both external and internal, could have a negative effect on realizing the functional requirements (essential variables). Hence, it is important to tackle the disturbances.

De Sitter	
External non-routine regulation by chang- ing essential task variables and/or their norms	Strategic regulation
External non-routine regulation: attenuat- ing task-external disturbances by redesigning network of tasks or change environment otherwise;	Regulation by design
Internal non-routine regulation: attenuating task-internal disturbances by redesigning the tasks internal infrastructure;	
Internal non-routine regulation by amplifi- cation, i.e. increasing routine regulatory potential	
Both internal/external routine regulation	Operational regulation

Figure 6: Three types of regulation (Achterbergh & Vriens, 2009, p. 240).

Regulation can be done on three levels according to De Sitter; strategic, design and operational regulation. In fact this means that there are three channels by which an organization can deal with the possible occurrence of disturbances. Strategic regulation is concerned with changes in the environment. This regulation takes place by adjusting the vision and / or reformulating the goals. Regulation by design is concerned with providing a mechanism or regulation table by which operational regulation becomes possible. By designing such a mechanism it becomes possible to build in the necessary regulatory potential in the network of tasks. Operational regulation takes place within a given structure. However, nothing is perfect, problems may occur which can not be solved
by operational regulation according to norms set by a regulation table. This means that something in the structure has to be changed (Achterbergh & Vriens, 2011; De Sitter, 1994). The changes are nonroutine changes, have to be developed by learning and need to be adjusted in changing conditions according to De Sitter. So, regulation by design is concerned with the organization of the processes, because something in the 'way of working'⁵ is being changed. De Sitter goes as far as describing regulation by design in terms of monitoring, assessing and acting which are neccesary to get the organization of the processes to the right standards. However, De Sitter emphasizes that the design of the organizational structure is part of regulation by design.

Thus, regulation by design is an important topic in the work of De Sitter. Regulation by design is one of the three levels of regulation in De Sitter's work and perhaps the most important one. Even some of the structural parameters have been directed towards improving regulation by design. The important feature of regulation by design is well acknowledged in the LSTSD approach of De Sitter.

4.1.2.5 Hierarchy

The LSTSD approach of De Sitter is very much focused on controlling the production processes in the organization and improving the structural conditions for the workforce. De Sitter argues that two characteristics stand out when it comes to stress and alienation in the workforce: work pressure and regulating capacity (De Sitter, 1994). De Sitter argues that a functional structure is problematic, because work is divided into specialized departments and the number of relations or interfaces between performance functions and specialized departments is high, which increases variation. This means that the organization has a high number of relations (between departments) and a high number of variation within those relations (De Sitter, Den Hertog & Dankbaar, 1997). This denies the possibility for cooperation and coordination with regards to process improvement in customer orders. There is no possibility for team formations with a common responsibility for customer orders. Moreover, in a functional concentrated structure, the labour force lacks regulation potential to achieve mutual alignment in their work. The focus in functional structures is hierarchical control and this leads to tension between workers and team managers. The lack of regulation possibilities for the workforce also leads to stress (De Sitter, 1994).

To counter problematic functional concentrated structures De Sitter proposes parallelisation and segmentation. In the new parallel structural design, group production takes place in which parallel working teams are responsible for customer orders. According to De Sitter the new division of labour changes a lot in the hierarchical structure, because tasks which used to be done through chefs or

⁵ It includes changing the task's infrastructure. So, the capacity to change the organizational structure itself is included.

workmasters is now done within groups. De Sitter goes as far as claiming a complete hierarchical layer disappears. This is because a lot of stuff is handled within teams and the teams regulate themselves with other production units (in a quasi-autonomous manner).

However, even though De Sitter argues that the hierarchical structure changes when the structure is changed from a problematic division to a more adequate division he does not give any more specifics. So, the LSTSD approach of De Sitter gives very limited insight with regards to hierarchy in organizations.

4.1.2.6 Link between parameters and variables

The essential variables in the LSTSD approach are closely tied to the survival of organizations. The variables have to stay within certain limits in order to maintain the organization's viability. The structural parameters capture relevant characteristics of the organizational structure. Different values on the structural parameters have different effects on the functional requirements (essential variables). According to De Sitter the organizational structure should support organizations dealing with complexity. This is important, because high complexity means a lot of relations and variety of relations between tasks in the organizational structure. To ensure the structure can deal with complexity De Sitter argues that the organizational structure should have the capability to attenuate and amplify. Attenuation is reducing the probability of the occurrence of disturbances. Amplification is to increase the regulatory potential. So attenuation makes sure disturbances occur less frequently and amplification enables an organization to deal with the remaining disturbances. This is quite logical since one can imagine that an organization in which a high number and variety of relations in the network of tasks exist the chance on the occurrence of disturbances increases.



Note: Parameter values affect attenuation and amplification, which, in turn, affect functional requirements

Figure 7: Relationship between parameters & variables (Achterbergh & Vriens, 2011, p.411).

The idea in De Sitter's work is to reduce complexity as much as possible, which means less relations and less variety between tasks in the structure, by building a structure that attenuates and amplifies as much as possible using the structural design parameters. Different values on the structural parameters influences the capacity of the structure to attenuate and amplify which in turn affects the realization of the essential variables. De Sitter argues that the values of the structural parameters should be set as low as possible so that the underlying structure is able to attenuate and amplify and realize the essential variables (Achterbergh & Vriens, 2011).

The LSTSD approach of De Sitter has a clear, logical explanation for the relationship between the structural parameters and essential variables based upon complexity.

4.1.2.7 Design principles

The first design principle in the work of De Sitter is that the approach should be integral. De Sitter argues that there are only two possibilities. The alternative is a partial approach, which is an approach on the level of subsystems or aspect system. However, De Sitter argues that that a partial approach neglects the relations between subsystems which would result in problems remaining unsolved. Many organizational problems have a structural nature, that is why De Sitter's first design principle is to adopt an integral approach (De Sitter, 1994).

The second design principle is that an organization should clearly define the primary process. De Sitter argues that a redesign is impracticable as long as the primary process is not known. The main question is: What do we produce for whom? (De Sitter, 1994, p. 206). De Sitter specifies the primary process as: 'The process for which a system has been specifically designed to produce one or more specific products or services' (De Sitter, 1994, p. 205).

The third design principle is that the goal of the design approach is controllability of the system in time. De Sitter admits that this goal as a design principle is insufficient. He added four specific generic design goals to support this design principle: productive flexibility, productive controllability, productive innovation capacity and productive quality of work. The controllability is a quality of the system that brings fourth the process. The end goal of the design should not be controllability of organization goals, but rather controllability of the system to select and pursue such goals (De Sitter, 1994, p. 207).

The fourth design principle is the concept of controllability as a design principle. This design principle is probably the most important one in the LSTSD approach of De Sitter. It is aimed at reducing complexity in the structure of the organizational design. 'Increasing complexity is an increasing inability to deal quickly and adequately with changing demands made upon the organization, i.e., in reduced control' (De Sitter, Den Hertog & Dankbaar, 1997, p. 509) In order to counter complexity and increase controllability the basic principles should be:

- Reducing disturbance probabilities by a reduction of impending variety (attenuation)
- Reducing disturbance sensitivity by increasing control capacity (amplification)

(Sitter, Hertog, & Dankbaar, 1997; Achterbergh & Vriens, 2011) The degree of controllability: $Controllability = \frac{Potential for regulation}{Required regulation}$

Figure 8: Controllability (Achterbergh & Vriens, 2009, p. 246).

In this concept of controllability both effectivity and efficiency must be satisfied. More potential for regulation than required regulation is not efficient and less potential for regulation than required regulation is not effective. De Sitter argues that the required regulation should be as low as possible

and potential for regulation should be proportional to required regulation (De Sitter, 1994). The fifth and sixth design principles are about the production and control structure. The fifth design principle states that there are two central design objects: Production structure & Control structure. The sixth design principle combines the concept of controllability and the object of design. It states that a design principle for the production structure is to increase possibilities for process variation and lower the variation required. Design principle for the control structure is to increase availability of control information and decrease control information required. De Sitter also argues that the aim of the production structure is to lower required variation (attenuation) and the control structure ensures increased possibilities for process variation are utilized (De Sitter et al., 1997).

Now that the design principles have been reviewed, it is important to note that the overall-design principle / guideline in De Sitter's work is: 'The lower the values on these design parameters, the more the underlying structures will be able to attenuate and amplify, and the better the prospect of realizing the functional requirements' (Achterbergh & Vriens, 2011, p. 411). So, the overall design principle is to set the value of the structural parameters as low as possible to design an adequate structure with optimal controllability.

The design principles lead to design strategies which have been worked out in great detail in De Sitter's work. He also refers to the strategies as solutions in his work. It is impossible to give a full account of the design strategies in De Sitter's work here. In short, his strategies focus on parallelisation at macro level to create semi-autonomous, independent, parallel flows which are allocated to particular output category / product market combinations (orders). These flows contain make, prepare and support processes as well as strategic regulation. External input variety is reduced by creating these individual flows.

The focus of attention at meso level is segmentation and integration of the flows. Performance operations with a maximum of mutual interdependence in direct production are selectively clustered into segments with a minimum of interfaces which allows for semi-autonomous sequential segments. The next step is to realize independent horizontal alignment between segments and an integration with support and preparatory functions. The aim of segmenation is to reduce internal variety. Overall parallelization and segmentation allow for a great reduction of required variation (attenuation).

On micro level the focus is to create interdependent teams and taskgroups. At this level performance and regulatory work is divided over individuals and machines. It is about the division of tasks within the segment of a flow. The quality of work can be improved by increasing regulatory potential in each task and decreasing required regulation. At micro level it is not feasible to merely limit the attention to performance functions, both performane and control functions have to be considered simultaneously. This can be done with the structural parameters; parameter 2 up to parameter 7 (De Sitter, 1994; De Sitter et al., 1997).

The LSTSD approach of De Sitter has a considerable, well explained set of design principles. They can logically be used with the structural parameters. Not only does De Sitter's work offer design principles, his work also provides design strategies which are worked out in great detail. Therefore, it is safe to say his work does strongly fulfill the requirement for offering a set of design principles with regards to the design of the production and controle structure as to realize an adequate structure.

4.1.2.8 Design precedence rules

The first design precedence rule in the work of De Sitter is to formulate functional requirements on the basis of what he calls an 'air castle'. The meaning is that a redesign is fruitless if a lot of the existing structure is taken for granted, i.e., every facet and every part of the system should be able to change and everything can be discussed (to change). If this is not the case, if a designer limits a redesign to a subsystem, it will not lead to an adequate integral redesign.

The second design precedence rule is to design the production structure first and then design the control structure. As De Sitter argues, it is not sensible to design the control structure if you do not know what needs to be controlled. Since the production structure divides the performance tasks it is obvious to start with the production structure.

The third design precedence rule is that the production structure is designed in a top-down fashion. The design for the structure of independent teams and task groups in segments has to be prepared first at macro and meso level by parallelization and segmentation. So the production structure is designed from macro to meso level to micro level. All functional requirements have to be considered in every design phase (levels).

The fourth design precedence rule is that the control structure has to be designed in a bottom-up fashion. The designer has to start allocating the three levels of regulation to specific locations in the process. If a designer would allocate top-down it would lead to potential regulation getting assigned to central management instead of local units. So start allocating potential regulation at micro level to to continue at meso and finally macro level.

The final design precedence rule is that production technological functional requirements have to follow the design of the segmentation at meso-level. Specific decisions about the technical dimension of the infrastructure have to follow the design at micro level; The design of the internal structure of task groups (De Sitter, 1994).

The design precedence rules in the LSTSD approach of De Sitter make a lot of sense, since it is logical to design the production structure first and then the control structure etc.. But in all, the precedence rules are formulated pretty general and abstract.

4.1.3 Implementation

The LSTSD approach of De Sitter promotes a participative change strategy. The first step for redesign is to raise awareness for the need to change. Management, staff, workers etc.. have to believe in the new route and resources must be made available. Top management has a crucial role, because leadership is demanded. The organization must be made aware and ready for the decision to invest and start an intensive change effort (De Sitter et al., 1997).

A following step is to do a structural exploration in which a distinction is made between structural and non-structural problems. This can be done by training courses throughout the organization. This allows for starting up improvement activities by the workforce and enhances support for the process of change, because problems are getting solved. The main vehicle for changing the structure is an intensive training program. The objective is to enable organizational members to take design in their own hands in a participative way. The members feel that their problems and opinions are taken serious. Moreover, organizational members start to understand each other, because they learn to speak the same language. This way of redesigning, in which a substantial number of employees are involved in training and participation, takes a considerable length of time. However, if it creates wide support for the change trajectory, it is worth the investment. Also, a redesign based upon knowledge throughout the organization. Finally, the implementation of a design is done much quicker when there is a broad back-up throughout the organization (participative) than an implementation imposed from top management. An overview of what an organizational design change trajectory should look like:



Fig. 2. The change trajectory. Figure 9: Design change trajectory (De Sitter, den Hertog, & Dankbaar, 1997, p. 517).

The change trajectory is iterative, it can go back- and forward in trying to realize satisfying solutions. It is clear that the LSTSD approach of De Sitter heavily favours a participative change trajectory. It is also clear that in the work of De Sitter there is a clear understanding of the intertwined nature of a redesign and the involved changing process. He provides solid arguments in his work as to why a redesign in a participative manner is favoured. He does offer some (useful) insights for the implementation phase of the design process, however, it should be noted that these insights are quite brief.

4.2 The information processing view by Galbraith.

This section will briefly introduce Galbraith's organizational design approach: The information processing view. In the next parts of this section his approach will be reviewed by using the theoretical framework in this paper.

Galbraith is an important author in the field of organizational design and organization development. Galbraith has written many primary works in the field of organizational design, such as: Designing complex organizations (1973), Organization Design (1977), Designing Organizations: An Executive Briefing on Strategy, Structure, and Process (1995) etc. 'Although the analysis of organization structure has always been a difficult problem to deal with systematically. Galbraith has found a way to bring order to this complex area by building on previous theories and integrating them around his information-processing view of organizations' (Galbraith, 1973, p. vi). Even though, Galbraith incorporates insights from several previous literature studies, his overall work can be labelled as an information processing view (Baligh, Burton, & Obel, 1996, p. 1651; Galbraith, 1974).

Galbraith's work is primarily influenced by the work of two authors. Galbraith was greatly impressed by the work of James D. Thompson. He was able to take his doctoral seminar as Thompson was writing Organizations in Action (1967) and was influenced by him to study organizations. It provided a basis for some of the content in Galbraith's work. Another important author, which influenced the work of Galbraith was Herbert Simon. Galbraith somethimes had the feeling he was doing nothing else than rewrite his ideas on the basis of ten years of empirical data. The type of organization design that he practices is strategic organization design. It has its roots in Chandler's (1962) work which states: "Structure follows strategy" (Galbraith, 2012, p. 3). His work is a top-down design methodology. And according to Galbraith, the socio-technical systems approach is a bottom-up design approach alternative, even though he claims it is most applicable at lower levels of the organization. The purpose of his work is to present a model with which alternative organizational forms (structures) can be identified and evaluated (Galbraith, 1973). Galbraith argues that his approach is closely tied to the contingency approach, because the contingency approach deals with uncertainty and has two basic conclusions: 1) There is no single best way to organize. 2) Not every way of organizing is effective (Galbraith, 1973). Galbraith's definition of organizations is that they are: '1) composed of people and groups of people 2) in order to achieve some shared purpose 3) through a division of labour 4) integrated by information-based decision processes 5) continuously through time' (Galbraith, 1977, p. 3). Now, he argues that organization design is concerned with a decision process to bring coherence between the goals of an organization, the patterns of the division of labour, interunit coordination and the people who perform the work (Galbraith, 1977).

4.2.1 Diagnosis

No matter where the starting point is, strategy provides the focus. The decision process when changing or designing the organizational structure begins therefore with an analysis of the diversity of the business (Galbraith, 1995).



Figure 10: Diversity analysis (Galbraith, 2002, p. 159).

So, in the process of choosing a structure, the first cut is to determine whether the business is service or product based and whether the organization produces single or multiple products or services. Which makes four basic starting points as figure 10 shows. The next step in the analysis is to question whether the organization serves a single or multiple and distinct geographical areas. The next priorities are concerned with operations, marketing, purchasing, finance, human resources etc. The designer moves through these organizational dimensions in the decision process by considering them and assigning priorities based on the strategy. The next issue is whether any activities require scale or expertise. The analysis has to find out whether a functional structure, process structure, geographical structure, hybrid structure or divisional structure is more fitting. When the organization produces multiple products or services a second analysis is needed to determine the structure within each division (Galbraith, 2002). The analysis can lead to different choices of structure and lateral processes.

Galbraith shows in his work that different types of structure can possibly emerge from the analysis in his work. However, the analysis he presents in his work for choosing the right structure is very limited for diagnosing a present organizational structure. His analysis seems to be aimed at aligning strategy and organizational structure choices rather than analysing a given (present) organizational structure.

4.2.2 Design

This section will review the information processing view of Galbraith by going through the necessary requirements that are essential for the design phase of designing organizational structures. This section is divided in eight sub-sections.

4.2.2.1 Essential variables

The purpose of Galbraith's work is to conceive organizations as information-processing networks and to make clear why and through what mechanisms a relation exists between structure on the one hand and uncertainty and information on the other hand (Galbraith, 1973). According to Galbraith, to tackle the design problem when designing organizations two important considerations should be made: The first is that subtasks should be organized in such a way that it facilitates the effective performance of those subtasks. As long as subtasks differ in terms of predictability, different structures should be used. The second is the design-problem of integrating differentiated subtasks as to achieve successful completion of the whole task. The right way to integrate subtasks depends on the degree of differentiation between the subtasks. The greater the differentiation (differences) between subtasks the harder it is to realize effective collaboration. An important following assumption is that the predictability of the organization task is a basic conditioning variable in the choice of an organizational structure. Galbraith argues therefore that differences in organizational structures are differences in the strategies of the organization to 1) increase their ability to pre-plan, 2) to increase their ability to adapt more flexible when pre-planning is not possible, 3) to lower the performance level so as to realize continued viability (Galbraith, 1973).

A basic essential variable in Galbraith's design approach is therefore the predictability of the organization task. An even more important and logically following essential variable is the capacity of the organization to deal with task uncertainty, because the primary effect of uncertainty is that the organization becomes limited in her possibilities to pre-plan or to make decisions before they have to be executed. So, organizations need to be able to deal with task uncertainty. Uncertainty is explained by Galbraith as the difference between the amount of required information to perform a task and the amount of information the organization already has.

The required information for the performance of the organization task is the function of:

- The diversity of the output (products, services, customers)
- The diversity of the input resources
- The level of difficulty of goals or performance

The greater the diversity, the greater the complexity, the greater the amount of information required when making decisions. So, uncertainty is the relative information which has to be processed when performing the task relative against the required information and the information the organization already possesses. Key concept is the information processing during task performance (Galbraith, 1973). Even in predictable situations, when most of the coordination is pre-planned, organizations have to process information during decision-making. This depends on the division of labour, the diversity of the output and the level of performance (Galbraith, 1973). A balance between required information and information to be processed has to be realized. If not, level of performance of the organization will decrease.

Galbraith, in his concept of organization design, has divided task uncertainty in three elements: task diversity, task difficulty and task variability. He argues: 'These studies found that task variability, diversity, or difficulty were systematically related to structure, leadership style, personality, and decision processes' (Galbraith, 1977, p.31).



Figure 11: Concept of organization design (Galbraith J., 1977, p. 31).

For the purpose of this paper the concepts of 'people' and 'reward systems' are left out, since they belong to human resources management. An overview of the essential variables in Galbraith's work: #-Predictability of the organization task

#-The capacity to deal with task uncertainty

#-Task diversity

- #-Task difficulty
- #-Task variability

The second essential variable in Galbraith's work is divided in three sub variables. The essential variables in Galbraith's work are quite abstract and one may wonder about the completeness of the variables in his approach. His approach does not offer norm values for the variables, except that a balance between information required and information processing capacity has to be realized. It is simple and abstractly formulated that the only desired effects for an organizational structure is to realize the capacity to deal with uncertainty and or increase predictability.

4.2.2.2 Capacity to adapt

Galbraith argues that organization design is a continuous process. This makes organizing to be a continuous management task, like budgeting, scheduling or communicating. 'A continuously changing business environment requires a continuously changeable organization to keep pace' (Galbraith, 2002, p. 154). The predictability of the business environment has an influence on the future strategy and desired values. Other than the desired values, the long-range strategy also provides criteria for choosing the future organizational type (structure). The first changes should be aimed at fixing current problems. If the current organizational structure does not fit with the business environment, design changes should be made to fix what is not working today, consistent with the organization of the future. However, strategy is not always known. Galbraith argues that if the strategy is not known the structure should not be changed, because you need a clear strategy to change the structure. The future can be unknowable, in that case, the current structure should be used or a generic functional one focusing on processes. If the strategy always changes, the designer has to continuously use processes. In that case reconfigurable project teams are the essence of the flexible organization. These project teams should manage the current business, learn about new business and as learning proceeds try to formulate new strategies (Galbraith, 1995).

So, in order to increase the adaptability of the organization Galbraith proposes the use of organization structures and processes that are easily reconfigured and realigned with a constantly changing strategy. (Galbraith, 2002, p. 75) In other terms, the structure should be designed in such a way that the structure and processes adjust and change all the time (see 4.2.2.4).

Galbraith does recognize the need for shifting strategies in changing business environments, along with an alignment in strategy, structure and processes. However, the capacity to adapt or the flexibility of the organization is not a norm value of one of the essential variables in Galbraith's work. It is rather the design process, in which structure follows strategy, from which the necessity to be able to adapt is derived.

4.2.2.3 Structural parameters

Two sets of structural parameters can be identified in Galbraith's work. A set of parameters which have an influence on the essential variables and a set of parameters which describe the structure. The first set of parameters are closely tied to uncertainty and result in the design strategies in Galbraith's work, which are perceived as design proposals in this review (see 4.2.2.7). These parameters are about the integration problem of the subtasks to realize effective completion of the organization task.

According to Galbraith, the design problem is that the executors of the subtasks cannot communicate with all the roles with whom they are interdependent (Galbraith, 1974). So, he argues that mechanisms are needed to permit coordinated action across all the interdependent roles (subtasks). When uncertainty increases and more information processing is needed, these mechanisms ensure the organization increases its information processing capabilities (Galbraith, 1974). To process the greater amount of information necessary, organizations must evolve these mechanisms to maintain the level of performance. 'In order to coordinate interdependent roles, organizations have invented mechanisms for collecting information, deciding, and disseminating information to resolve conflicts and guide interdependent action. The collection of mechanisms used constitutes the organizing mode of the organization' (Galbraith J. , 1977, p. 40). The organizing mode is the organizational structure, which is constituted by the first set of parameters⁶:

- Parameter 1: Coordination by rules or programs or procedures. When job related situations and desired behaviour can be predicted in advance, rules, programs or procedures allow interdependent activities to be executed without the need for communication between interdependent parties. Thus, the virtue of rules is that they eliminate the need for inter-unit communication and the decisions for situations that can be anticipated in advance are decentralized to the lowest level. A coordinated pattern of behaviour results if everyone adopts the appropriate behaviour.
- Parameter 2: Hierarchy of authority. Some members play coordinating or managerial roles and these roles are arranged in a hierarchical form in every organization. These representatives have a legitimate authority to influence other members' behaviour in resolving conflicts and coordinating interdependence. The hierarchy form is an efficient information-processing mechanism, because hierarchical channels reduce the number of channels that each subunit must maintain and yet ties the interdependent units together. Hierarchy allows organizational members to employ hierarchy for situations for which they have no rules (exceptions). However, the hierarchy has a limited range and can become overloaded as uncertainty increases (more exceptions).
- Parameter 3: Coordination by planning and targets or goals. Instead of specifying specific behaviours to be enacted by rules and / or programs, organizations undertake the process to determine goals or targets to be achieved and allow employees to select appropriate

⁶ This set of parameters is analysed in this review as a set of parameters, because these are characteristics of the structure which have an impact and influence on the essential variables. Galbraith, however, calls them coordination mechanisms.

behaviour which lead to the goal or target. Thus, goal setting allows for discretion at the subtask level while maintaining coordination between interdependent subtasks. Planning achieves integrated action and reduces the amount of information processing, by eliminating the need for continuous communication between interdependent subunits. Setting meaningful subgoals to guide subunit action is crucial to realize coordination of interdependent subtasks.

Parameter 4⁷: Narrowing span of control. This parameter is an adjustment on the second parameter. A hierarchical network can become overloaded when uncertainty increases. This happens when the number of sources of information and exceptions become too much for managers to handle. So, these are reduced to a number, at which the managers have the capacity to handle them. The overall effect is that the number of managers increases, with which the information processing capabilities in the organization increases.

(Galbraith, 1974; Galbraith, 1977)

The second set of parameters in Galbraith's work are mentioned as 'policy areas' or 'dimensions'. They are shown in figure 11 (4.2.2.1) under the area of choice 'structure'. 'It is important to become familiar with the four policy areas that determine the structure of an organization. These policy areas, or dimensions are the following:' (Galbraith, 1995, pp. 19-20).

- Specialization: Number of disciplines to be used in the organization task.
- Shape: Number of people constituting the departments at each level of the structure.
- Distribution of power: First concept is the vertical distribution of decision-making power and authority; centralization or decentralization. Second concept is the horizontal distribution of power. This is when decision-making power has to be shifted to the departments or units dealing with critical issues.
- Departmentalization. This refers to the choice of integrating specialized work into departments. Which leads to a hierarchy of departments. (Galbraith, 2002, p. 11)

These dimensions of the structure, as Galbraith calls them, are characteristics of organizational structures. 'It is assumed that there is no single relation between task attributes and any one dimension' (Galbraith, 1977, p. 31). So, no clear logical explanation between these parameters and the essential variables or adopted design strategies has been provided, they are merely described as dimensions of the structure as observed phenomena.

⁷ In Galbraith's original work (1973) and his article (1974) this mechanism was not mentioned. In his later works, 1977 onwards, he added a fourth mechanism.

The coordination mechanisms in Galbraith's work, seem to be more fitting as specified parameters which have an influence on the essential variables than the structural dimensions as mentioned in his work. However, they provide useful insights, especially for realizing effective coordination.

4.2.2.4 Regulation by design

The importance of regulation by design is that the design itself can be object of change and thereby is important to realize adaptability. Galbraith does not mention different forms of regulation in his work. However, he does recognize the need for the capability to reconfigure the organizational structure. He argues that the structure of the reconfigurable organization consists of a stable part and a changing part. The stable part is the functional structure. The changing part changes with changes in competitive strategy. It is configured of miniature businesses around products, channels, segments and customers (Galbraith, 2002).

Galbraith claims: 'In the reconfigurable organization, the structure changes, but the processes are stable and common across the miniature business units' (Galbraith, 2002, p. 84). He also states that constant change brings constant conflict. In order to deal with the constant conflict / disturbances, information systems and problem-solving management teams are necessary in the reconfigurable organization. So, management needs to integrate and coordinate work within and between miniature business units.

A reconfigurable organization can literally and simultaneously organize any way it wants to organize with projects and miniature business units that are continually formed, combined and disbanded. It results from the skilled use of three capabilities:

- Forming teams and networks across organizational departments.
- Coordinate the complexity of multiple teams and profit centre units by internal prices, markets and marketlike devices.
- Forming partnerships by external networking to secure capabilities the organization does not have.

(Galbraith, 2002, pp. 75-90)

The reconfigurable or changeable organization as described in Galbraith's work makes sure the design itself can be object of change, which is an important feature of regulation by design. Galbraith, even though his work recognizes the need to deal with conflict and / or disturbances by problem-solving management teams and information systems, does not recognize different forms of regulation and the design of a mechanism that ensures the necessary regulatory potential is provided.

4.2.2.5 Hierarchy

Hierarchy plays an important role in the information processing approach of Galbraith. As aforementioned, hierarchy is one of the coordination mechanisms in Galbraith's work. It is viewed as a structural parameter in this review, because it is a characteristic of the structure that influences the essential variables in Galbraith's work. It is one of the mechanisms by which an organization can deal with task uncertainty. Hierarchy is a necessity, because organizations can be confronted with unknown situations for which a response is demanded. The decision or response to be developed in the organization should take into account the subtasks that can be influenced. This can bring a lot of information collecting and problem solving activities along. To deal with these kind of situations or disturbances new hierarchical management roles are created. These new managerial roles handle the information collection and decision-making activities necessitated by uncertainty (Galbraith, 1973).

So, when organizations face greater uncertainty, for which no rules are indicated, the hierarchy is employed to deal with it. It is a logical concept, because problems can be passed on to those managers that possess the information and knowledge to deal with those problems and make new decisions. The problem is referred upward to that level in the hierarchy where a superior authority has the responsibility to deal with all affected subunits (Galbraith, 1973; Galbraith, 1974). Galbraith argues that the hierarchy is based on authority and reward, so that the decisions to be made by managers are determined effectively. However, the hierarchical communication system has a weakness. Each link in the hierarchy has a limited capacity to process information. When task uncertainty increases, more and more problems and uncertainties have to be dealt with upward in the hierarchy. When this happens too much, the hierarchy gets overloaded, because of the limited capacity at each link to process information. Delays will occur when information transmits upward in the hierarchy and the responses will get delayed as well. This situation is problematic for an organization and should be prevented by using other coordination mechanisms (Galbraith, 1973).

Galbraith's work provides very useful insights as to how hierarchy plays an important role in the decision-making system of an organization and to achieve coordinated action.

4.2.2.6 Link between parameters and variables

The structural parameters in Galbraith's work that have an influence on the essential variables are basically coordination mechanisms. These coordination or integrating mechanisms must be adopted by organizations to deal with task uncertainty. Galbraith explains this by pointing out that when the amount of uncertainty increases the amount of information that has to be processed increases. Decision-makers in an organization therefore have to process more information when performing tasks to realize a certain level of performance. When the task predictability is high, when the primary task of the organization is understood well prior to performing it, most of the work can be preplanned. When this is not the case, when the task predictability is low and task uncertainty is high, coordination mechanisms are needed to coop with the increased amount of uncertainty (Galbraith, 1973; Galbraith, 1974).

Galbraith goes on by explaining that the amount of required information for performing a task is a function of the diversity of the output, diversity of the input and the difficulty of performance. The higher the diversity of output and input and difficulty of the goal of the primary task, the greater the amount of factors and interaction between those factors. This leads to greater complexity, which means a greater amount of information has to be processed simultaneously during task performance. The organization either finds a way to process the information or tries to avoid to have to do so (Galbraith, 1973).

Galbraith argues that the value of his information-processing model is that it forms a basis for formulating design strategies to change bureaucratic structures to adapt to conditions of greater complexity. He does this by working out strategies aimed at either decreasing the amount of information required to coordinate the organization's tasks or increase the information processing capability of the organization (Galbraith, 1973).

Complexity and the amount of information to be processed during task performance is the important link between the structural parameters and essential variables in Galbraith's work. The relationship between the parameters and variables is briefly, clearly and logically explained in Galbraith's work. Moreover, this relationship and the structural parameters in Galbraith's work are transmitted into a couple of design strategies an organization can adopt (see 4.2.2.7).

4.2.2.7 Design principles

Galbraith's work does not specifically mention design principles, his work rather works towards design strategies. The design strategies in his work are viewed as design propositions in this review, because they give an answer to the question how the design of the structure should be done as to realize an adequate organizational structure. An adequate organizational structure ensures the organization can successfully employ its activities to effectively realize the organization task. In how far an organization can do this with the coordination mechanisms; goal setting, hierarchy, span of control and rules, depends on the frequency of disturbances / exceptions and the hierarchy to deal with them. When task uncertainty increases the number of disturbances / exceptions increases as well, until the hierarchy becomes overloaded (Galbraith, 1974; Galbraith, 1977).



Figure 12: Design parameters and propositions (strategies) (Galbraith, 1977, p. 49).

So, when task uncertainty increases the organization needs to either reduce the need for information processing or increase its capacity to process information. Galbraith provides three⁸ strategies in his work by which a reduction in the need to process information can be realized and two strategies by which the capacity to process information can be increased (see figure 11).

The three design propositions, Galbraith calls them strategies, by which a reduction for the need to acquire and process information during task execution can be realized:

- Environmental management: This proposition is not really about the structure itself. It is
 rather about tackling disturbances / uncertainties from the environment. It is aimed at
 reducing uncertainty by attempting to modify the environment. An organization could for
 example enter various cooperative schemes, such as contracting, co-opting, cooperation etc..
 An organization could also try to search a new environment if it cannot manage a given
 environment through various forms of environmental manoeuvring.
- Creation of slack resources: This proposition is simply about decreasing the level of performance. For example, the planned scheduling time or the required man-hours could be increased. This leads to more resources being consumed to realize the performance. These additional resources can be called slack resources. The slack resources are an additional cost for the organization, but they reduce the amount of information that must be processed during task execution and prevent overloading of the hierarchical links.
- Creation of self-contained tasks: In this proposition the basic organizational structure shifts.
 It is not based upon input, resources or competences, but on output or geographic categories. This is a change from a functional structure to an output based semi-autonomous

⁸ In Galbraith's original work (1973) and his article (1974) only two strategies for reducing the need to process information are presented. He added a third one, environmental management, in his later work (1977).

structure. This reduces the need for information processing in several ways. The problems that are inherent to having all resources and departments / units being coupled to all output categories (customer orders) disappears to a certain extent, because now you have different semi-autonomous groups in the organization addressing certain output categories, so there is no need to continually fine tune between departments or units, because each autonomous group has the resources to perform its tasks. Another way by which reduction in the need to process information happens is by a reduced division of labour, because functionally structured organizations pools the demand for skill across all output categories, while in the semi-autonomous structured organizations the semi-autonomous groups use their own skill.

The two design propositions, Galbraith calls them strategies, by which an increase in the capacity to process information can be realized:

- Investment in vertical information systems: This proposition is investing in mechanisms with which information can be processed during task performance, without overloading the hierarchical system. The logic behind this proposition is the greater the uncertainty, the more frequent an organization has to re-plan, which requires the organization to invest in more resources, such as office personnel, computer time etc.., to be able to process information about relevant factors. The investment in these resources is needed to increase the capacity of decision makers. The investment strategy aims at collecting information on the right place and direct it at the right time to the appropriate hierarchical positions. The amount of disturbances that overload the hierarchical system are decreased and the information processing capacity is increased.
- Creation of lateral relations: The last proposition proposes using lateral decision processes throughout the hierarchy to move the level of decision making down where the information exists instead of directing it upward in the hierarchical system. According to Galbraith there are a few mechanisms to apply the lateral relations⁹:

1) Direct contact between the people with the same problem. This avoids upward referral and prevents overloads from the hierarchy.

2) Create a liaison role to handle interdepartmental contacts. This can be done when there is a large volume of contact between two subtasks / departments.

⁹ Galbraith sums up four mechanisms for lateral relations in his books (1973, 1977) and five in his article (1974). This review will stick with four, because the additional one mentioned in his article is only a difference between a temporary task force / team and a permanent team.

3) Create a task group or team to collectively solve problems. This usually happens for interdepartmental problems, which requires the departments to form a team to solve the issues. This way decisions become decentralized and hierarchical overloads are being reduced.

4) According to Galbraith, when more and more important decisions are made by interdepartmental groups at a lower level in the organization, problems of leadership arise. In response a new role is created, an integrating role. Which functions as a representative role for the general manager (Galbraith, 1973; Galbraith, 1974; Galbraith, 1977).

Galbraith argues that an organization can choose one of these five organizing modes or a combination of them. He hypothesizes that these propositions¹⁰ are exhaustive and that an organization will choose that mode which has the least cost. He therefore argues that an organization has to adopt one of the strategies to cope with uncertainty, when this is not the case the creation of slack resources will automatically happen (reduced performance).

An overall design principle in Galbraith's work is that the task information requirements and the information processing capacity have to be matched / balanced.

The design propositions in Galbraith's work are logical when it comes down to the information processing capacity and information decision systems, however, they are quite abstract when it comes down to designing the organizational structure.

4.2.2.8 Design precedence rules

Galbraith views the design of the organizational structure as a process. In his work he does not only direct attention to the structure itself, but also to the processes, roles and responsibilities, people, information systems, rewards, training and career paths.

¹⁰ Galbraith uses the terms organization modes and design strategies for what this paper assumes to be design propositions.



Figure 13: Design Sequence (Galbraith, 2002, p. 157).

Part of the design process is also about the human resources in an organization. Reflecting his design process, it is not only aimed at the organizational structure, rather it is aimed at the organizational infrastructure.

As mentioned earlier, Galbraith argues that the structure should not be changed without a clear strategy. Obviously, the strategy is the point of departure in his work. The design sequence according to Galbraith:

<u>Strategy</u> sets the basic direction and generates the criteria for choosing the next policies.



Next, the departmental <u>structure</u> that best executes the strategy. The department type communicates priority in addressing the strategy.



Next, the vertical structure forms the basis upon which the <u>key processes</u> will take place. If the structure is functional, cross-functional product teams or cross-functional work flow process teams may be designed.



Next, who is responsible for what has to be decided. <u>Key people</u> should be selected for the various roles.



For the vertical structure and lateral processes to work effectively, the <u>roles and</u> <u>responsibilities</u> of managers and teams need to be defined and clarified. A mismatch, if the wrong people have been selected, can lead to a redefinition of the roles and responsibilities.



When the roles and responsibilities have been divided and the people are chosen, they will need the relevant information, so the <u>information systems</u> follow (Galbraith, 2002).

The last part of the design process, as described in Galbraith's work, is left out, because those elements have to do with human resources (not with the structure).

The design process in Galbraith's work follows a logical sequence. It has to be noted that he practices a top-down design methodology. He does, however, not really go into the matter of which steps have to be taken at which level (macro, meso, micro).

4.2.3 Implementation

Galbraith argues that organization designs can realize effectiveness by achieving a strategic fit and by creating commitment among organization members to implement the design. A design process that builds this commitment has to be followed by the management. Galbraith presents an open design process for building the commitment to implement a design (Galbraith, 2002).



Figure 14: Implementation design process (Galbraith, 2002, p. 173).

The first step is about developing criteria and alternative structures. It kicks off with a workshop, which lasts for about three days. It starts with an educational presentation. Then, after a questionand-answer session, the business strategy is reviewed. From the strategy, team members of the design team come up with design criteria. The criteria are ranked to result into about five key criteria, which will guide the design. Then, the design team comes up with alternative designs, which fix today's organizational problems and move toward a desired organization. These alternative designs include structure and key lateral processes. Three design alternatives are selected after weighing the pros and cons (Galbraith, 2002). The remainder of the workshop is devoted to planning and scheduling a test on the design alternatives. This includes the development of interviews, with which organization members will be informed about what the design team is considering and to solicit input. Those people that are affected by the organizational change are interviewed. Also, Galbraith argues: 'The design team makes the trade-offs between time, resources, and the people to include' (Galbraith, 2002, p. 175).

When the interviews are done the design team needs to analyse the data from the responses, with

which modifications to the criteria and alternatives can be made. Usually at this point the decision will be made to either directly go to the final meeting or conduct another round of data collection and analysis (Galbraith, 2002). Usually a second round is done when certain issues have to be solved, in which the design team can learn more by using other workshops, benchmarking or convening experts. The design team learns more about the issues which can results in the modification of the design criteria and design alternatives.

The final meeting is about a day and a half or two days. People that are most affected by the changes are usually present. The purpose of the session is to give an update and to get their input one last time before committing to one design alternative. This meeting also starts with a presentation to inform about the design criteria and the recommended design alternative, followed by a question-and-answer session, followed by making subgroups to discuss the ideas. 'In this manner, the organization's members learn the strategy and the logic of the proposed organization. Their opinion is sought, heard, and used to modify alternatives before a final announcement is made' (Galbraith, 2002, p. 177). At the end of the final meeting each subgroup presents its recommendation. Shortly after the input, the executive team or general manager maker their decision (Galbraith, 2002).

The design process for implementing an organizational design, described in Galbraith's work, is straightforward and practical. It is a useful process, with useful insights, for designers in practice to implement an organizational design.

4.3 The contingency approach by Burton & Obel.

Burton and Obel are authors in the field of organizational design and in the field of organization theory. They have been concerned with the challenge of creating a useable theory for organizational design. The point of perspective in their work is the contingency approach. Not only do they base their work on the contingency approach, they have actually tried to bring contingency theories together and integrate them into one useable theory. 'The theories are partial ones, and there is not a composition and integration of these pieces into a comprehensive contingency theory of organization design. To create a useable organizational design tool for management, we must first put together these pieces into a consistent and comprehensive whole' (Baligh, Burton, & Obel, 1996, p. 1649). More specifically, Burton, Obel & Hakonsson (2015), argue that the scientific foundation of their work is based upon almost a century of research of organizational design, in what they call: multi-contingency approach. They argue that design is the diagnosis of misfits and the action to fix them.

Burton & Obel's approach is closely tied to the information processing view of Galbraith. 'Generally, we use information processing as an integrating concept in the design of organizations' (Burton & Obel, 2004, p. 4). A lot of the basic ideas in Burton & Obel's work are based upon the information processing view. 'The information processing view of organization thus underlies many of the arguments in this book. It gives managerial substance and relevance to the contingency theory propositions in strategic organizational design' (Burton & Obel, 2004, p. 9). So, relatively Burton & Obel's work can be seen as a further development in the field of organizational design when linked to the work of Galbraith. Overall Burton & Obel's work is both aimed at students as well as designers in practice. 'We scrutinize the organizational theory to develop a knowledge base to help students learn about the fundamentals of organizational design and help practitioners design effective and efficient organizations' (Burton & Obel, 2004, p. 16). Burton & Obel present an iterative top-down approach and the subtitle of their textbook claims to provide 'a step-by-step approach'.

4.3.1 Diagnosis

A big part of Burton & Obel's main work (2015) is dedicated to assessing, analysing and diagnosing the goals, infrastructure, strategy and environment of the organization. In their step-by-step approach, five out of seven steps, or ten out of twelve sub-steps, are dedicated towards the diagnosis phase of designing an organization. 'Based on a large body of research, an organization's design should be chosen based on the particular context, and further the description of the context should be multidimensional, including both structural and human components' (Burton, Obel, & Hakonsson, 2015, p. 7). The diagnosis steps worked out in Burton & Obel's work do not only focus on elements of the organizational structure, it focuses on elements of the infrastructure. For the

purpose of this review, those elements that have to do with human resources and/or technology will be left out. The next figure shows the step-by-step approach in Burton & Obel's work.



Figure 15: Step-by-step approach (Burton, Obel, & Hakonsson, 2015, p. 67).

Burton & Obel further argue: 'The multi-contingency model provides a comprehensive framework for diagnosing the organizational design components and whether they are aligned' (Burton, Obel, & Hakonsson, 2015, p. 10). They do this by identifying misfits in the organization's design. They describe misfits as misalignments within the organizational design components that can lead to a decrease in organizational performance. Therefore, Burton & Obel argue that misfits are the engine of the organizational design process.

The starting point for the analysis is the scope and goals of the organization. The scope is to identify and state what the organization is doing and the unit of analysis, in which the unit can be an organization, department, division, team or a set of companies. Next, the organization's goals have to be determined. Two important fundamental goal dimensions are efficiency and effectiveness. 'To access the company goals for our model, you have to inspect the official goals and analyse them to assess if the goal has a focus on efficiency, effectiveness, or a balanced combination' (Burton, Obel, & Hakonsson, 2015, p. 17). So, one must analyse the goals in terms of efficiency and effectiveness. The optimal balance between efficiency and effectiveness is difficult to obtain, but the pursuit of efficiency and effectiveness must always be adopted. It has profound consequences for the information processing balance and it significantly affects the choice for an adequate organizational design. However, analysing the goals of the organization has to be done in cohesion with analysing the other components in the organization's design, because one must see what is necessary for the strategy and goals to be effectively realized (Burton, Obel, & Hakonsson, 2015).

The next step is to assess the strategy and the environment. The strategy and environment are basic contingencies for deciding the organizational design, because structure follows strategy and strategy has to fit with the environment. So, Burton & Obel argue that a fit has to be realized among three elements: the organizational design, the strategy and the environment in which it operates. The strategy is a choice of what an organization should do to pursue its goals. Now, Burton & Obel describe the strategy of an organization in terms of degree of exploration and exploitation and they categorize it as: reactor, defender, analyser with or without innovation and prospector. They argue that a specific strategic type fits with particular organization's goal dimensions: efficiency and/or effectiveness. If a misfit is detected, something has to change. A misfit with the environment can also be the case. The environment is described in terms of complexity and unpredictability, from which they derive a calm, varied, locally stormy or turbulent environment. The strategy type and the organization's goals have to fit with the particular type of environment of an organization. The discussed diagnosing steps so far are aimed at diagnosing what an organizational structure is ought to realize. Burton & Obel do not only work these concepts out in their framework, they also provide diagnostic questions and misfit propositions in their work.¹¹

The following sub-steps in the diagnosis framework of Burton & Obel's (2015) work that have to do with the actual design of the organizational structure are:¹² the configuration of the firm, task design and coordination and control systems. Burton & Obel argue: 'A poor choice of configuration leads to opportunity losses which can be a threat to the organization's short-term efficiency and effectiveness, as well as its long-term viability' (Burton, Obel, & Hakonsson, 2015, p. 69). So, choosing the right structure is a critical decision. They define the configuration as how the firm partitions big tasks into smaller tasks, either by specialization or product and the indication of formal communication patterns. The task design, which basically is the division of labour, is defined as decomposing work into sub-tasks, while considering the coordination among the sub-tasks to meet organizational goals. The coordination and control systems are defined as systems that integrate, or

¹¹ The diagnostic questions can be found at the end of each chapter in their main work (2015). In their earlier work (2004) the misfit propositions can be found in chapter nine.

¹² The sub-steps aimed at Human Resources or Technology are left out, because this review only looks at those elements that are aimed at the organizational structure.

tie together, the various sub-units of the organization (Burton, Obel, & Hakonsson, 2015, pp. 69-131-187).

- Configuration of the firm: Burton & Obel describe four basic configurations in their work, which they base upon two fundamental dimensions: product/service/customer orientation and functional specialization. The basic configurations are: simple, functional, divisional and matrix.
- Task design: Burton & Obel categorize the task design along two important dimensions: repetitiveness and divisibility. These two dimensions lead to four basic task designs, which they call: orderly, complicated, fragmented and knotty.
- Coordination and control systems: 'Formalization and centralization are the two fundamental design dimensions that underlie the design of coordination and control systems' (Burton, Obel, & Hakonsson, 2015, p. 190). The two dimensions result in five categories, which they describe as: family, machine, market, mosaic and clan. (Burton, Obel, & Hakonsson, 2015)

The dimensions and categories can be used to diagnose the organizational structure. The next figure shows the complete diagnosis framework in Burton & Obel's work.

Corresponding quadrant in organizational design space		в	c	D	
Incentives	Personal pay	Skill pay	Bonus-based	Profit-sharing/gain- sharing	
Information and knowledge systems	Event- driven	Data-driven	People-driven	Relationship-driven	
Coordination and control	Family	Machine	Market	Clan/mosaic	
Organizational climate	Group	Internal process	Developmental	Rational goal	
Leadership	Maestro	Manager	Leader	Producer	
People	Shop	Factory	Laboratory	Office	
Task design	Orderly	Complicated	Fragmented	Knotty	
Agreements	Self- contained	Provider	Collaborative community	Confederation	
Geographic distribution	Global	International	Multi-domestic	Transnational	
Configuration	Simple	Functional	Divisional	Matrix	
Environment	Calm	Varied	Locally stormy	Turbulent	
Strategy types	Reactor	Defender	Prospector	Analyzer with innovation	Analyzer without innovation
Dimensions of strategy	Neither	Exploit	Explore	Exploit	Explore
Organizational goals	Neither	Efficiency	Effectiveness	Efficiency and effectiveness	

Figure 16: Diagnosis framework (Burton, Obel, & Hakonsson, 2015, p. 231).

To use Burton & Obel's diagnosis framework, one has to go through each step and analyse the values on the dimensions described at each step to determine in which category the organization finds itself in. According to Burton & Obel, the four columns in the framework are the four main quadrants of the organizational design space. An organization has to try to reduce misfits and bring all components as described in the framework into alignment. A fit exists when all the components fall into one of the four quadrants. Furthermore, Burton & Obel argue that although quadrant D may be ideal, because it focuses both on effectiveness and efficiency, it is not always suitable due to design constraints. Also, the design space of quadrant D is more costly than a singular focus on either efficiency or effectiveness. Only if an organization finds itself in quadrant A it should plan for change, and the framework can help identify what to change and how to proceed. The most important is to develop the design components in such a way that misfits are avoided and alignment is realized (Burton, Obel, & Hakonsson, 2015, pp. 23-24).

Burton & Obel's work is unique in the sense that a lot of their work is directed towards the diagnosis phase of designing organizational structures. They provide a comprehensive two-dimensional framework and a step-by-step approach to diagnose organizational design components. Moreover, they provide diagnostic questions and misfit propositions which are useful for diagnosing the organizational structure. However, a problematic issue is whether the dimensions and categories in the diagnostic framework are exhaustive and whether alignment amongst all steps is an achievable quest.

4.3.2 Design

This section will review the contingency approach of Burton & Obel, by using the necessary requirements concerning the design phase of designing organizational structures. Each sub-section discusses one necessary requirement.

4.3.2.1 Essential variables

According to Burton & Obel, thirty percent of the variation in performance can be explained by organizational design, based upon research on the relationship between organization design and efficiency (Burton, Obel, & Hakonsson, 2015, p. 8). An organization can be defined as: 'a consciously coordinated social entity, with a relatively identifiable boundary, which functions on a relatively continuous basis to achieve a common goal or a set of goals' (Burton & Obel, 2004, p. 3; Burton, Obel, & Hakonsson, 2015, p. 14). An organization exists for a purpose, has goals and to yield better performance an organizational design must create fit among the patterns of relevant contextual, structural and strategic factors. The design-problem of organizations is twofold. It involves two complementary problems: 1) how to partition the organization task into appropriate smaller tasks of the sub-units and 2) how to group small activities so that they fit together to efficiently realize the

organizational task or goals. The smaller tasks must be arranged in such a way that effective coordination can be realized. Without coordination there is no organization, just a collection of separate activities (Burton & Obel, 2004; Burton, Obel, & Hakonsson, 2015). Coordination also means that there is a need for information and information exchange as to deal with task uncertainty, otherwise coordination can not be realized. Information processing, therefore, is an integrating concept.

The importance of effective coorrdination and efficient realization of the organization goals results in three criteria, or essential variables, which are paramount in an organizational design:

- Effectiveness: An organization is effective if it realizes its purpose and accomplishes its goals.
- Efficiency: An organization is efficient if it utilizes the least amount of resources necessary to obtain its products or services.
- Viability: An organization is viable if it exists over a long period of time. (Burton & Obel, 2004, p. 4)

Burton & Obel argue that an organization should attempt to be simultaneously effective and efficient, because both are deemed to be important for the viability of the organization. Effectiveness is acquired by doing the right thing, it addresses the organization's positioning in its environment. Efficiency is acquired by doing it the right way and has its focus on the internal working of the organization (Burton & Obel, 2004). Also, Burton & Obel argue that an organization should be designed so that it processes information effectively and efficiently.

Burton & Obel argue: 'In design terms, contingency theory suggests that the effectiveness, efficiency, profitability, and viability of an organization's structure depends on such contingency factors as its size, strategy, technology, environment, and organizational design' (Baligh, Burton, & Obel, 1996, p. 1650). This suggests that the essential variables are not only affected by the organizational structure or structural parameters but also by situational factors, which are the contingency factors. Especially the environmental imperative is an important factor, as Burton & Obel argue: 'The environmental imperative means that the environment is a major determinant of how an organization should be designed' (Burton, Obel, & Hakonsson, 2015, p. 49). Moreover, they argue: 'The multiple contingency model states that the organizational structure depends on multiple dimensions in the contextual situation' (Burton & Obel, 2004, p. 17). The contextual or the contingency factors in Burton & Obel's work connect the essential variables and the structural parameters together in one model as viewed in the next figure.



Figure 17: Three dimensional model (Burton & Obel, 2004, p. 20). The contingencies can not be seen as sub-variables, because they are factors on themselves which actually affect the essential variables as well as the parameters. Together the contingencies, parameters and essential variables form a three dimensional model. The parameters on the right and the contingencies on the left together result in design propositions (see 4.3.2.7), which enhance the realization of the essential variables. According to Burton & Obel the 'criteria represent different concepts that are desirable and provide general guidance in selecting appropriate organizational configurations and organizational properties' (Burton & Obel, 2004, p. 5). In which the criteria are the essential variables, the configuration is the organizational structure and the organizational properties are the structural parameters.

The essential variables in Burton & Obel's approach present a solid and necessary starting point to guide the design of an organization as criteria. These essential variables have been specified in Burton & Obel's work, because they tackle the twofold design problem, which requires effective coordination and efficient realization of the organization's task. So, Burton & Obel have argued why they specified the essential variables, but norm values for the essential variables are lacking.

4.3.2.2 The capacity to adapt

Two important contingencies in the work of Burton & Obel have to do with an organization's capability to realize and if necessary, when the relevant environment is changing, adapt their goals: environment and strategy. 'Contingency theory and the principle that structure follows strategy all follow the common theme that there must be a fit between the environment and the organization' (Burton, Obel, & Hakonsson, 2015, p. 49). The environment both has limits and opportunities for an organization's strategy, creating a fit between the environment and the organization is essential. Now, according to Burton & Obel, the environment has two important dimensions: complexity and uncertainty / unpredictability. 'The characterization of an organization's environment in terms of complexity and uncertainty is important and relevant because an increase in both the complexity of

the environment and the uncertainty of the environment increases the demand for information processing in the organization' (Burton, Obel, & Hakonsson, 2015, p. 52). Complexity is about the number of factors in the environment and their interdependency. Uncertainty or unpredictability then is the nature of those factors and their variance. The greater the variance of the factors the less predictability. Together this relates to the number of relations in the environment and the variety of those relations. 'An organization must either project what will happen or adjust quickly to the environment' (Burton, Obel, & Hakonsson, 2015, p. 54). So, when an organization operates in a complex and unpredictable environment it has to be able to quickly adapt.

Burton & Obel apply the dimensions, complexity and unpredictability, to describe four types of environment: calm, varied, locally stormy and turbulent. These type of environments are different combinations of complexity and unpredictability:





A calm environment means that both complexity and unpredictability are low. A turbulent environment is an environment with high complexity and unpredictability. Moving from the left bottom corner to the right upper corner is moving to an environment which is more demanding. Now, Burton & Obel argue that certain strategies and organizational design components fit better with a particular type of environment. For example, the turbulent environment, which is highly complex and unpredictable, fits well with a combination of effectiveness and efficiency goals and an analyser strategy. An analyser strategy is when an organization adopts a focus on both exploration and exploitation. In a complex and unpredictable environment an organization is required to make many short and long-term adjustments and coordinated responses (Burton, Obel, & Hakonsson, 2015).

A strong point of Burton & Obel's approach is that it analyses the environment in terms of complexity and unpredictability and tries to make sure a fit is realized between the environment and the organization. The strategy choice makes sure that an alignment with the environment and the organization's goals is realized. A disadvantage is that the goals are categorized into effectiveness and efficiency goals. So it is either non of those categories, one of the two categories or a combination of both. The missing point is that an organization should continuously and effectively be capable to set out goals, rather than choose either of those categories. Moreover, flexibility or the capacity to adapt is not a norm value of at least one of the essential variables in Burton & Obel's approach.

4.3.2.3 Structural parameters

In relationship with the essential variables and contingencies in Burton & Obel's work are the design parameters. The design parameters are also mentioned as design properties (1996), design components (2015), as well as design recommendation possibilities (2004) in his work, but overall they refer to these parameters as design parameters. The design parameters in Burton & Obel's work have one major overarching parameter, which is the configuration. The other parameters are not limited to structural parameters, they include HR and technology parameters as well. For the purpose of this paper, only structural parameters are considered (as aforementioned).



Figure 19: Design parameters (Baligh, Burton, & Obel, 1996, p. 1649)

In figure 19, the upper right side is labelled as 'structure', yet in most parts of Burton & Obel's work this parameter is referred to as configuration. Burton & Obel argue that: 'The configuration specifies the general principle for dividing work, breaking tasks into subtasks and coordinating activities' (Burton & Obel, 2004, p. 46). He further argues that two dimensions, the product/service/customer orientation and functional specialization, indicate the focus of how the work will be divided and how the work must be coordinated. This leads to four basic configurations: simple, functional, divisional, and matrix (Burton, Obel, & Hakonsson, 2015, p. 71).

- The simple configuration is low on both dimensions and has the simplest structure with direct supervision (one executive who tells others what to do).
- The functional configuration is low on the product/customer dimension, but high on functional specialization. The units in the organization are grouped by functional specialization (finance, marketing, maintenance, HR, manufacturing, sales etc...)
- The divisional configuration is high on the product/customer dimension, but low on functional specialization. This type of structure contains self-contained or semi-autonomous units (divisions) focusing on products / customers. These units are coordinated by a headquarters unit.
- The matrix configuration is high on both dimensions. This type of structure is a functional
 organization with interdisciplinary project or product management teams. This configuration
 can overcome the problem when coordination requirements are too high for a functional
 configuration and the interdependency between products are too high as well, which results
 in the divisional configuration becoming inefficient.

(Burton & Obel, 2004; Burton, Obel, & Hakonsson, 2015)

According to Burton & Obel (2015), the matrix configuration offers more information processing capacity than the more simple configurations. The matrix configuration only fits in an environment that is both unpredictable and complex. Additionally, the simple configuration only fits when there is low information processing demands, because an executive can quickly become overloaded. The divisional configuration is fitting with a focus on effectiveness and a functional configuration fits with a focus on effectiveness and a functional configuration fits with a focus on efficiency, while the matrix configuration has a dual focus on both efficiency and effectiveness.

Burton & Obel (2004, 2015) also mention several other configurations, such as: ad hoc, (machine) bureaucracy, virtual network and several international configurations.¹³

¹³ A more complete overview of the configurations can be found in Burton & Obel's work (2004, chapters 2 and 11 & 2015, chapters 5 and 6)

'The configuration is a general description of the organizational structure. Other characteristics are important to give a more complete design specification, which can be stated in numerous ways.' (Burton & Obel, 2004, p. 369) These other characteristics are the design parameters. As mentioned before, this paper will only take into consideration the structural parameters. The structural parameters, which can be identified in Burton & Obel's work are: complexity and differentiation, formalization, centralization, and coordination and control. So, next to configuration, there are four important design parameters in Burton & Obel's work:

- Complexity and differentiation: Complexity here refers to organizational complexity, which is
 the degree of horizontal, vertical and spatial differentiation. Horizontal differentiation refers
 to specialization. It is greater when there are several small tasks. Vertical differentiation is
 relates to the depth of the hierarchy and is greater when the number of hierarchical levels
 between top management and the bottom hierarchy increases. Spatial differentiation refers
 to the degree of dispersion of the activities, it is greater when there are many locations of
 facilities and personnel.
- Formalization: Formalization represents the rules, procedures and policies in an organization. These contribute to obtain a standardized behaviour of the members of the organization.
- Centralization: 'We measure centralization by how much direct involvement top managers have in gathering and interpreting the information they use in decision-making and the degree to which top management directly controls the execution of a decision' (Burton & Obel, 2004, p. 80). So, centralization increases when the degree of formal authority to make centralized decisions increases. Decentralization is the opposite (low centralization).
- Coordination and Control: 'Coordination systems support flexibility and adaptiveness within and across departmental or divisional boundaries' (Burton, Obel, & Hakonsson, 2015, p. 189). This refers to the systems that integrate the various sub-units of the organization. Control systems refers to monitoring and measuring the performance of those sub-units. Both are important to make sure that enough relevant information is available at the right time and to make sure that the right decisions are made. The systems here refer to the numerous ways to obtain 'coordination and control': rules, procedures, meetings, task forces, integrators, liaison activities, direct supervision, planning, forecasting and budgeting etc.. (Burton & Obel, 2004; Burton, Obel, & Hakonsson, 2015)

The design parameters in Burton & Obel's work can have different values and thus are mechanisms which can be altered to make structural changes. Each organizational situational context is different, thus how to change the design parameters also depends on contingency factors. Together the design parameters and contingencies influence the essential variables. The design parameters and contingencies lead to prescriptive design propositions, which provide guidance in designing adequate organizational structures and avoid bad designs.

'Configuration' belongs to the set of design parameters in Burton & Obel's work, which is questionable, because configuration refers to the structure and to involve the structure as a design parameter is awkward, because the configuration or structure is what has to be designed in the first place. However, it is positive that the design parameters are related to contingency factors, which makes them applicable in any situational context.

4.3.2.4 Regulation by design

Burton & Obel's approach dedicate a lot of attention to strategic regulation, by specifying the scope, goals and strategy choices an organization can make and by describing the importance of the environmental imperative. However, regulation by design has not been described extensively in Burton & Obel's work. The holistic, step-by-step approach in Burton & Obel's approach is aimed at diagnosing fits and misfits and to provide relevant insights on how to fix the misfits. Fixing misfits is an ongoing dynamic process, in which management continually has to diagnose and search for the correct organizational design. This implies that the organizational structure and particularly the design parameters have to be adjusted on an ongoing basis. 'The organization's design is then a matter of choice at each point and time, and management must choose to re-design the organization over time if it is to survive' (Burton & Obel, 2004, p. 388). Thus, misfits have to be monitored on a continuing basis to take corrective action as they occur. Misfits can arise from exogenous and endogenous factors, changes outside the organization and changes inside the organization. These changes have to be assessed and adapted to. It is likely that misfits constantly exist, which requires constant fixing through fit recommendation, this is a dynamic process. Misfits have a higher probability of existence when the environment and technology is continually changing. Therefore, Burton & Obel argue that fit might never be obtained, but remains an elusive ideal, however, it does provide a framework for managerial action.

Burton & Obel's framework to continually diagnose and search for the correct organizational design does meet the regulation by design requirement to a certain extent. It acknowledges that the design itself can continually be object of change, because misfits continually have to be fixed. Which translates to continuously trying to achieve design fit, contingency fit, strategic fit and total design fit. However, it does not encompass any regulation table with regulation actions to ensure regulation can take place whenever disturbances occur, because the focus is misfits, not disturbances.
4.3.2.5 Hierarchy

Hierarchy plays an important role in Burton & Obel's approach. This is evident by looking at the design parameters in his work. The parameter that describes the complexity and differentiation in an organization is much about hierarchy, because it involves vertical and horizontal differentiation. Vertical differentiation can be measured by the number of vertical levels in an organization, which is nothing else than the way the hierarchy is made up in an organization. Centralization is also a parameter which is closely tied to the hierarchy in an organization, because it entails the decision-making authority and responsibility between the top level in the hierarchy and the lower units in the hierarchy.

Size is a contingency in Burton & Obel's approach, they emphasize that size matters, because they argue that large organizations have to be designed differently than smaller ones. As they argue: 'For a given number of people, the greater the degree of professionalization, the higher the possible level of decentralization, organizational complexity, and formalized coordination mechanisms' (Baligh, Burton, & Obel, 1996, p. 1659). So, they do not only look at size, but also at the professionalization of the workforce in order to be able to describe small, medium or large organizations and the implications this has for the design of the organizational structure. 'Our concept of size and our specification of how it is measured produce a situation component that is operational and relevant to our problem of structure design' (Baligh, Burton, & Obel, 1996, pp. 1659-1660). The concept of size is important, because an increase in size leads to higher degrees of decentralization and organizational complexity. These two factors, the size of the labour pool and the degree of professionalization are important, because they affect the information processing capacity in an organization. Most of the information processing is done by individuals, but the bounded rationality of people limits the capacity to process information. Ways to limit the information-processing needs and keep the focus on goals and tasks is done by limiting the communications and direct them along the hierarchy in the functional and divisional configurations or across units in the matrix (Burton, Obel, & Hakonsson, 2015, pp. 147-149).

In general, efficiency and environmental complexity can be met by increasing the number of people. Effectiveness and unpredictability can be met by increased professionalization, because more capabilities are required. The larger organizations become, the more the hierarchical decision making has to be decentralized, because of information processing needs and organizational complexity (Burton & Obel, 2004, pp. 175-177; Burton, Obel, & Hakonsson, 2015, p. 159).

Hierarchy is a well worked out theme in the contingency approach of Burton & Obel. Especially, because size is a a contingency factor in their approach and two of the aforementioned structural parameters are in direct relation with the hierarchy of the organization.

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4.3.2.6 Link between parameters and variables

'Organizational design entails developing design components that are in alignment, thus avoiding misfits that lead to performance decrement' (Burton, Obel, & Hakonsson, 2015, p. 24). Basically, this means that a good fit among design components has to be determined. The main goal is to design organizations that are effective and/or efficient for good performance. To realize a proper organizational design, fit has to be acquired. As Burton & Obel argue: 'Fit is a matching process where the organization can be matched with the environment or vice versa. A good fit means better performance' (Burton & Obel, 2004, p. 15). The organizational structure and the structure parameters have to be aligned with contingency factors.

The three dimensional model (figure 17) is based upon three elements: design parameters, contingencies and essential variables. The contingencies consist of contextual and strategic factors. Now, Burton & Obel argue that design propositions or design recommendations must be consistent for each contingency across all design parameters (Burton & Obel, 2004). The design propositions will be discussed in the next section. The type of fit, in which contingencies and design parameters are aligned is called the contingency fit. However, not only contingency fit has to be realized. Other fit criteria have to be realized as well. The fit criteria make sure that the designed organizational structure is appropriate for the circumstances and has harmonious parts. This means that the structure's capacity to meet the organizational goals has to be realized and that there has to be a logical consistency between the pieces that make up the organizational structure (Baligh, Burton, & Obel, 1996, p. 1653). An adequate organizational structure with the right values on the design parameters has to meet the fit criteria. This will enhance the realization of the essential variables. Burton & Obel describe four fit criteria in their work:

- 'Contingency fit: The contingencies have to fit with the design parameters.
- Design parameter fit: The design parameters or the properties of the organizational structure should fit with one another.
- Strategic / Situation fit: The organization's situation has to be internally consistent and the strategic facts have to make sense together. In other terms the values of the contingency factors have to fit each other.
- Total design fit: Total fit is the most demanding, it requires that all the previous fit criteria have been met. It also requires that design recommendations fit together internally and with the actual strategic situation' (Baligh, Burton, & Obel, 1996, p. 1654-1658; Burton & Obel, 2004, p. 20-24).

The link between the structural parameters and the essential variables is explained in Burton & Obel's work by describing fit criteria. Meeting all the fit criteria means that the right values have been given to the contingencies and the structural parameters to realize the essential variables. So, Burton & Obel do present a conceptual relationship between parameters, contingencies and variables. However, Burton & Obel admit the troublesome character of this relationship, since it might be difficult to simultaneously meet all the fit criteria and in some cases it might even be unobtainable. They argue that in this case a balanced combination has to be chosen.

4.3.2.7 Design principles

One of the purposes in Burton & Obel's work is to recommend good organizational designs. They do this by offering design recommendations. The organizational design recommendations in Burton & Obel's work are based upon various contingency theories. Burton & Obel argue that the partial contingency theories are not integrated and therefore are not ready for use in a prescriptive system. In design terms, contingency theory suggests that an appropriate design is contingent or dependent upon such factors as size, strategy, technology, environment and managerial preferences' (Baligh, Burton, & Obel, 1996, pp. 1648-1649). Burton & Obel have integrated several contingency theories of organization and transformed them into a set of logically integrated prescriptive design decision rules. The design rules or design recommendations are formulated in the form of "if-then" statements, for example: 'If the environmental hostility is extreme, then the centralization should be high' (Burton & Obel, 2004, p. 33). The design recommendations are based upon design variables which can have different values, and contingencies, which are variables of fact and can take different values as well. The knowledge gained from the partial contingency theories is then combined to derive at simple if-then rules. The integration of the theories is done with the aim of producing fits, so the design rules have to be consistent in realizing contingency, design parameter and strategic fit (Baligh, Burton, & Obel, 1996).

The advantage of the "if-then" rules in Burton & Obel's work is that the knowledge system of rules is simple, practical, understandable, and easy to use in real world cases. The next figure gives an illustration of the design decision rules:

Table 2 Design Decision Rules

- 1. If size is large, then the formalization is high, cf20.
- 2. If technology is routine, then the complexity is low, cf20.
- 3. If the strategy is prospector, then the centralization is low, cf20.
- If the environmental uncertainty is stable, then the centralization is high, cf20.
- If the preference for microinvolvement is high, then the centralization is high, cf40.
- 6. If the environmental complexity is high and the technology is not routine, then the horizontal differentiation is high, cf60.
- If the strategy is prospector and the technology is routine, then this may cause problems may arise.

Figure 20: Design decision rules (Baligh, Burton, & Obel, 1996, p. 1652)

The design decision rules have certainty factors, which is a qualifier in the statement to measure the degree of compulsion one should give the decision rule. The values can range from -100 to 100, a stronger statement would increase the certainty factor. The certainty factors helps in understanding how much compelling the decision rules are (Baligh, Burton, & Obel, 1996).

Burton & Obel argue that their knowledge base contains about 350 prescriptive decision design rules. 'We must pay attention to the fit of these prescriptions to avoid bad designs and to improve the system that prescribes designs' (Baligh, Burton, & Obel, 1996, p. 1654). All the design rules or propositions have to be consistent with basic contingency theories, other contingencies and design parameters. If this is not the case, the propositions should be replaced and the underlying theory should be reconciled. This way, focusing on the prescriptive process, serves both a practical as well as a theoretical side (Baligh, Burton, & Obel, 1996).

The design propositions or design decision rules in Burton & Obel's work are understandable and practical. The certainty factors are a useful addition as well. However, 350 rules is quite overwhelming and it is not clear which of these rules, and in what way they have to be used.

4.3.2.8 Design precedence rules

Burton & Obel argue that fixing one misfit may not make the situation notably better, because a fixed misfit may create other misfits. They argue that a total plan of a sequence of fixes should be mapped out. They call this a holistic approach. However, mapping out a total plan of a sequence of fixes is not easy. There could be numerous potential paths to take. Burton & Obel argue that a good way of evaluating which path to take, is to make an assessment of process and content costs. So in deciding the sequence of change, one should look at the content costs associated with a misfit and the process costs associated with changing the misfit (Burton, Obel, & Hakonsson, 2015, p. 246).

'The implication here is that it makes good sense to fix some misfits, even if you cannot fix them all' (Burton, Obel, & Hakonsson, 2015, p. 247). So, even if you cannot fix all misfits you should still try and fix misfits. However, some misfits may be more problematic than others. The type of misfits that are particularly important and the costs of the misfits depends on the organization and its particular situation. The ideal sequence is the sequence that minimizes the total costs. Another important element to take into account is to attend to those design components that are under your control. Generally, misfits that arise from internal sources are more under control than misfits arising from external sources (environment).

Design precedence rules are lacking in Burton & Obel's work. They argue that a holistic approach should be taken and that the sequence of fixing misfits should be based on minimizing total costs of changing the architecture. At the same time however, they argue that these elements are firm dependent. So, the reader is left to decide for himself what the ideal steps in the sequence of change should be.

4.3.2.10 Implementation

Burton & Obel argue that more than 50 percent of all change processes fail, because the implementation plan is not spelled out, or because actions are not taken when delays occur. They argue that change is realized as project-based management. Change plans, progress, and follow-up activities are crucial to realize proper implementation. This requires that a change management project removes misfits through activities. Burton & Obel argue that they offer a useful management tool for managers, by describing a spreadsheet that can be used for implementing change. It involves resource allocations, milestones, critical events and deadlines (Burton, Obel, & Hakonsson, 2015). The change project has to specify a number of parts of the implementation plan, which are related to 'what', 'who', and 'when':

• What: This part is about the activities that have to be undertaken. The activities can be seen as projects and sub-projects. Now, Burton & Obel argue that the multi-contingency framework and the two-dimensional approach can be used. The dimensions and diagnostic questions offered in their work are not only useful for diagnosing misfits, but also to define the required activities as projects and sub-projects. 'The idea is simple: look at the two dimensions underlying the component that you need to change: is change required on both, or just one of these dimensions? Next, look at which diagnostic questions load on the relevant dimension(s); they provide useful guidance for which detailed design activities are required' (Burton, Obel, & Hakonsson, 2015, p. 279). The design activities and events are required to fix misfits on the design components.

- Who: It is important to know who is responsible for the change project and sub projects. They are responsible for finding the required resources to implement the changes. The allocation of resources is important, it should be based on the critical events and a reduction of total content and process costs (Burton, Obel, & Hakonsson, 2015, p. 282).
- When: Deadlines and milestones have to be specified, which means prioritization of when and where resources have to be utilized. The project timeline need to be monitored, so that corrective action can be taken whenever delays occur. 'The more concrete and measurable the deadlines, the easier it is to follow up on whether they are met' (Burton, Obel, & Hakonsson, 2015, p. 283). So, it is not only important to specify deadlines, they should be specific and measurable as well.

Burton & Obel's approach of implementation is a project-based management change approach. They deal adequately in describing what implementation is about and they argue that their diagnosing framework can be used for implementation as well. However, the implementation phase of designing the organization in Burton & Obel's work lacks specific and practical insights.

4.4 Relating and comparing the three organizational design approaches.

This section will provide a schematic overview from the results of the first three sections of this chapter. Followed by a discussion on the comparative results in the next section.

4.4.1 Overview

This schematic overview summarizes the organizational design theories briefly in light of the criteria, which are the necessary requirements as formulated in the theoretical framework in chapter two.

	Necessary requirements	De Sitter	Galbraith	Burton & Obel
Diagnosis	Diagnosis	-Functional requirements and structural parameters as diagnosing tool -Structural problems and potential bottlenecks to understand why to re-design	-Diversity analysis -Geographical analysis -Analyse organizational dimensions -Analyse whether activities require scale or expertise	 Comprehensive framework for diagnosing the organizational design components: Assess the scope and goals of the organization Assess the organization Assess the strategy Assess the environment Analyse the configuration Assess the task design Analyse the coordination and control systems Reduce misfits and bring design components in alignment Diagnostic questions and misfit propositions
Design	Essential variables	-Quality of organization -Quality of work -Quality of working relations	 #-Predictability of organization task #-Capacity to deal with task uncertainty #-Task diversity #-Task difficulty #-Task variability 	-Effectiveness -Efficiency -Viability
	Capacity to adapt	 Flexibility: Short production-cycle time With sufficient product variations To deliver in varying volumes In a variable mix (of products) Potential for innovation 	 Use easily reconfiguring and realigning structures and processes with constantly changing strategy Reconfigurable project teams are the essence of the flexible organization 	 Creating a fit between the environment and the organization is essential Organization has to be able to quickly adapt in a complex and unpredictable environment

	Necessary requirements	De Sitter	Galbraith	Burton & Obel
	Structural	1. #-Degree of functional	1. Coordination by rules.	1. Configuration
	parameters	concentration 2. #-Degree of performance differentiation	programs and procedures	2. Complexity and
		3. #-Degree of performance specialization	 Coordination by planning, 	3. Formalization
		4. #-Degree of separation of performance and control	targets and goals	4. Centralization
		activities 5. #-Degree of control	4. Narrowing span of control	5. Coordination and control
		specialization 6. #-Degree of control		
		7. #-Degree of division of control		
	Regulation bv	- Provides a regulation table to	- Reconfigurable or	- Organizational structure
	design	build in the necessary regulatory	changeable organization	has to be adjusted on an
	-	potential	- Capability to reconfigure	ongoing basis
		- Non-routine changes	organizational structure	- Ongoing dynamic process
		- Described in terms of	 Increased regulatory 	- Misfits continually have to
		monitoring, assessing and acting	potential by problem-solving	be fixed
		 Capacity to change the structure 	management teams and	
		itself	information systems	
	Hierarchy	- Proposes parallel structural	- Hierarchy is a coordination	- Vertical differentiation is
		design with group production and	mechanism	the number of vertical
		parallel working teams	- Necessary to deal with task	levels
		- Changes in hierarchical	uncertainty	- Centralization entails
		structure, because tasks are done	- Hierarchy important to deal	decision making authority
		within groups in new division of	with problems and make	and responsibility
		labour Claims a complete hierarchical	decisions	- Hierarchical decision
		- Claims a complete meral chical	- Limited capacity at each	decontrolized when
		solution)	information	organizations become
		solutiony		larger
	Link between	- Reduce complexity:	- Adapt to conditions of	- Fit criteria have to be
	parameters	- By attenuation; Reducing the	greater complexity:	met:
	and variables	probability of the occurrence of	- By decreasing amount of	- By contingency fit
		disturbances	information required	- By design parameter fit
		- By amplification; Increasing the	- By increasing the	- By strategic fit
		regulatory potential	information processing	- By acquiring total design
	Desire	late card conversely		tit Design desision gulas in
	Design	- integral approach		-Design decision rules in
	principles	- Define primary process	- Creation of clack recourses	statements
		the system in time	- Creation of self-contained	- The prescriptive rules
		- Controllability as design	tasks	must he consistent and
		principle	- Investment in vertical	realize fit
		- Lower required variation by	information systems	- About 350 prescriptive
		· · · · · · · · ·	-	

	Necessary requirements	De Sitter	Galbraith	Burton & Obel
	Design precedence rules	production structure and increase possibilities for process variation by control structure - Overall design principle is to set the values of the parameters as low as possible - Every facet and part of the system should be able to change - Design production structure first, then control structure - Design production structure top-down - Design control structure bottom-up - Technical dimension of infrastructure follows the structural design	 Creation of lateral relations Overall design principle is that the task information requirements and information processing capacity have to be balanced Designing the organizational structure is a process: Strategy first Secondly, the departmental structure Thirdly, key processes Fourthly, key people Fifth, roles and responsibilities Finally, information systems 	design decision rules - In general the rules are simple, practical, understandable and easy to use Map out a plan of a sequence of change by determining: - Important misfits - Content costs - Process costs - Misfits that are under your control
Implementation	Implementatio n	 Participative change strategy Raise awareness Intensive training program Create wide support for the change trajectory 	 Achieve strategic fit Build commitment Open design process: Start with a workshop Develop criteria and alternatives Rank the criteria and alternatives Test design alternatives by conducting interviews Analyse data Final meeting to decide upon design alternative 	-Diagnosing framework and diagnostic questions can be used for implementation - Project-based management approach - What: Define required activities - Who: Decide who is responsible and allocates the resources - When: Specify deadlines and milestones

Figure 21: Schematic overview results

4.4.2 Comparative results

This section provides the comparative results, based upon the results from the analysis of the first three sections of this chapter (schematic overview in the previous section). General points of attention will be pointed out first. A discussion about the comparison between the three approaches with regards to the necessary requirements will follow. Lastly, the approaches will be related to one another. The purpose of this section is to provide an answer on the last central question as described in chapter one: 'What can be learned by comparing the results of the analyses of the three organizational design theories?'

4.4.2.1 General points of attention

The work of De Sitter formulates rules and principles for the design of viable organizational structures. The organizational structure in the work of De Sitter is the division of labour. He provides insights with which an adequate division of labour can be structured. The division of labour is worked out extensively in the work of De Sitter, because he devotes a lot of attention to tasks, transformations and the network of tasks. In comparison to Galbraith and Burton & Obel's work, which do not only focus on the organizational structure. Their work entails more than just the organizational structure, their works contains elements and concepts of the organizational infrastructure. So, their work does not only contain elements which have a structural nature, but also non-structural elements such as human resources and technology.

De Sitter's approach is more of a solution-oriented approach than the two other organizational design theories. De Sitter provides argumentation in his work with regards to structural problems and problematic structures and then moves on to present the 'right structure', which according to him, is an adequate structure that optimizes controllability. The work of Galbraith and Burton & Obel both indulge two basic assumptions, which state that 1) There is no single best way to organize and 2) Not every way of organizing is effective. This basically means that their approach is aimed at bringing the structure in alignment with contextual factors rather than providing one solution in terms of the organizational structure.

4.4.2.2 Comparison based upon the theoretical framework: diagnosis, design and implementation

Reviewing the diagnosis phase of designing an organizational structure reveals that the work of Burton & Obel provides the most concrete, specific and complete set of useful insights. They have done this in their work by providing a comprehensive framework for diagnosing organizational design components, providing misfit propositions as well as providing diagnostic questions. The diagnosis phase of designing organizational structures plays an important role in the work of Burton & Obel and that is why a lot of their work has been dedicated toward this end. They do this by identifying misfits in the organization's design and that is why they argue that misfits are the engine of the organizational design process. It has to be pointed out that the diagnosis steps in Burton & Obel's framework do not only focus on elements of the organizational structure, it rather focuses on elements of the infrastructure and realizing alignment amongst all steps in the diagnostic framework is not easily achieved. De Sitter and Galbraith have not paid as much attention to the diagnosis phase of designing organizational structures. Even though, De Sitter argues that his parameters and functional requirements can be used as a tool for diagnosing organizational structures. Galbraith's insights on the diagnosis phase of designing the organizational structure are very much focused on the strategy of the organization, rather than the organizational structure, has to be brought in alignment with the organization strategy.

Reviewing the design phase of designing an organizational structure the work of De Sitter stands out when looking at the five general criteria for assessing organizational design theories. The five general criteria as mentioned in chapter three: essential variables, parameters, link between parameters and variables, principles and precedence rules. De Sitter provides the most useful insights concerning these five criteria, because he has provided the most detailed, specific and complete insights with regard to these necessary requirements. The analysis has shown that De Sitter's set of essential variables and structural parameters are much more concrete, specific and categorized as compared to the variables and parameters in Galbraith and Burton & Obel's work. Also, De Sitter is the only one to provide norm values for the essential variables, he does this by translating the external functional requirements into internal functional requirements. Norm values for the essential variables are lacking in Galbraith and Burton & Obel's work. De Sitter is the only of the three authors to specify parameters both for the production as well as for the control structure.

The link between the parameters and essential variables is well explained in all three organizational design theories, even though Burton & Obel admit that it might be troublesome to obtain all fit criteria as presented in their work. The analysis has shown that the design principles or propositions in Galbraith's work focus on the information processing capacity and the information decision systems. The design principles or propositions in Burton & Obel's work are very practical, but are quite overwhelming and it is not clear which of the rules, and in what way they have to be used. Whereas, De Sitter provides clear, logical and explicit design principles to design the production as well as the control structure. Clear, logical and well explained design precedence rules are lacking in Burton & Obel's work and formulated abstractly in De Sitter's work. Galbraith does work out the precedence rules as a design process, but it is aimed at the entire organizational infrastructure.

Galbraith has provided the most useful insights with regard to the hierarchy in an organization, because it is one of the coordination mechanisms in his work and he explains how hierarchy plays an important role in the decision making system. Burton & Obel have worked out the hierarchy in an organization substantially well, as hierarchy directly relates with two structural parameters in their theory and is closely tied to the contingency factor: size. This necessary requirement, hierarchy, is lacking in De Sitter's work as he offers very limited insights with regards to hierarchy in organizations.

With regard to the other two requirements: capacity to adapt and regulation by design, all three organizational design theories offer useful insights. Even though, De Sitter's work is the only of the three approaches which has the capacity to adapt as one of the norm values of the essential variables. The capacity to adapt or flexibility is at large recognized by the three organizational design approaches. The same applies for regulation by design, De Sitter is the only approach which specifically works out regulation by design, however, all three organizational design theories recognize the necessity to design the structure in such a way that the structure itself can be object of change.

Reviewing the implementation phase of designing an organizational structure the work of Galbraith provides the most concrete and specific insights as to how to actually implement an organizational design change. He provides a participative open process to implement an organizational design change, the steps and activities involved are described in a practical and detailed way. The work of De Sitter and Burton & Obel also favour a participative organization design change to prevent resistance to the new structure and they do adequately describe what implementation is about. However, they do not offer as practical and specific insights as compared to the aforementioned process of Galbraith. Therefore, it is argued that Galbraith offers the most practical, specific and useful insights with regard to the implementation phase of designing organizational structures.

4.4.2.3 Relating the three approaches

The work of Burton & Obel and Galbraith have in common that the strategy of the firm plays an important role. Burton & Obel pay a lot of attention to the environment as well, which is one of the contingencies in their work. Galbraith takes the division of labour as a given, while De Sitter untangles the division of labour as the 'thing' which has to be designed, Burton & Obel speak about task design rather than the division of labour. The configuration of the firm plays an important role in both Galbraith and Burton & Obel's work, in which certain configurations are more fitting in certain contexts, while De Sitter adopts the view that certain configurations are problematic and should not

be considered at all. Complexity plays an important role in all three organizational design theories. All three organizational design theories are aimed at tackling the complexity problem. De Sitter's theory is aimed at reducing disturbances, while Galbraith's approach is aimed at reducing information required, while Burton & Obel's work is aimed at reducing misfits. De Sitter's goal is to achieve optimal controllability, while Galbraith's goal is to achieve a balance between information required and information to be processed, while Burton & Obel's goal is to achieve design parameter, contingency, strategic and total design fit.

De Sitter's work is the only approach that distinguishes between a production and a control structure. De Sitter does mention that there is an information structure as well. Galbraith's work is heavily focused on the information processing capabilities of the organization. In this sense Galbraith's work and De Sitter's work could be seen as complementary approaches in terms of the useful insights they offer. The contingencies, as described in Burton & Obel's work, offer useful insights, because these contextual factors can have an impact on the organizational structure. This way, the three organizational design approaches do offer relevant and useful insights which can be complementary to one another. Future research could contribute and establish new insights as to how complementary the insights from these organizational design approaches really are.

5. CONCLUSION

The first section in this chapter will summarize the results, present the conclusions and provide an answer on the main research question. The second section will present the recommendations by formulating ideas for future research. The last section will present a short reflection with regard to the iterative choices in this research project.

5.1 Conclusion

In chapter two a theoretical model with the necessary criteria to critically assess organizational design theories was presented. Three organizational design theories were analysed in light of the necessary requirements from the theoretical model. The analysis has led to 1) an overview and better understanding of these organizational design approaches, 2) it shed light on the useful insights these design approaches offer, 3) results, which offer comparative and relational insights on the organizational design theories with regard to the design of the organizational structure.

The analysis has shown that the work of Galbraith and Burton & Obel focus on the organizational infrastructure, while De Sitter's theory focuses on the organizational structure. It has also become clear that Galbraith and Burton & Obel's theories work toward the most fitting structure in their work, while De Sitter has more of a solution-oriented approach and works toward one adequate organizational structure. It became apparent that Burton & Obel's theory offers the most concrete and complete insights with regard to the diagnosis phase of designing organizational structures. De Sitter's theory offers the most detailed, specific and complete insights with regard to the design phase of designing organizational structures. Galbraith's theory offers the most practical and detailed insights with regard to the implementation phase of designing organizational structures.

The analysis have also shown that there are commonalities between the organizational design approaches. Strategy and the configuration of the firm play an important role in both Galbraith and Burton & Obel's work. Complexity, the division of work and reducing disturbances or problems play a role in all three organizational design approaches. Burton & Obel's theory pays the most attention to the environment of the organization. The useful insights Galbraith's theory offers in terms of information processing capabilities, Burton & Obel's theory offers in terms of contingencies and De Sitter's theory offers in describing the production and control structure could be complementary to one another, which could serve as a starting point for combining and integrating these useful insights in future research.

In chapter one it was pointed out that the modern sociotechnical approach of De Sitter has been forwarded as the most explicit and detailed design theory in the field of organizational design at the Radboud University. More specifically, De Sitter's work is a lowlands sociotechnical system design approach. The findings in the previous chapter indicate that De Sitter's theory is rightfully claimed as the more explicit and detailed design theory, however, this is true for the design phase of designing organizational structures when compared to the other design approaches. The findings also made clear that this is not the case for the diagnosis and implementation phase of designing organizational structures as compared to the other organizational design approaches. Therefore, this research concludes that De Sitter's theory is rightfully claimed as the better organizational design approach, but the support for this claim is limited to the design phase of designing organizational structures.

This research concludes that there are some major differences between the organizational design approaches (based upon the studied literature) as the findings have shown, but there are a lot of relational elements and commonalities between the organizational design approaches as well. Therefore this research views the design approaches as complementary to one another, because the analysis in light of the necessary requirements has shown that the design approaches differ in offering strong insights on different criteria of the theoretical framework. The organizational design approaches are relevant and useful for the design of organizational structures and the insights they offer could contribute in an integration of the knowledge base within the literature field of organizational design. Burton & Obel's diagnosing insights, De Sitter's design insights and Galbraith's implementation and hierarchical insights could contribute to the integration of the knowledge they offer into a more complete theory for designing organizational structures. This would contribute and further develop the literature field of organizational design.

5.2 Discussion

This research is a literature review, in chapter two the research started by finding the right elements to construct the theoretical framework. The theoretical framework was necessary to be able to review organizational design theories. The theoretical framework has a number of criteria, which are described as necessary requirements. Whether the theoretical framework is complete or incomplete or whether some of the requirements should have been left out or others included is always debatable. However, this research views the theoretical framework as applicable to any organizational design theory which claims to be relevant and useful for the design of organizational structures. More research about the right set of necessary requirements or criteria is needed to further develop a framework by which organizational design theories can be assessed.

In light of the necessary requirements this review assessed three organizational design theories, which are theories from three different perspectives. The works of De Sitter, Galbraith and Burton & Obel were selected. However, the literature field of organizational design is extensive. It contains several more organizational design approaches and theories. Future research could develop and gain new insights by reviewing, comparing and relating other approaches and theories in the field of

organizational design.

The findings and results in this research made clear the organizational design theories differ in terms of the useful insights offered with regard to certain requirements of the theoretical framework. Future research could unpack these findings by an in-depth analysis focusing on specific elements of the theoretical framework.

The findings in this literature review are purely theoretical. Even though, there is a practical relevance in the sense that managers or designers in practice can use this review to have an indication about the useful insights the three selected organizational design theories have to offer, it would be fruitful to use these findings with the purpose of conducting a practical oriented research. An empirical study is not easily conducted, but the results of this paper, especially the insights regarding the diagnosis, design and implementation phases of designing an organizational structure are fruitful areas for practice oriented studies.

The functional dimension of designing an organizational structure, the D-D-I-E cycle does not only contain the three steps included in this paper. The 'E' stands for evaluation and is the last and final functional step in the D-D-I-E cycle. This research does not claim this step to be a functional necessity for an organizational design theory to offer useful insights about. However, future theoretical research may consider including evaluation as a criterium, as to find out whether organizational design theories offer any useful insights with regard to this step.

5.3 Reflection

This research project started with the idea to critically review five organizational design theories. However, considering the feasibility of the study, which had to have the format of a paper, the choice was made to select three organizational design theories. Since the initial idea was to look at five different organizational design approaches, it was decided to stick to the idea of looking at different approaches by selecting theories from different design approaches.

The theoretical framework initially only included the give general criteria, which were selected from previous literature reviews on organizational design theories and three more criteria obtained from literature in the field of organizational design. Upon consulting with the supervisor, the idea formed to add criteria based upon the previous step of diagnosing and the following step of implementing an organizational design. There was enough support in the literature to make the idea work, upon which was decided to include the elements in the theoretical framework.

The main question as well as the object of study in this research was adjusted and improved as the research went along. Getting to the 'right' research question was no simple mechanistic step-for-step decision process. As more and more knowledge was gained from exploring the literature and thinking about what it really was this literature study tried to explore, the right question and

objective of the study became clear.

Several difficulties were met and overcome during this research. The organizational design theories of Burton & Obel and Galbraith included more than just structural elements. Analysing these design theories meant at the same time filtering out the non-structural elements, which was not easily done. Another problem was to find enough methodological literature backup for conducting a literature review. This problem was amongst others solved by adopting the method Verschuren & Doorewaard (2010) provide in their work. Another problem was to write this research project in a concise way. The theoretical framework, including 10 requirements, in combination with three organizational design theories turned out to be a lot of material to process through. Especially because it was decided to systematically analyse the three theories, which meant to go through each requirement in a systematic way. The fruitful findings and results of this literature review make up for the extended amount of pages that were necessary to conclude the research project.

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