

Strategic decision-making in loosely coupled systems faced by high degrees of uncertainty and complexity

Dutch universities coping with COVID-19



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Preface

Dear reader,

I am delighted to present this master's thesis in which I focused on factors that influence the resilience of loosely coupled systems in times of high uncertainty and complexity. Specifically, I focused on Dutch universities operating during the COVID-19 pandemic. As a student myself, it was an interesting journey that brought me a different perspective on how universities function. This thesis has been executed on behalf of the Nijmegen School of Management (NSM) at the Radboud University (RU).

I would especially like to thank Dr. Ir. Hans Schaffers for his supervision and support. Without his extensive knowledge and the provided insights by means of his feedback, this master's thesis would not be as adequate as it is now. Furthermore, I would like to thank Dr. Peter Vaessen for his role as the second examiner and for his useful feedback. Altogether, both of them brought me many new insights which is something that I will definitely be using later on in the working field. Also, my gratitude goes out to all the interviewees and their willingness to participate in my research. Without their insights it was never possible to complete this research.

Finally, I would like to thank my parents, brothers, girlfriend and friends. Their support throughout the past period helped me to stay motivated and to persevere!

I hope you will enjoy reading this report.

With best regards,



Bas Pijpers | June, 2021

Abstract

Research aim: Loosely coupled systems (LCS) tend to be rather flexible and adaptable. However, in practice it seemed that these organizations struggled to cope with high degrees of uncertainty and complexity caused by the COVID-19 pandemic. This research aims to identify important factors that affect the coordination process and resilience of LCS, which resulted in the following research question: *“Which factors determine to what degree loosely coupled systems are able to achieve resilience in environments that are characterized by high levels of uncertainty and complexity?”* Factors that indicated resilience are: preparedness, responsiveness, adaptability and learning.

Research approach: This research is based on a deductive approach in which academic literature is found and tested by means of a case study consisting of six different cases within the Dutch educational sector. In total, four unstructured interviews and twelve semi-structured interviews were conducted.

Results: Analysis has shown that the highly fragmented organizational structure of LCS plays an important role in times of uncertainty and complexity. The short-term focus causes employees to use their autonomy and creativity to rapidly deal with the problems at hand. In the long-term, this prevents such organizations from adopting a collective approach. In order to regain some degrees of uniformity, LCS tend to shift towards centralized decision-making practices by means of crisis management teams. In order to downplay the consequences of COVID-19, employees started to undertake more exploratory activities resulting in a wide variety of new solutions. Normally, employees tend to stick to exploitative activities since the relatively stable environment barely challenges them to innovate. Last, findings indicate an important role for IT-systems to enhance cross communication and learning (Office365).

Practical contribution: From a more practical point of view, several key insights have been found which mostly relate to the role of top management. Findings indicate why top management should try to maintain some degree of control in order to increase uniformity and to find a balance between exploration and exploitation. Findings can also serve as a guide when facing during future crises.

Future research: Most importantly is that future research should conduct a quantitative approach that measures the degrees of achieved resilience. Also a longitudinal approach is recommended to analyze the long-term consequences of the COVID-19 pandemic.

Titel: **Strategic decision-making in loosely coupled systems faced by high degrees of uncertainty and complexity:** *Dutch universities coping with COVID-19*

Keywords: *Complexity, COVID-19, Crises, Decision-making, Loosely Coupled Systems, Resilience, Strategy, Uncertainty, Universities.*

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1. Introduction

1.1 Topic and problem

This thesis addresses strategic decision-making processes within loosely coupled systems (hereafter, LCS) that deal with high degrees of uncertainty and complexity. Since this research uses universities as a case study, it is of importance to understand that universities can be considered as the quintessence of LCS, because of their high levels of decentralization and low levels of coordination and control (Ingersoll, 1993). Hessels (2013) defines coordination as follows: *“the establishment or strengthening of a relationship among the activities in a system, with the aim to enhance their common effectiveness.”*

Furthermore, it is key to understand that organizations can operate under different modes of governance (e.g. network, market or hierarchy). Therefore, organizations may be dependent on different factors in order to enhance efficiency and to deal with the external environment at hand. Considering the characteristics mentioned above, the network governance mode is arguably most in line with the concept of LCS (Provan & Kenis, 2008). The unforeseen outbreak of COVID-19 (Coronavirus) has impacted the world globally, resulting in a pandemic. Global restrictions, in order to downplay the spread of the virus, caused economic as well as social activities to stagnate (World Bank, 2020). From a theoretical point of view LCS are considered to be adaptable, flexible and capable of responding to crises (Sandberg, Löwstedt & Räisänen, 2020). However, as a student myself, it was noticeable how universities struggled with the high degrees of uncertainty and complexity caused by the virus. This became evident by means of postponed examinations; abundance of new online conference platforms to use (e.g. Slack, WebEx, Skype, Zoom, Microsoft Teams); spread of contradictory information and the lower quality of lectures. Altogether, this master’s thesis is driven by the fact that, from a theoretical point of view, LCS are known to be flexible and adaptable, but in practice it seemed that these organizational forms, to some degree, struggled with the COVID-19 pandemic and hence, it is interesting to analyze what adaptive practices for LCS are necessary in order to stay functioning in a turbulent environment. An interview from Hermans (2021) with chairman Wigboldus of the Radboud University, showed that the Radboud University has experienced a difficult and tough year. More specifically, in an interview from Noij and Lambeets (2021), the chairman from the Radboud University argued that COVID-19 changed the way education will be in the future. This is mostly due to the shift towards online education and the rising work pressure among employees. Overall, Libbenga (2020) argues that universities were not prepared to operate efficiently under the fast changing conditions caused by the COVID-19 pandemic. An example is that most universities, except the open university of Maastricht, struggled to shift towards an E-learning environment. Salah-Eddine Kandri (2020), Global Head of Education, IFC, states: *“COVID-19 has struck our education system like a lightning bolt and shaken it to its core”*. The question that arises here is: *‘What capabilities should universities possess in order to operate efficiently when hit by a disruptive event such as COVID-19 and which decisions might help to overcome these challenges?’*

Problem

The main problem that is studied in this master's thesis is that, from a practical point of view, LCS seem to be less prepared to deal with high degrees of uncertainty and complexity. It was observable how LCS, and in this case universities, were less able to offer a certain perspective towards its students and, for example, struggled with the continuance of lectures. From a research problem point of view, the theme that is studied in this master's thesis lies in the applicability of LCS' existing decision-making processes and capabilities in times of uncertainty and complexity. It seems that these current decision-making processes and capabilities might be less applicable in highly uncertain and complex environments (see paragraph 1.2). Therefore, the question that arises here is what decision-making processes and capabilities are effective in a turbulent environment. It is of importance to investigate how LCS could change these processes in order to become more resilient in the future. Therefore, this thesis analyzes how LCS can enhance their capabilities in regard to: preparedness, responsiveness, adaptability and learning capacity in order to increase their organizational resilience. These capabilities can be enhanced by means of: adaptation of organizational structure, adapting decision-making processes, problem solving strategies and IT-systems.

1.2 Theoretical positioning

Given the previously formulated problem that LCS might respond less efficiently to crises, it is of importance to analyze to what extent these types of organizations' decision-making processes are able to withstand high degrees of complexity and uncertainty. Furthermore, this allows us to identify underlying reasons that explain how this problem could occur. Based on the theoretical positioning of the knowledge themes, the theoretical knowledge gap is described.

Characteristics of loosely coupled structures

First, it is of importance to see to what degree the organizational structure positively or negatively influences the process to overcome situations of high uncertainty and complexity. Weick (1976) states that LCS involve different actors that interact with each other, but also have their independencies (e.g. faculty members and board members within universities). The organizational structure of LCS is highly fragmented but rather stable (Mintzberg, 2009) and therefore especially applicable in stable environments (Lunenburg, 2012). A key advantage is that the structure of LCS allows individual departments to react to small needs or problems without affecting the whole organization. In this case, effective solutions can eventually be communicated across the organization and ineffective solutions will not damage the whole organization. However, a possible disadvantage of LCS is that this structure negatively influences the capability to respond to sharp discontinuities (e.g. crises) that have a wide variety of consequences (Weick, 1982). The lack of linkages within the organization hinders communication and coordination between departments and causes LCS to be less efficient and relatively

slow to major external changes (Weick, 1976). This might also hinder the efficiency of LCS to design and diffuse changes across the organization when necessary in order to adapt to the changing environment. Solutions to problems that have the potential to enlarge regardless of the LCS's efforts, are mostly communicated too late to the extent that the crisis already exists. Altogether it is argued that LCS seem to underreact when dealing with large disturbances which is caused by the fact that changes are not noticeable throughout the whole organization directly and therefore, the impact is sometimes underestimated. Moreover, this might also be due to the fact that the communication between departments is not optimal (Weick, 1982).

It seems that the disruptive outburst of COVID-19 created an uncertain and complex environment to such an extent that the current organizational structure of LCS might have negatively influenced the organizational performance. A research opportunity arises here to analyze how LCS made adaptations to their current organizational structure in order to downplay the consequences caused by a major external event. Burke (2014) states that little research is conducted in regard to organizational change of LCS. Therefore, he advises that all future research regarding this topic should be published in order to extend our current knowledge regarding LCS.

Current decision-making processes within LCS

Secondly, it is of importance to analyze what decision-making processes LCS currently adopt and why this may be a reason that these are less appropriate in times of crises. The decision-making processes within LCS are often described as a time-consuming and step-by-step process that occurs throughout the organization (Mintzberg, 2009). Reponen (1999) states that decision-making within LCS is often vague and that decision-makers cannot or dare not to comment on problems related to other fields. Furthermore, decision-making within LCS is considered to be decentralized, fragmentized and uncoordinated and therefore, one could question if this is still efficient in today's era. External pressures increasingly force universities to function as a whole instead of highly decentralized. For example, globalization caused competition between universities to increase. In order to gain and secure a significant international position, universities must create research groups that are large enough to have an impact which is more likely to occur when different departments cooperate. This also entails that an increase of communication between departments is preferable. Furthermore, the variety of departments within universities causes a strong vision to be absent. In order to overcome this challenge, it is necessary for LCS to increase their leadership in order to address new issues, motivate staff and to acquire resources (Reponen, 1999). Altogether, this indicates that the current decision-making processes within LCS might be less applicable in times of crises since they are considered to be slower and that the lack of central leadership hinders LCS to respond to crises as a whole. A research opportunity exists here to analyze how LCS changed their decision-making processes in order to cope with the high degrees of complexity and uncertainty caused by COVID-19.

Barriers for achieving organizational resilience

The previous subheadings indicated that the structure as well as the organizational decision-making processes within LCS play an important role in regard to operating in highly uncertain and complex environments. However, it is also of importance to analyze to what extent organizations can use their resources in such environments.

Organizational resilience indicates that an organization is able to develop or adapt resources in order to cope with a changing environment (see paragraph 2.5) (Teece, 1997). This is especially relevant in this scenario since universities experienced difficulties to change their current teaching and working infrastructure in order to deal with the changing external conditions. Thus, it allows us to identify underlying reasons that explain why certain organizations are less capable of adapting to fast changing environments. Dohaney, de Roíste, Salmon and Sutherland (2020) identified several barriers that organizations might experience when trying to enhance resilience. Some barriers they found are: lack of staff time, lack of digital literacy, existing digital systems are limited, unwillingness to adapt, lack of a plan for improvement, lack of incentives and a lack of resourcefulness in finding solutions. However, as stated before, the barriers to resilience can also be found in the organizational structure of LCS. For example, their highly fragmentized structure diminishes the degrees of innovation in order to overcome specific challenges (Weick, 1982). The authors opt for a blended decision-making strategy in which organizations combine top-down leadership with bottom-up decision-making processes. This causes a series of related actions that happen across the organization. This research focused on an earthquake in New-Zealand (Dohaney et al., 2020). Therefore, extensive research is recommended since organizations experience phenomena asymmetrically across different contexts and hence, this gives the opportunity to analyze a similar case which focuses on resilience building by LCS during COVID-19.

Knowledge gap

The identified research problem and theoretical positioning indicate that the organizational structure of LCS may play an important role in their organizational performance in times of high uncertainty and complexity. LCS tend to mostly operate in stable environments. So far, we do not fully understand how the structure of LCS and their related decision-making processes influence organizational resilience. Moreover, more research needs to be done about which factors enhance LCS' capabilities to respond to high degrees of complexity and uncertainty efficiently. This research addresses the knowledge gap by identifying important factors that help LCS, which mostly operate in a stable environment, to successfully enhance resilience. Herewith, the theoretical relevance of this master's thesis contributes to the literature on LCS.

1.3 Research objective and research question

Based on the formulated knowledge gap, the main objective of this research is to contribute to current literature on the concept of LCS by gaining insight in which factors influence the capabilities to accomplish organizational resilience and allowing them to cope with high degrees of uncertainty and complexity. In order to successfully conduct this research, the essential research question within this master's thesis is:

Which factors determine to what degree loosely coupled systems are able to achieve resilience in environments that are characterized by high levels of uncertainty and complexity?

The following sub questions provide guidance with the aim to address the research question:

1. To what extent does the organizational structure of LCS (low degree of internal linkages), in an uncertain and complex environment, affect the nature of the coordination process?
2. To what extent do LCS adapt their decision-making process (decentralized) to enhance coordination and to become more resilient?
3. To what extent do LCS, in an uncertain and complex environment, modify their problem solving strategy?
4. To what extent do LCS, in an uncertain and complex environment, integrate new ways of communication and learning within their coordination process?

Sub question one gives a deeper understanding of the challenges that LCS might face due to their low degree of internal linkages between departments. Sub question two sheds light on the degree that LCS specifically changed their decision-making processes in order to anticipate the changing environment. Sub question three focuses on the foresight of LCS. It focuses on how LCS deal with problems at hand and to what degree this changed due to the turbulent environment. More specifically, it focuses on to what extent LCS make use of exploitative or explorative activities to deal with possible challenges. Last, sub question four explains to what degree LCS develop new communication and learning strategies in an highly uncertain and complex environment and how this enhances LCS' resilience.

1.4 Relevance of research

Theoretical relevance

The formulated knowledge gap indicates that there is little research conducted that shows which factors are of importance for LCS to enhance their resilience in times of high uncertainty and complexity. The theoretical relevance of this master's thesis is especially visible by addressing this knowledge gap which is done by means of the four formulated sub questions. This thesis is of importance since it indicates to what degree the lack of internal linkages within the organizational structure of LCS influences the

coordination process. Moreover, this thesis shows to what extent the typical decentralized decision-making processes of LCS still uphold when the environment changes. Third, this thesis indicates to what degree LCS develop new resources or exploit current resources. Last, this research contributes by showing what communication and learning practices are especially relevant in times of high uncertainty and complexity. Altogether, analyzing these four sub questions is of importance since it enhances our understanding to what extent LCS should adjust their organization in order to cope with a crisis by means of highlighting what decision-making processes are successful in such situations in order to overcome challenges and to enhance organizational resilience. This is of key importance since it also indicates which factors of LCS positively or negatively influences organizational resilience.

Practical relevance

This master's thesis helps future managers to enhance their coordination processes in times of crises. First of all, this research allows decision-makers to adjust their organizational structure accordingly when facing times of high uncertainty and complexity. This allows decision-makers to deal with the lack of internal linkages in a responsible way. Also, the insights of this master's thesis can help managers to adjust and enhance their current decision-making processes in order to enhance the coordination and resilience. Furthermore, this research indicates to what extent they should rearrange their problem solving strategies in order to find better solutions to the problems at hand. Last, this thesis highlights to what extent information exchange can help employees to improve their decision-making. Moreover, this also shows how receiving and sharing information can improve communication across different departments and how this can be done in new ways. Altogether, this master's thesis can serve as a guide that managers can rely on in times of high uncertainty and complexity. Previous research has shown that one can use prior knowledge in order to deal with turbulence (Comfort, 2007). For example, Taiwan was able to use its prior experience it gained from the SARS outbreak in order to act rapidly regarding the COVID-19 outbreak in Wuhan. By this means, Taiwan was able to limit COVID-19 its impact. As a result, by the end of 2020, Taiwan, with a population of roughly 23 million, only had 7 deaths reported (Chia-Yen Dai, Ting-Hsuan Dai, Wang-Huei Sheng, Chi-Kung Ho, 2021).

1.5 Research approach

This research will be conducted by means of a case study that analyzes how universities have responded to the COVID-19 pandemic and dealt with the repercussions. In order to get a grasp of this disruptive event within universities, it is key to start with unstructured interviews. By means of posing open questions, one is able to get a sophisticated view of the topic. Therefore, four people within Dutch universities are interviewed. It is key to ask some basic questions to see how these actors experienced the COVID-19 pandemic within universities. For instance, basic questions could be: did your job/tasks/activities change due to COVID-19, if so, how did your activities change and how did you

experience these changes? After this phase of orientation, semi-structured interviews are taken to get a more detailed view that allows us to answer the sub questions as well as the main research question. Observations have shown that the COVID-19 pandemic hit multiple levels within the universities. Some topics of interest are: prior knowledge, faced challenges, cooperation, new objectives and gained knowledge. The semi-structured interviews have been adapted where necessary in order to increase the internal validity. Interviews have been taken until saturation was achieved.

1.6 Thesis outline

The lay-out of this master's thesis is as follows: chapter 2 contains a literature review which discusses the most important theoretical concepts and related propositions that are eventually presented in a conceptual overview. Chapter 3 sheds light on the methodology. It clarifies the used approach and how validity and reliability are guaranteed. Chapter 4 includes the found observations from the conducted interviews. Chapter 5 comprises the conclusions in regard to the formulated sub questions and propositions and it also answers the main research question of this master's thesis. Also, it includes an adjusted conceptual model. Last, chapter 6 entails the discussion. It highlights the theoretical as well as practical contributions of this research. Moreover, it sheds light on the limitations of this master's thesis and gives indications for future research.

2. Literature review

This chapter gives a more detailed understanding about the challenges LCS face when operating in a highly uncertain and complex environment and how these organizations are still able to achieve a thriving business. Firstly, this chapter focuses on a variety of paradigms that show different angles of how one could look at the general academic literature. In total, three paradigms are highlighted, namely: Strategy, Structure and Environment (SSE), Resource-based view (RBV), extended with a view on dynamic capabilities, and third, the learning organization. The second section focuses on the organizational structure of LCS and how this can create challenges in environments that are highly uncertain and complex. This gives a broader view of sub question one. Furthermore, this section focuses on how these challenges might be solved by means of certain decision-making processes which is related to sub question two. The third section focuses on similar organizational structures and their characteristics. More specifically, it analyzes which features could help LCS in times of high uncertainty and complexity. Altogether, this builds a foundation for sub question three. Section four focuses on how the exchange of information across departments can help organizations to enhance communication and learning. Moreover, it focuses on the exact role of IT-systems in this regard. Eventually, this gives a broader understanding that helps to answer sub question four. Finally, this chapter focuses on the concept of resilience and how organizations can become more flexible and more capable to adapt to changing circumstances. It allows us to identify critical factors that help to assess to what extent organizations can become resilient. Moreover, it highlights the concept of strategic decision-making (SDM) and how this differentiates depending on the environmental and organizational context. Finally, it also highlights possible barriers for organizations to achieve resilience.

Several methods have been adopted in order to gather relevant literature for this master's thesis. First of all, search strategies were used that are recommended by the NSM library team. This includes using Business Source Complete, Web of Science and RUQuest and the use of boolean search terms in order to find relevant articles. Moreover, the snowballing method was adopted in order to move from more general articles to more specific articles. Google Scholar allowed the researcher to use more specific search terms and to get access to a wider variety of databases.

Besides gaining more insight on how the key themes are described in existing literature, the goal of this chapter is also to develop a basis for further research. Chapter 1 indicated that the current decision-making processes of LCS might be less appropriate in rapidly changing environments and chapter 2 highlights the concepts that might increase the survivability of LCS in rapidly changing environments. These concepts are described in a conceptual overview (see paragraph 2.6).

2.1 Relevance of theoretical frameworks

This next section can be seen as an orientation phase in which several paradigms are highlighted. One should be aware that multiple paradigms are possible in the field of strategic management and therefore, the following paradigms show different point of views of how organizations can gain a competitive advantage. It helps to provide a more detailed direction in regard to this literature review.

2.1.1 Strategy, Structure and Environment (SSE)

This paragraph gives a clearer understanding of the concept of Strategy, Structure and Environment (SSE). The concept of SSE analyzes the internal adjustment (strategy-structure) and the external adjustment (strategy-environment) of an organization. On the one hand, organizations should develop a strategy that is suitable in regard to the external environment and on the other hand, organizations should have an appropriate internal structure that fits the strategy (Pertusa-Ortega, Claver-Cortes & Molina-Azorin, 2015). This indicates that the organizational strategy and structure differ when organizations operate in different environments. For example, Miller (1992) argues that an uncertain environment mostly requires organizations to differentiate, specialize or make more informal decisions in order to increase flexibility. Moreover, Miller (1992) states that the concept of loose coupling may play an important role in regard to the internal and external fit of organizations. As indicated in chapter 1, loose coupling may help organizations to make changes relatively quick and affordable. On the other hand, loose coupling may also result in inconsistencies within the organization which causes incongruities in regard to the organizational structure and processes (Miller, 1992). By analyzing the structure and environment of organizations one can see which conditions can enhance firm performance (Wilden, Gudergan, Nielsen & Lings, 2013). Therefore, it might be useful to have a specific focus on how LCS can successfully regain a perfect fit between the organizational strategic decision-making and its internal and external environment. This is in line with the formulated sub questions in chapter 1.

2.1.2 Resource-based view (RBV)

The Resource-based view (RBV) argues that organizations are distinct from each other due to the internal resources that a firm possesses. Therefore, the success of organizations is less depending on the internal and external fit of an organization, but more depending on the internal resources that it has. More specifically, organizations are more likely to gain a competitive advantage when they possess valuable, rare, inimitable and well-organized tangible or intangible resources (Solevik, 2018). The key element here is that inimitable resources allow organizations to have a superior competitive advantage on the longer term (Barney, 1991). An extension of the RBV is the concept of dynamic capabilities. This concept tries to explain how organizations can perform differently although they have similar resources (Solevik, 2018). Eisenhardt & Martin (2000) formulated the following definition of dynamic capabilities: “*Specific organizational and strategic processes (e.g. product innovation, strategic*

decision-making or alliancing) by which managers alter their resource base.'' As an example, one could take a look at the product development process in which cross-functional teams come together and all bring their own expertise to the table which results in superior quality. Also, strategic decision-making can be seen as a dynamic capability in which decision-makers make use of their business, functional and personal expertise. It needs to be stressed that dynamic capabilities can indeed be seen as a form of competitive advantage. However, it is argued that firms can gain similar capabilities while taking a different path. Therefore, one can question to what degree dynamic capabilities can be seen as a sustainable advantage (Eisenhardt & Martin, 2000). In regard to this master's thesis, it is of importance to understand that dynamic capabilities in a stable market are more likely to be embedded in existing knowledge and rules of thumb whereas dynamic capabilities in a turbulent market are more likely to be focused on the development of new knowledge and more iterative routines (Eisenhardt & Martin, 2000). Therefore, this may indicate a shift in focus for LCS.

2.1.3 The learning organization

Before discussing the paradigm of the learning organization in more detail, it is of importance to use the correct definition. Many people tend to confuse the learning organization with organizational learning or use the two concepts interchangeably. The learning organization is a certain structure of an organization whereas organizational learning is the process of learning within organizations (Örtenblad, 2001). Senge (1990), as cited in, Smith (2001), defines learning organizations as organizations in which employees continuously increase their ability to achieve new goals. This paradigm argues that organizations can gain a competitive advantage by innovating continuously, accordingly and more rapidly than competitors (Sugarman, 1997). Nafukho (2008), states that organizational learning should be equal, if not, greater than the degree of external changes if organizations would like to persist. Therefore, a key element is that the success of the organization is not fully depending on the capabilities of only its management, but also dependent on the learning capabilities of all employees (Sugarman, 1997). The rationale behind this concept is that applying an organizational structure in which people are able to continually learn will enhance an organization's ability to react flexibly and adapt in times of rapid change. Garvin (1993), as cited in, King (2001), defines learning organizations as *'An organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.'* Senge (1990), as cited in, Smith (2001), states that there are five key principles that differentiate a learning organization from traditional organizations. These are discussed in appendix 2. Moreover, appendix 2 also highlights the most important change strategies related to the learning organization.

2.1.4 Selected paradigm

After analyzing the different paradigms available, the SSE paradigm seems most suitable for this master's thesis. This paradigm is especially relevant since it represents an angle that this research takes since there is a continuous trade-off between how organizations try to achieve the optimal internal as well as external fit. More specifically, the introduction of chapter 1 indicated that there was a possible misfit regarding the organizational decision-making processes and the changing environment. This indicated that the current decision-making processes within LCS might be less efficient when trying to successfully respond to extremely different external conditions. Moreover, it came to light that the current organizational structure might be less applicable as well. An example is that it was no longer possible to have physical contact and therefore, organizations had to adapt to this as well.

2.2 LCS operating in dynamic environments

This section gives more detailed insights, by means of prior academic literature, that indicate why LCS might experience difficulty regarding their organizational structure and their decision-making processes when being faced with a highly complex and uncertain environment and hence, gives us a broader understanding of sub questions one and two. To be more specific, this section focuses on what LCS exactly entail, which challenges LCS face in turbulent environments and how LCS might overcome these challenges. Eventually, this section elucidates on the formulated propositions which are derived from this literature analysis.

2.2.1 Loosely Coupled System

As stated in the introduction of chapter 1, universities are seen as the paragon of LCS (Weick, 1976). Also, LCS do have a lot in common with the network governance mode (Provan & Kenis, 2008). This is especially noticeable since different departments within universities are interrelated, but also independent of each other. Loose coupling suggests that the different departments within an organization function mostly independent from each other (distinctiveness), but do contain some degrees of interdependencies (responsiveness) (Weick, 1976; Orton & Weick, 1990; Weick 2001; De Caluwe, 2011; Akgün et al., 2012). Within LCS, one can find several smaller 'systems' that consist of groups of people that, through affinity, share a certain task. These smaller groups can change continually (De Caluwe, 2011). To be more specific, universities deal with various disciplines. These disciplines are mostly set in a self-organizing department. The departments consist of different study programs that select their own courses and have their own responsibilities regarding their teaching methods (Clark, 1983).

Contrasting findings

One can argue that Weicks' research might be outdated since it originates from 1976. A reconceptualization of Orton and Weick redirected the research regarding loose coupling by specifying the concept of LCS (Orton & Weick, 1990). Also, Petri (2008) revisited the research regarding educational organizations. In fact, he argues that the amount of disruptive changes is limited. In general his main finding suggest that most educational organizations nowadays deal with more actors than before (Petri, 2008; De Caluwe, 2011). Moreover, there has been some criticism regarding the concept of loose coupling. Murphy and Hallinger (1984) argue that loose coupling suggests that different organizational levels and its components have limited impact on other organizational levels, mostly due to various and incompatible goals (Orton & Weick, 1990). This is in contrast to Weick (2001), who argues that interdependencies can be found within LCS. Moreover, Rowan (2002), as cited in, Hautala, Helander and Korhonen (2018), argues that educational systems have become more bureaucratized. Therefore, they state that the concept of LCS does not fully apply to educational systems anymore. With an abundance of contrasting findings, it seems unclear if loose coupling has a negative or positive influence on higher educational institutions when faced with high uncertainty and complexity. This research addresses this gap by examining how LCS are influenced by uncertain and complex environments such as COVID-19.

Decision-making processes of LCS

Besides the typical characteristics of LCS regarding the structure, it is also of importance to analyze what their current decision-making processes look like. This will eventually allow us to gain insight in how this decision-making process creates challenges for LCS when faced with a turbulent environment. Zabochnik (2002) states that organizations mostly adopt two types of decision-making strategies, namely either centralized or decentralized. First of all, it is key to analyze what the connotation of both concepts is. Centralized decision-making processes indicate a great influence of top management teams. By means of centralization, top-level decision-makers make specific choices without consulting lower level employees. Having a centralized decision-making approach allows organizations to have beneficial coordination effects which increases efficiency (Zabochnik, 2002). Rantakari (2013) states that firms that operate in a stable environment mostly adopt a centralized decision-making strategy. However, this seems questionable since LCS are known for their stable environments and mostly operate in a decentralized decision-making structure. A decentralized decision-making approach indicates that multiple levels within the organization are involved in the decision-making process. Moreover, this means that lower-level management is able to make decisions without the involvement of senior leaders (Zobajnik, 2002). Decentralized decision making is especially useful in situations where a quick response to fast changing technologies and environments is required (Aoki, 1986, as cited in, Zabochnik, 2002). Gachet and Brézillon (2005) emphasize that organizations should 'cut down' long decision paths

and should adopt a more hybrid decision-making process in order to react to rapid changes. Prasetyo, Masi and Ferrante (2019) define collective decision-making as follows: *“Collective decision making is the ability of individuals to jointly make a decision without any centralized leadership, but only relying on local interactions.”*. Thus, decentralized decision making allows a group of individuals (e.g. faculty members) to jointly make decisions in order to address a certain problem, without the interference of higher-level management teams. In line with prior research (e.g. Weick, 1976, Weick 1990 and Mintzberg, 2009) we can argue that LCS indeed adopt a decentralized decision-making structure. Moreover, it shows that decentralized decision-making processes, on the one hand, enhance firm performance, whereas it may also hinder firm performance. Therefore, it is key to analyze which implications a decentralized decision-making process has for LCS when facing highly complex and uncertain environments. This is analyzed in the next section.

2.2.2 Lack of uniformity within LCS in times of uncertainty and complexity

The previous section analyzed how LCS normally function by means of a decentralized decision-making processes and also highlighted that so far less insights are available of how these organizations operate in turbulent environments. This section analyzes what challenges LCS face due to this decentralized decision-making.

Low degrees of cross department coordination

As discussed in chapter 1, already some limitations have been found in regard to LCS when faced with high degrees of uncertainty and complexity. First of all, Hannaway and Woodroffe (2003) argue that activities from one department are only barely noticed by other departments. To be more specific, different strategies emerge over time throughout the organization. This indicates that there is a limited collective approach within LCS when dealing with severe problems that reach multiple levels within the organization. This is also emphasized by Arango-Vasquez & Gentilin (2021) who state that LCS are characterized by their weak interrelationships between departments and the fact that LCS respond rather slowly in turbulent environments. The lack of internal linkages also hinders LCS from making rapid decisions in times of crises. Weick (1982) states that LCS have the tendency to fully fragment in case no one pays attention to the overall system. Alarid, Sims and Ruiz (2010) argue that this can be solved by means of managers who maintain control by creating a shared vision. These findings, combined with those of chapter 1, seem to indicate that LCS are likely to be more effective in stable environments where organizations do not have to deal with highly complex situations. This argument is also stressed by Cohen, March and Olsen (1972) who argue that complex problems with high correlations are more likely to have a hierarchical decision-making structure, whereas problems with low degrees of interrelation most likely lead to a decentralized decision-making processes. Cameron (2000) and Ouchi (1978) extend on this research by arguing that organizations should try to find a balance between the

degrees of control and looseness. Thus, instead of thinking in either/or terms, one should look at possible combinations of tight and loose coupling within complex systems such as universities (Burke, 2014). Also, Tsuchiya (1992) states that LCS should become more tightly coupled and adopt more centralized strategies in situations of high uncertainty and complexity. However, this might also cause LCS to lose their sensitivity and flexibility. This creates a paradox since this indicates that LCS should shift towards a different structure which is in contrast with their ambiguity which allows separate departments to focus on different objectives (Tsuchiya, 1992).

Overall, we can conclude that the highly fragmented linkages within LCS might prevent such organizations from having a collective approach since there is little coordination between different departments. This results in the following proposition:

P1: The highly fragmented internal linkages hinders LCS' ability to develop a collective approach in times of high uncertainty and complexity

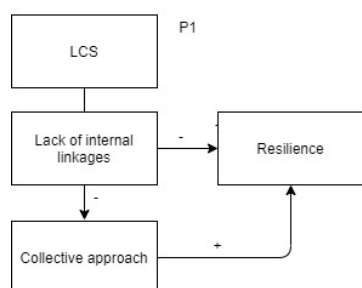


Figure 1: proposition 1

Prior research states that the go-to solution in times of crises is to adopt a blended strategic decision-making process which allows for more efficient and rapid-decision making processes. This approach also allows LCS to adopt a centralized vision that enables them to implement similar activities throughout the whole organization and focus on common objectives. In the case of LCS, which are known for their decentralized decision-making processes, it is expected that the decision-making power becomes more centralized. This expectations results in the following proposition:

P2: LCS have integrated a more centralized decision-making approach in times of high uncertainty and complexity blended decision-making).

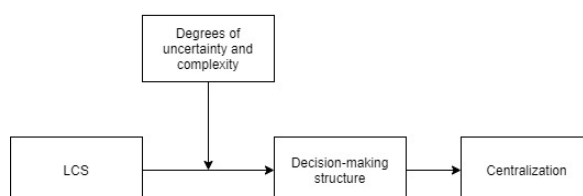


Figure 2: proposition 2

To conclude, the two formulated propositions indicate that the degree of internal linkages (connected – fragmented) and the type of organizational management (centralized – decentralized) are decisive for the responsiveness and adaptability of LCS in highly uncertain and complex environments

2.3 Organizational structure characterized by loose coupling

The previous section showed which challenges LCS may face and how to overcome them. However, it is of importance to understand that there might also be other problems solving strategies to overcome these challenges. Therefore, the next section analyzes to what extent there are other organizational structures with similar loose coupling characteristics that might provide useful insights for LCS.

2.3.1 Problem solving strategies adopted by network organizations

The introduction of chapter 1 already indicated Network governance can mostly be seen as a significantly different form of governance than the traditional forms of governance such as market and hierarchy. These governance forms mostly put emphasis on the concept of solo operations. This is in contrast to network governance which focuses on the interplay between a variety of organizations in order to reach common objectives (Provan & Kenis, 2008).

Network organizations operate in a non-hierarchical form in which teams with specific expertise cooperate in order to deal with a complex product or situation and to decrease the level of uncertainty. This organizational form is characterized by its flexibility, responsibility and openness (Rutten, 2016). Podolny and Page (1998) define network organizations as follows: *‘a network form of organization as any collection of actors ($N > 2$) that pursue repeated, enduring exchange relations with one another and, at the same time, lack a legitimate organizational authority to arbitrate and resolve disputes that may arise during the exchange.’* This form of organization distinguishes itself from other organizational forms because of their enduring, instead of episodic, exchange relations and because of the absence of legitimate authority.

Provan and Kenis (2008) identified three different types of networks, namely: Participant-Governance, Lead Organization-Governed and Network Administrative Organization. These three different types of network governance imply different levels of cooperation and authority. The first one indicates cooperation without a central governance entity, whereas the latter consists of a central entity that is assigned to manage all relations.

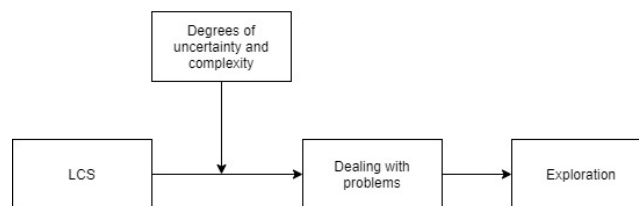
Network organizations dealing with uncertainty

Moynihan (2008) analyzed how networks learn when faced with high degrees of uncertainty. Learning helps decision-makers to enhance their capabilities, flexibility and confidence when faced with future crises. Three different types of uncertainty are identified. First, substantive uncertainty is the lack of knowledge about a certain problem. Second, strategic uncertainty is caused by the multiple actors within a network organization who all, to some degree, have their own autonomy. Third, institutional uncertainty arises when dealing with actors from other institutions who have their own objectives, opinions and perceptions (Koppenjan and Klijn, 2004, as cited in, Moynihan, 2008). Moynihan (2008) found that network organizations mostly learned ‘on-the-job’ due to a lack of prior experiences with

crises. Thus, in times of high uncertainty and a lack of prior knowledge, network organizations have no other choice but to explore for new solutions. Moreover, network organizations adjust and create standard operating procedures accordingly. Altogether, this argumentation results in the following proposition:

P3: In times of high complexity and uncertainty, LCS are forced to undertake more exploratory activities to find new solutions.

Figure 3: proposition 3



This proposition is especially relevant since Arango-Vasquez & Gentilin (2021) state that new insights could be useful in terms of the adaptive capacity of LCS and the relationship between standardization and innovation. Therefore, this proposition could analyze to what degree this relationship between standardization and innovation changes if LCS are forced to operate in a different environment.

2.4 Information, communication and learning

2.4.1 Information exchange enhanced by means of IT-systems

The previous sections gave some indications about the different types of governance (Provan & Kenis, 2008). This section gives more detail on how a certain type of governance influences information exchange and how information is managed. Schraagen, Veld and De Koning (2010) argue that information sharing during a crisis differs per organizational structure. Therefore, they compared hierarchical structures with network teams. The authors found that network teams or loosely coupled teams were able to come to decisions faster than hierarchical teams. This is mostly due to the fact that hierarchical structured teams mostly have to wait for the responsible team member to make the final decision. Furthermore, they argue that there is a higher degree of interaction within network teams which resulted in more knowledge diffusion. This research concludes that network teams perform better during crises due to their high degrees of information exchange, their mutual trust and due to the fact that they monitor each other's performances (Schraagen et al., 2010).

Furthermore, section 2.2.2 also showed that these barriers can be dealt with by means of a blended learning strategy. In line with this, the introduction of chapter 1 already indicated that the coordination within LCS is considered to be relatively inefficient since the distribution of information

mostly takes place within one department. Therefore, this section analyzes what the exact role is of IT-systems in regard to resilience and how communication and learning, via IT-systems, can enhance organizational performance.

IT-systems enhancing organizational performance

Work by Petrauskas (2006), shows that information technologies (IT) systems have a significant impact on organizational performance. For example, they can support possible changes in organizational activities or organizational structures. Moreover, Ok, Özdemir & Kandemir (2007) found that IT-systems are especially useful in universities. They state that IT can help to improve communication of the university in respect to its internal and external environment and hence, this improves the alignment between strategy, structure and environment. Dedrick, Gurbaxani and Kraemer (2003) found that IT-systems should not only be used for the automation of processes, but more importantly that it should be used to enable organizational changes in order to improve productivity. In order to make high quality rapid decisions, decision-makers need to receive information in time (Petrauskas, 2006).

IT-systems and organizational structures

Hitt and Brynjolfsson (1997), analyzed how IT-systems are related to the internal organization. They argue that the decision-making strategies within organizations mostly depend on the type of information required. Their findings indicate that one's individual decision power is positively related to IT-systems and therefore, this shows that IT-systems are related to an increased degree of decentralization. This is in line with the work of Tsuchiya (1992) who showed that IT-systems can improve strategic decision-making processes within LCS so that they can maintain their loosely coupled structure. Moreover, Hitt and Brynjolfsson (1997) found that organizations who implemented IT-systems are more likely to have a higher degree of human capital. Also, these organizations are more likely to put more emphasis on the educational level when hiring new personnel. Their most significant statement is that firms, who employ a certain amount of professionals within their organization, are more likely to integrate IT-systems and adopt a decentralized organizational structure. However, one side note needs to be made that is especially applicable to universities. Hessels (2013), states that coordinating, by means of new IT-systems, might take too much time of employees which they would normally have spent on research.

IT-systems and communication costs

Work by Wyner and Malone (1996) shows that organizations adapt their organizational decision-making processes according to the related communication costs. Their research focused on the relationship between the reduction of communication cost by means of IT-systems and the organizational efficiency in regard to decision-making processes. In fact, there are three different types of decision-making, namely: independent decentralized, centralized and connected decentralized decision-makers. The latest

structure indicates autonomous decisions by means of remote information made available through a shared network. It is necessary that this information is brought to the decision-makers effectively. This structure is especially useful in organizations that consist of ‘knowledge work’ and where decision-makers have knowledge that is hard to communicate to others (e.g. understanding college students or dealing with local government). This structure is mostly used when the value of remote information is considered to be high. Wyner and Malone (1996) argue that organizations reach a connected decentralized structure if the IT-systems are able to reduce the communication costs. In their final statement, they argue that innovation and knowledge work becomes more and more important and therefore, it is highly expected that decentralized decision-making processes are becoming increasingly visible within other organizations.

IT-systems during crisis

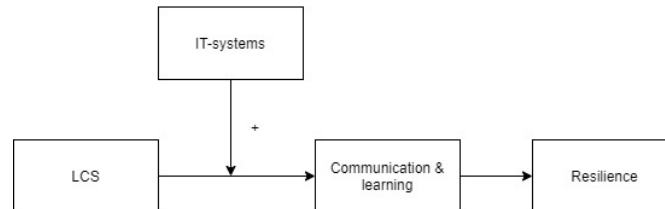
Comfort (1993) analyzed the role of IT-systems during crises that are defined by high uncertainty. She argues that crisis managers are hindered in their decision-making because of the limited information available and the limited means to communicate information rapidly. This directly impacts the efficiency of decision-makers to respond to problems at hand. IT-systems allow for the creation of interactive networks in which decision-makers can think about problem solving together. Moreover, IT-systems also increase the availability of information. Comfort (1993) argues that broadly distribution of information across the organization, in combination with timely feedback, will help organizations to develop goals and actions in order to effectively deal with crises. Jefferson (2006), confirms this by stating that the implementation of IT-systems is especially important regarding the communication, integration and planning of actions in regard to ‘extreme events’. Altogether, this indicates that communication via IT-systems help organizations to gather more relevant information which helps them to make better decisions in times of high uncertainty. Petrauskas (2006) shows how information technology effectiveness can be assessed by means of three criteria, namely: time (time needed to reach decision-maker), cost and path (number of stages before reaching decision-makers). These factors focus on how easily and efficiently one can communicate with others by means of IT-systems and the assessment of these factors will allow organizations to determine whether it is worthwhile to adjust or maintain its current IT-system. The previous findings indicate that IT-systems are indeed a worthwhile investment. However, Klein (1996) argues that the main weakness of such IT-systems is that they are mostly evolved separately. This means that they are not fully integrated throughout the organization. Meanwhile, if an organization tries to enhance its coordination, a well-integrated system is required. This helps to manage all the dependencies within the organization.

Overall, it seems that IT-systems can enhance the efficiency of communication, planning and implementation of activities which then increases organizational learning and overall firm performance. This is especially the case if organizations make use of integrated IT-systems. Moreover, research has

shown that IT-systems are especially relevant and helpful in times of crises. From these conclusions, the following proposition is derived

P4: Information exchange, by means of IT-systems, enhances communication and learning.

Figure 4: proposition 4



2.5 Factors affecting resilience

Whereas paragraph 2.2 highlighted what challenges LCS face and how they can solve problems, this section provides more insights that allows us to see how organizations build strategies in order to become a resilient organization and thus solve the cause of these discussed problems. This section mainly explains what resilience exactly entails by highlighting some definitions used in a variety of studies, what drives resilience, what hinders resilience, how efficient decision-making influences resilience and finally, how this is related to LCS. Eventually, this allows us to get a clearer picture of the overall main research question.

2.5.1 The concept of resilience

We find ourselves in a world in which we are continually dealing with unexpected events. A recent example of such an unexpected event is of course the COVID-19 pandemic. For organizations, it is of key importance to face these challenges; come back stronger and to deal with future challenges as well (Weick & Sutcliffe, 2011). The capabilities of an organization to tackle these challenges appropriately significantly influences its viability and sustainability (Koronis & Ponis, 2018). Therefore, it becomes important that organizations increase their resilience (Weick & Sutcliffe, 2011). Fiksel (2003; 2006), defines resilience as follows: *‘‘The capacity of a system to tolerate disturbances while retaining its structure and function.’’* In a business context he defines resilience as *‘‘the capacity for an enterprise to survive, adapt, and grow in the face of turbulent change.’’* (Fiksel, 2006). Koronis and Ponis (2018) define resilience as *‘‘the accumulated cultural capacity of an organization to make sense of risks and negative events, to absorb the pressure and ultimately protect the organization’s social capital and reputation’’*. This ability to adapt is also mentioned by Ponomarov and Holcomb (2009). The concept of adaptability shows that organizations should be able to activate, combine and recombine their resources according to a certain situation when new challenges arise (Koronis & Ponis, 2018). Duchek (2019) developed a conceptual framework which shows that resilience can be achieved by means of three successive stages consisting of the recognition and anticipation to potential threats, an offensive

approach to purposefully cope with crises and thirdly a reflective approach to enhance adaptation and learning after crises.

After analyzing these different definitions, it becomes clear that, for this research, the capacity of an organization to sense future events and to absorb possible pressures while maintaining social capital and reputation is of key importance to overcome challenges caused by negative or disruptive events and therefore also most relevant. The capacity of a resilient organization consists of four elements, namely: preparedness, responsiveness, adaptability and learning. These four elements are further supported by social and capital foundations such as trust and image (Koronis and Ponis, 2018). The factors are elucidated next:

Preparedness. According to Koronis and Ponis (2018) prior research regarding resilience states that an organizations' preparedness is determined by its degree of preparatory actions, planning, development of manuals and practice. By having a high degree of preparedness, an organization improves its ability to evaluate risks, predict the impact of an event and train its employees. The latest is considered to be of great importance since it increases the input of potential solutions and it minimizes the lack of discernment. The importance of this is also stressed by Fowler, Kling and Larson (2007) who state that top-level managers and middle-level managers showed higher levels of perceived preparedness than lower-level employees. This is mostly due to their responsibilities in regard to crises. However, one cannot successfully plan preparatory actions or develop manuals if it has not experienced any risks and threats. Altogether, preparedness consists of three levels, namely: resources, functions (e.g. procedures) and training of personnel.

Responsiveness. Being prepared allows organizations to face future challenges. Responsiveness, on the other hand, can be seen as an organization's ability to successfully respond to crises. It describes the organization's ability to comprehend the crisis at hand; thoroughly examine its impact; frame problems and act as a collective organization (Koronis & Ponis, 2018). Hoyt, Huq and Kreiser (2007) identified various enablers of responsiveness, namely:

- Environmental scanning: analyzing and collecting data regarding the external environment in order to seize opportunities and track down threats. Information is collected through: personal interaction, published data and an organization's data gathering activities (e.g. benchmarking).
- Strategic planning: strategy that is defined through a certain set of activities. Planning is mostly done through personal communication and with a short-term focus. Planning can also be done by means of certain procedures and policies such as budgeting.
- Flexible manufacturing infrastructures: focuses on the dynamic interactions and information flows between various actors and departments.

- Supply chain governance: governance focused policies and procedures in order to maintain a good relationship with stakeholders while, at the same time, mitigating the risk of opportunism.
- Multi-skilled workers: focus on the process of creating a high-skilled workforce by means of training and education.

Adaptability. A part of organizational resilience is also an organization's adaptability that increases and changes over time. This can be achieved by managing resources in such a way that they are: flexible, storable, convertible and malleable in order to adapt to a specific situation (Koronis & Ponis, 2018). It is of importance not to look at past solutions, but to promote innovation. New ideas give an organization the possibility to take steps forward into a new environment and reality. Adaptability can be achieved through problem recognition, improvisation and adaptation of (technological) resources. This enables an organization to adopt a new way of strategic thinking that is applicable in a new environment. In case of LCS, adaptability allows them to adopt a new way of strategic decision-making that is more relevant in times of crises (Koronis & Ponis, 2018).

Learning. The learning aspect focuses on the development of new facets within the organization in order to deal with current and future crises. An organization can 'learn' by gathering external knowledge and internal information in order to make the right assumptions. A learning system is able to evaluate risks, recognize problems and solutions and to calculate possible impacts. An organization can achieve this by creating a learning culture. It suggests how an organization recognizes previous made mistakes and processes this information in order to cope with current problems more successfully (Koronis and Ponis, 2018). This aspect can be connected to 'system 1' thinking where decision-makers make intuitive decisions, based on prior knowledge (paragraph 2.5.2) (Kahneman, 2003). Moreover, it also shows similarities with the concept of the learning organization mentioned in paragraph 2.1.3.

2.5.2 Concept of Strategic Decision-Making (SDM) in rapid changing environments

Section 1.2 indicated that LCS mostly make use of an incremental learning strategy which can be defined as a step-by-step process which is time-consuming and considered to be relatively slow in times of crises. This strategy is considered to be less applicable when rapid decision-making is necessary. Therefore, this paragraph analyzes how firms deal with complex problems that ask for rapid decisions.

Strategic decision-making (SDM) can be seen as a process in which a specific course of action leads to a specific result. Decision-makers mostly have access to a certain set of alternatives with each their own outcome. However, in most cases the exact outcome is unknown which causes uncertainty. Therefore, reducing the degree of uncertainty has become one of the crucial challenges within SDM (Vermeulen & Curşeu, 2010, p.1). This uncertainty prevents managers from taking fully rational strategic decisions. It can be argued that managers are cognitively limited which also makes it a very

complex process. Moreover, managers possess different perspectives, which also differentiates the decision-making process (Haley and Stumpf, 1989). Altogether, SDM is characterized by a lack of structure, novelty, complexity and open-endedness (Mintzberg, 1976). Orasanu & Connolly (1993) state that prior research mostly found that, despite the high degrees of complexity and uncertainty, SDM is mainly characterized by the following steps: problem recognition, generation of alternatives, evaluation of alternatives by weighing pros and cons and choosing an alternative that seems to be the best response to the problem. However, in order to deal with these degrees of uncertainty and complexity Orasanu & Connolly (1993) argue that decision-makers mostly base decisions on their previous experiences with the problem. Klein (2008), states that people mostly use prior knowledge and experience in order to deal with these situations.

Since both options are contrasting, uncertainty reduction can be achieved in two ways. First, a decision-maker can gather relevant information in order to choose the best alternative to the problem. Secondly, a decision-maker could make use of pre-existing heuristics instead. These pre-existing heuristics allow decision-makers to make fast decisions based on cognitive short-cuts gained from prior experiences (Vermeulen and Curşeu, 2010, p1).

Thinking fast and slow

In fact, Kahneman (2011) argues that decision-making can be distinguished into intuition thinking (system 1) and reasoning thinking (system 2). He argues that there are two types of systems that drive the way humans think. System 1 thinking can be described as a process of habits which is more difficult to control. This process is characterized as: fast, unconscious, implicit and emotional. System 2 thinking can be described as a well-thought process in which actors search for new or missing information. This process is considered to be slower and more rational than system 1 thinking. Moreover, this system thinking is also more controlled and monitored. Kahneman (2011) argues that most people think to act rational whereas they mostly act intuitive instead. These two ways of thinking can also influence the outcome of the decision-making process. This can be shown by means of the following situation:

Someone would like to buy a baseball bat and a ball which together cost 1.10\$. The baseball bat is 1\$ more expensive than the ball. When people were asked to answer the question how expensive the ball was, they answered with .10\$. (Kahneman, 2003)

The example above shows that people intuitively argue that the difference between 1.10\$ and .10\$ is 1\$. However, if we look closer and think rationally, we can see that this answer is incorrect.

From this example, we cannot conclude that the use of heuristics or intuitions is always related to poor performance. Kahneman (2003) argues that experienced decision-makers even perform better when they follow their intuitions instead of conducting a thorough analysis. West, Toplak & Stanovich

(2008) argues that reliance on heuristics mostly results in biases due to the fact that managers are unaware that they use heuristics. Biases, such as overconfidence and neglecting base-rate information are most likely to occur in system 1 thinking. Therefore, Kahneman (2003) states that system 2's primary function is to monitor system 1's thinking. A wrong intuitive judgment from system 1 is considered to be caused by a lack of monitoring by system 2 (thinking rational). Thus, our ability to avoid errors depends on the degree that comes to one's mind and if the corrected thoughts of system 2 also come to mind. Thus, it depends on how heavily we trust our unconditional intuition. Accessibility determines how easy certain thoughts come to mind. Thoughts that are easily accessible (come easy to mind) are more likely to result in system 1 thinking whereas less accessible (do not come easy to mind) attributes are expected to be slower and more costly (Kahneman, 2003). Altogether Kahneman's (2003) main point is that continually depending on computation is too costly and slow and therefore, people are encouraged to use intuition. However, he also states that people should be more aware of possible faulty intuition. Besides intuition, people can also make use of certain rules-of-thumb (Simon, 1979). These rules-of-thumb can guide decision-makers in a more specific direction and allow them to make decisions after searching for only a small part of all the available information. Eventually, one can make a decision when the formulated satisfying criteria are met such as a certain amount of costs or profit (Simon, 1979). This decision-making style indicates that people can search for information and still limit the time spent on these decisions by making use of certain criteria.

2.5.3 Barriers to organizational resilience

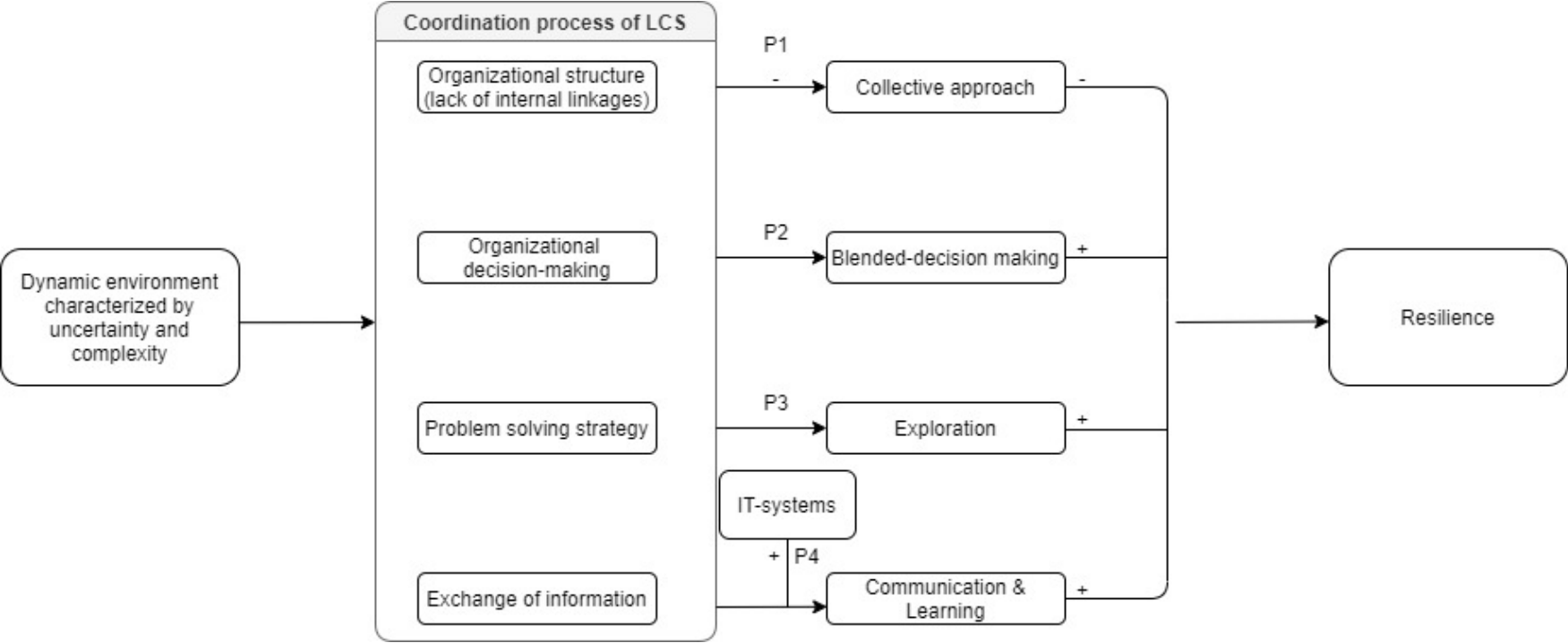
There have been several factors identified that might prevent organizations from becoming resilient. First of all, Mallak (1998) states that turbulent environments put pressure on employees since they continuously need to make quick assessments of changing situations, meanwhile they did not receive the adequate training, preparation and resources to act appropriately in such situations. This indicates that employees should be educated on how to act in a resilient way. Furthermore, paragraph 1.2 highlighted some difficulties that LCS can experience on an individual level. However, there are also barriers that exist on an institutional level. Research by Dohaney et al. (2020) explains this in more detail. Their research was conducted in New Zealand, where they asked academics how they define a resilient university. They researched the Victory University of Wellington (VUW) which consists of multiple campuses across the region. The researchers applied a mixed method approach by means of interviews, focus groups and questionnaires. Dohaney et al. (2020) state that mostly resilience is prevented due to management & leadership initiatives and the organizational infrastructure. To be more specific, the authors found that, regarding management, organizations experienced low degrees of leadership and a lack of a resilient vision. Moreover, regarding the organizational structure, the authors found that most employees perceived a lack of organizational digital as well as physical systems and processes. Lastly, the authors found that most organizations struggled with efficient ways of

communication between senior-leaders and employees (Dohaney et al., 2020). Moreover, they argue that universities in specific should adopt a blended learning approach in order to overcome these barriers. A blended learning approach indicates physical access to resources, supported by online facilities. This strategy will promote communication between peers and staff and therefore also enhances learning engagement. The development of an online environment can be seen as the first milestone towards more resilience (Dohaney et al., 2020).

2.6 Conceptual model

This paragraph gives a conceptual overview (please, see next page) of the different concepts and knowledge themes mentioned in the previous paragraphs. This conceptual model is used as an analytical tool that helps to analyze the relationships between the different concepts and to interpret the found results in chapter 4. Furthermore, it will test if the propositions are supported and what might be possible explanations when this is not the case. Therefore, this will not only confirm existing findings but also help to contribute to the concept of LCS with new findings. It also shows how the derived propositions relate to the formulated sub questions in chapter 1. The answers to the propositions allow us to answer the sub questions and main research question of this master's thesis. The first sub question within this master's thesis revolves around how the organizational structure of LCS affects the coordination process in times of high uncertainty and complexity. It is expected that the organizational structure, characterized by a low degree of internal linkages, hinder LCS to develop a collective approach towards the crisis (P1). The second sub question highlights how LCS adapt their organizational decision-making process in order to enhance coordination and therewith also their resilience. It is proposed that LCS implement an organizational change in which they shift their balance from a decentralized decision-making approach towards a more centralized decision-making approach. This will combine top-down decision-making with bottom-up decision-making (P2). Sub question three analyzes how LCS try to cope with problems. It is proposed that LCS adjust their focus towards the exploration of new activities in order to find new solutions (P3). Lastly, sub question four focuses on how LCS try to integrate new processes of communication and learning. It is expected that the exchange of information, by means of IT-systems, will help LCS to enhance their level of communication and learning (P4). To conclude, this conceptual model shows that a dynamic environment affects the coordination processes of LCS. Specifically, this thesis focuses on the organizational structure of LCS that hinders a collective approach in turbulent environments. Moreover, it focuses on possible alterations in the decision-making process and to what extent LCS coordinate more exploratory activities. Last, it focuses on to what extent information exchange is done by means of IT-systems and how it might improve internal communication and organizational learning. Overall, this makes it possible to formulate an answer to the main research question.

Figure 5: conceptual model



3. Methodology

This chapter gives a more detailed description of how this research is executed and why specific decisions have been made. First, a more generic overview is given regarding the chosen research approach and the different phases that this research consists of. Subsequently, this paragraph also shows why a case study was perceived as most appropriate, which cases eventually have been selected and what possible research alternatives were available. The second section of this chapter describes the data collection method applied and it gives a detailed overview of which data was required to answer the sub questions of this master's thesis. Moreover, it also highlights how this data was collected and gives more insights in regard to the interview procedure. Third, the data analysis procedure is discussed which highlights how the data has been carefully processed and how all concepts have been operationalized. Fourth, the assessment of the quality of this research is discussed. This chapter concludes by stating how ethical research is guaranteed.

3.1 Research design

In order to answer the research question *“Which factors determine to what degree loosely coupled systems are able to achieve resilience in environments that are characterized by high levels of uncertainty and complexity?”* insights in the factors that influence the coordination process of LCS to accomplish organizational resilience have been collected. The overall research approach was mostly based on deductive reasoning in which existing literature was tested and, where possible, combined with new insights (Halecker 2015). This was especially relevant in this case since it allowed one to see to what extent current literature also applied to LCS and how characteristics of LCS may have caused different outcomes. The most appropriate method for this concept was a qualitative research method since this is characterized for its production of very detailed and extensive information with only a limited amount of observations (Bleijenbergh, 2013). Therefore, this approach gave the opportunity to analyze to what extent COVID-19 influenced LCS and what decisions the organizations took to adapt to the fast changing environment caused by the pandemic. More in-depth, it also helped to analyze why these decisions were made and what the possible consequences of these decisions were. Eventually, this helped to analyze which factors are of importance in regard to the coordination process of LCS when operating in a highly uncertain and complex environment. Moreover, Myers (2013), argues that qualitative research methods are especially applicable when analyzing phenomena that are relatively new and not extensively researched before. This was especially applicable to this master's thesis since chapter 2 indicated that so far not all the details are known regarding the concept of LCS and how they operate in highly uncertain and complex environments.

3.1.1 Specification of different research phases

This research was divided into two phases. Choosing for two phases was done for the following reasons: it helped to increase the focus of this master's thesis research problem, it helped to refine the theoretical model and it gave the possibility to adjust the prepared semi-structured interviews for phase one accordingly. More specifically, phase one was an initial open orientation phase that consisted of four unstructured interviews. The unstructured interviews in phase one provided more detailed insights regarding the impact of COVID-19 on universities. It showed how daily operations changed and how this was influenced by the external environment. For example, phase one indicated that universities reacted mostly responsive and that gained experience helped to redesign the main activities in order to deal with the new situation. Thus, it showed that universities were capable of adapting to new situations. As mentioned in interview one: *'At the beginning of this COVID-situation we acted mostly responsive. We were mostly looking how we could make sure that our daily activities could continue, but we started to act more proactively when the situation persisted. We were seeing how we could change our work and education.'* Phase two sheds more light on how this transition really took place. Phase two, was an executive phase, which consisted of twelve detailed semi-structured interviews that were taken on multiple organizational levels within universities. This phase helped to analyze how the organizational structure of LCS affected the coordination process, to what extent LCS altered their decision-making processes, which problem solving strategies were adopted and how information exchange, by means of IT-systems, took place.

3.1.2 Case study

Conducting qualitative research by means of a case study is one of the four basic research strategies that one can think of (i.e. case study research, ethnography, grounded theory and action research). A case study allowed one to analyze a social phenomenon within multiple organizations during a specific period in time in order to analyze relevant causes and consequences underlying this phenomenon (Bleijenbergh, 2013). In this case, it allowed the researcher to analyze how COVID-19 impacted the coordination process within multiple Dutch universities. Myers (2013) defines case studies as follows: *'Case study research in business uses empirical evidence from one or more organizations where an attempt is made to study the subject matter in context. Multiple sources of evidence are used, although most of the evidence comes from interviews and document.'* This also perfectly explains why a case study is a suitable approach within this thesis. It allowed the researcher to gather empirical evidence in order to give a broader understanding of how LCS operated in complex and uncertain environments and which factors are of importance in order to enhance organizational resilience. The reason that universities are selected is, as mentioned in chapter 1, because they can be seen as the perfect example of LCS (Weick, 1976; Weick & Orton, 1990; Weick, 2001) and were greatly impacted by the disruption of COVID-19 (Kandri, 2020).

The coronavirus disease (COVID-19) is an extremely infectious lung virus which originated in Wuhan, China. At the end of 2019, Wuhan experienced a severe outburst of an idiopathic disease. Within the first fifty days, 1800 people had died and over 70.000 people were infected. Indications are that the outbreak started at the Hunan seafood market which is known for selling animals, such as bats, snakes and marmots for consuming purposes (Shereen et al., 2020). At March 11, 2020, the World Health Organization (WHO) proclaimed the COVID-19 outbreak as a global pandemic (World Health Organization, 2020). On January 27, 2021, the total number of reported cases was nearly 100 million. Globally, COVID-19 caused 2.1 million deaths (World Health Organization, 2021). It can be said that this virus has a catastrophic economic as well as social impact. By analyzing multiple cases by means of in-depth interviews, this allowed us to see how universities responded to COVID-19 (Bleijenberg, 2013). Overall, this gave a more representative view to what extent LCS are capable of operating in highly uncertain and dynamic environments.

3.1.3 Selected cases

On the next page, one can find the cases that have been selected for the case study. In total, six different cases have been analyzed. The six cases consist of six different universities within the Netherlands. Each case consists of two interviews with employees that are active on different levels within the organization. Interviews with top-level decision-makers helped to analyze the coordination processes within the universities. Interviews with lectures helped to analyze the effectiveness of these initiated actions. Analyzing on two different levels increased the validity and reliability and specified the information since it gave the opportunity to check how the initiated actions by the board or the faculty were perceived by lecturers. Altogether, this formed a complete overview of all the actions and its consequences. Regarding the size of the cases, the university was analyzed as a whole, but also more emphasis was put on how universities dealt with the E-learning environment. By looking at one specific part, it allowed one to go into more detail in order to see what decision-making was undertaken (Myers, 2013). The results of the conducted interviews are highlighted in chapter 4.

3.1.4 Possible alternative research design

One can choose between a variety of different research methods in order to study a phenomenon. For example, action research is also widely used in the fields of business and management. Its main focus is to initiate organizational change while also studying this change process. A typical characteristic of this research is that it allows the researcher to intervene in the change process and therefore, also requires cooperation with employees (Myers, 2013). This alternative seemed less applicable in this master's thesis. COVID-19 restrictions did not allow the researcher to have close contacts with employees. Therefore, it was less possible to be actively involved in the change process. Moreover, this approach is more likely to be subject to bias which may influence the validity.

Table 1: overview cases

Cases	University	Interviewee	Position	Discipline
C1a			Chairman Operational crisis team (CTO)	Real Estate & Facilities (RE&F)
C1b			Lecturer	Economics
C2a			Vice-dean, Senator	Economics
C2b			Director business operations	Management
C3a			Secretary faculty	Management
C3b			Policy Advisor	Strategic development
C4a			Secretary executive board	Biochemistry / management
C4b			Lecturer	Industrial Engineering and Innovation Sciences
C5a			Lecturer	Engineering / decision-making
C5b			Dean faculty	Management / social sciences
C6a			Chairman executive board	Veterinary / management
C6b			Lecturer	Public governance and management
Similarities			Differences	
Sector: these organizations all operate in the same sector. Therefore, they also deal with the same external forces (i.e. uncertainty and complexity caused by COVID-19).			Specialization: Specialization differs among organizations. For example, profoundly business or technical oriented.	
Mission: the majority of the mission statements are similar. All organizations strive to offer the best possible education.			Culture: the personalities within these organizations differ. Therefore, also the culture differs (Reponen, 1999)	
Organization: the organizational charts indicate that all universities are consist of a similar hierarchy (e.g. executive board, faculties and services)			Size: the organizations differ in size. Given the highly fragmented structure of LCS, this might be of influence as well.	
Coordination: all organizations have weak internal linkages between different departments				

3.2 Data collection

This paragraph gives a broader understanding of which data was vital to collect given the formulated research questions, propositions and the conceptual model. Moreover, it shows how the collection of data took place.

3.2.1 Required data

As to achieve a clear answer to sub question one, it was necessary to analyze how the organizational structure of LCS affected the coordination process. It was necessary to analyze to what extent it was still possible to develop a collective approach in response to COVID-19. In regard to sub question two, emphasis was put on the distribution of decision-making power within LCS prior to and during COVID-19. Furthermore, in order to answer sub question three, data was collected on how LCS focused on the search for innovative ideas and implementation of new activities prior to and during COVID-19. Also focus was put on how this helped the organization and increased its flexibility. Last, sub question four was answered by looking at the process of information exchange within LCS. Specifically, it was analyzed which IT-processes were changed, why they were changed and how this helped the university to enhance its resilience. Each sub question helped to analyze what factors were mainly influencing the coordination process of LCS in times of high uncertainty and complexity.

3.2.2 Primary data collection

As stated in chapter 1 and 2, little research exists that explains how LCS operate in times of high uncertainty and complexity. Therefore, in order to get a broader understanding of how this is done, the most apparent data collection method was to interview involved organizational members of universities. A qualitative approach gave detailed information and allowed one to understand the reasoning behind certain choices. In relation to this master's thesis, it gave a detailed understanding of how LCS developed decision-making strategies and which challenges were faced.

As stated in paragraph 3.1, phase one consisted of four unstructured interviews. Unstructured interviews are preferred in case one wants to understand how people or organizations experience certain situations (Bleijenbergh, 2013). Thus, these unstructured interviews gave insight into how employees of universities experienced the COVID-19 pandemic. Moreover, it also gave insight into how daily activities within universities changed. Also, unstructured interviews allowed interviewees to formulate their own answers. A key advantage of this was that the variety in the answers offered new insights that were not known to the researcher beforehand (Bleijenbergh, 2013). In relation to this master's thesis, it created an opportunity to expand or adjust the interview questions of phase two in order to ask more specific questions. This increased the internal validity. Moreover, the interviewer was able to ask questions that came to mind. Asking very specific questions regarding the topics that are of interest also increased the internal validity (Bleijenbergh, 2013).

Given the extensive theoretical analysis in chapter 2, it is key to understand that the theoretical framework guided the semi-structured interviews in phase two. The unstructured interviews in phase one gave the possibility to specify the semi-structured interviews in order to gain more detailed information. Myers (2013, p.121) defines semi-structured interviews as follows: ‘‘*The use of some pre-formulated questions, but no strict adherence to them. New questions might emerge during the conversation.*’’. (Myers, 2013, p.122). Bleijenberg (2013) argues that a dozen of interviews is already considered to be a lot since qualitative research is considered to be a time-consuming process. Myers (2013, p. 122) states that the point of saturation (i.e. new interviews do not contribute to current insights) is a good indication that no further interviews have to be conducted. Therefore, this master’s thesis consists of twelve interviews which together cover the formulated sub questions in chapter 1.

3.2.3 Interview procedure

In order to successfully gather the data needed to answer the sub questions of this research, an interview guide has been developed based on existing literature which is in line with the deductive research approach. The interview questions are based on several tree structures (appendix 4). These structures helped to see which underlying indicators are related to the concepts. However, the interview questions are formulated in an open way in order to also gather new findings (e.g. other causes that a collective approach is less likely to happen). Moreover, the relevance of the respondents in order to answer the main research question is key when making a selection of possible respondents (Bleijenberg, 2013). LCS consist of a variety of departments with all their own responsibilities. Therefore, in order to get a fathomable understanding of these types of organizations it was necessary to interview people from multiple organizational levels. Based on several universities’ organizational charts, three levels have been identified, namely: executive board, faculties and study program. The people active in these various levels have been contacted through email, telephone and LinkedIn. This was done directly, or indirectly via secretaries. To conclude, the interview questions vary per interview in order to increase the validity of this master’s thesis. The interview questions can be found in appendices 5 and 6.

3.3 Data analysis procedure

3.3.1 Data analysis

This section discusses how all the information gathered by means of interviews is analyzed in an efficient way in order to extract the most relevant information. All interviews have been conducted by means of Zoom or similar virtual meetings such as Microsoft Teams. All interviews have been recorded in order to increase the reliability of the transcriptions. These transcriptions formed the basis of the coding process. During the data collection and analysis, brief memos have been written of the most significant or surprising findings. Memos helped to get a grasp on the different analytical steps that have been taken and it gave a clearer picture of what significant things happened during this research (Myers, 2013). Miles and Huberman (1994, p.56), as cited in, Myers (2013) define coding as follows: ‘‘*Codes*

are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study. Codes are connected or unconnected to a specific setting.” The coding process has been executed by means of the analyzed concepts in chapter 2 and the related dimensions and indicators which are highlighted in paragraph 3.3.2. The coding process consisted of three phases in order to analyze and reduce the total amount of data. First, the relevant indicators have been identified. Secondly, the related dimensions have been analyzed. Last, these identified dimensions were linked to the overall concepts (Bleijenbergh, 2013). Subsequently, an analysis compared the different codes between the different cases in order to formulate statements. This indicated how this phenomenon was present in a variety of universities (Bleijenbergh, 2013). The last step was to report the findings in an understandable manner. Therefore, the results were reported in line with the sub questions. Own interpretations of the data are given and supported by fragments of the transcriptions (Bleijenbergh, 2013).

3.3.2 Operationalization of key concepts

The next page highlights the most important concepts within this master’s thesis. It shows how these concepts have been defined. Moreover, it shows the indicators that have been used as codes in order to analyze the interviews. Altogether these concepts and indicators can also be found in a conceptual overview (please see appendix 4).

Table 2: operationalization of key concepts

Concept/variable	Definition	Indicators	Source scientific article
Organizational structure of LCS	<i>“1) The various units and activities are relatively independent and can adjust to changing demands in different ways and at varying rates; (2) control is decentralized and information travels slowly and unevenly; (3) members may draw on a variety of inconsistently related criteria to interpret their participation; and (4) norms by which rules are evaluated are scattered thinly throughout the system.”</i> (Akgün et al., 2012).	- Self-oriented - Short term - Self-direction - Debate / confrontation accepted - Success due to ability	(Tiessen, 1997)
Decision-making (top-down and bottom-up)	<i>“A balance of collegial decision making within the department, and individual decisions by faculty members regarding their assigned courses”</i> (Wallace & Young, 2010)	Centralized - Top level decision-making - No authority lower levels - Increased efficiency - No consultation lower levels Decentralized - Power distributed lower levels - Quick response - No interference of management - Authority on lower level	(Zabojnik, 2002)
Problem solving	<i>“Problem solving is cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver</i> (Lovett, 2002, as cited in, Mayer & Wittrock, 2006)	Exploration - Search for ideas - Risk taking - Experimentation - Flexibility - Innovation - Discovery	(March, 1991)
Communication & Learning (Organizational learning)	<i>“An information management strategy that consists of systematic efforts to transfer knowledge throughout an entire organization”</i> (Spector & Davidsen, 2006)	- Analyzing information - Storing, retrieving and putting use of information - Receiving information - Seeking information	(Schechter, 2008)
IT-systems	<i>“Processing of the data which is the resource of the science and used in technical, economical and social fields’ communication by the human being in a regular way especially by the help of electronic machines”</i> (Molloy and Schwnk, 1995)	- Efficient data storage - Integrated throughout organization - Timeliness of information delivery - Gathering external information	(Giovanelli, Rotondo & Marino, 2017)
Coordination process	<i>“Coordination can be seen as a process of managing resources in an organized manner so that a higher degree of operational efficiency can be achieved for a given project.”</i> (Hossain, 2009)	- Organizational structure (linkages) - Organizational decision-making - Organizational problem solving - communication and learning	(Weick, 1976; Zabojnik, 2002; March, 1991; Schechter, 2008; Giovanelli et al., 2017)
Resilience	<i>“The capacity for an enterprise to survive, adapt, and grow in the face of turbulent change.”</i> (Fiksel, 2006).	- Preparedness - Responsiveness - Adaptability - Learning	(Koronis & Ponis, 2018)

3.4 Research quality

This paragraph discusses the trustworthiness of this research and how a high degree of quality was guaranteed. When conducting case study research, four critical tests can help to establish the quality of the research (Rowley, 2002). First, construct validity is focused on reducing the degree of subjectivity within a research. This indicates that the correct underlying indicators of a concept are measured (Rowley, 2002). Construct validity was guaranteed by interviewing multiple sources. This gave the researcher multiple points of views regarding the phenomenon that was analyzed. Secondly, internal validity focuses on the establishment of causal relationships which indicates that certain conditions have a causal effect on other conditions (Rowley, 2002). Internal validity was achieved by finding interrelationships between constructs. Using the phases of the coding process allowed researchers to find these patterns. Third, external validity focuses to which extent one's findings can be generalized. Thus, to what extent do the findings within a specific research also apply to other similar settings (Rowley, 2002). By analyzing multiple cases, one can find similarities and differences. Analyzing these findings can help to assess the degree to which the findings are generalizable to other situations as well. Lastly, having a high degree of reliability indicates that the research is transparent and therefore repeatable. This is achieved by structural documentation of procedures and high quality record keeping (Rowley, 2002). Finally, in order to maintain high degrees of reliability, a conceptual overview is given in appendix 8 which indicates all the different steps that have been taken during this master's thesis.

3.5 Research ethics

This section discusses certain considerations so that this research can be conducted in such a way that it is ethically acceptable. According to Smith (2003) there are four relevant principles that researchers should take into account when conducting a research. First, it is of importance to determine who is responsible for the authorship. In this case, the research is conducted on behalf of the Radboud University, Nijmegen School of Management. Although this research is written by a student (Bas Pijpers – S1047519), the Radboud University owes all property rights after successfully completing this research. Secondly, the researcher was fully aware of its role when conducting interviews. Relationships were kept purely professional and were not intended to exploit or harm others. In case of privacy sensitive data, the information was dealt with in a confidential manner in order to maintain trust between both parties. Third, respondents only participated in this research voluntarily. Before participation, all respondents were given a statement which explained what the goal of this research was and how data gathered from the interviews was used. Participants could withdraw from the research at any moment. This statement can be found in appendix 3. Last, in order to maintain confidentiality and privacy, all interviews are anonymized. Also universities' names are not mentioned since this information is easily traceable. Moreover, respondents were not obliged to reply to all questions in case they felt uncomfortable. Unanswered questions have been excluded.

4. Results and analysis

4.1 Introduction

The findings in this chapter are the result of thorough analysis which was continuously executed when transcribing and coding all the conducted interviews. Therefore, it is key to understand that the formulated statements and interpretations in this chapter are based on these analyses and are supported by means of citations from different cases. Thus, the mentioned findings in this chapter are a summary of all the observations that have been found beforehand. Paragraph 4.2 discusses how LCS' organizational structure affects the coordination process which relates to sub question one. Paragraph 4.3 analyzed how LCS adapt their decision-making processes which is linked to sub question two. Paragraph 4.4 focuses on the problem solving strategies of LCS in times of high uncertainty and complexity and therefore, relates to sub question three. Finally, paragraph 4.5 analyzes how IT-systems can facilitate information exchange in order to enhance communication and learning within LCS which corresponds with sub question four. Each paragraph ends with a small overview of all the observations and findings.

4.2 Organizational structure affecting the coordination process

This paragraph sheds light on how LCS' organizational structure influences the coordination process in times of high uncertainty and complexity. The first two chapters within this master's thesis highlighted that LCS are known for the fact that their organizational structure is highly fragmented which means that there is little coordination and communication between different departments. This section shows what this entails in situations that are uncertain and complex. Altogether, the observations that are highlighted are related to sub question one: *To what extent does the organizational structure of LCS (low degree of internal linkages), in an uncertain and complex environment, affect the nature of the coordination process?*

COVID-19 impact experienced by employees

By means of the conducted interviews, it seems that employees most likely underestimated the severity of COVID-19 at the beginning of 2020. A possible reason for this seems that most employees did not experience any comparable situations in the past. As stated in case C3a: *'I have been working at the university for over thirty years and this is something we have never experienced before. We did have a couple of crises, but never that it was necessary to have a crisis team on university level.'* The lack of prior experience could also be a reason for the uncertainty within the universities. As expressed in case C2b, the university did not have a clear strategy in response to the closure of universities: *'I remember well that I had to discuss this (i.e. closure of universities) with my management team and actually we came to the conclusion that we could not continue with our daily practices if we had to shut down the university.'* Therefore, it looks like the university was not fully prepared to operate under these

changing circumstances. As mentioned in the introduction of chapter 1, these uncertainties were also noticeable by the students. This is also highlighted by case C4a: *'In the beginning of the year (2020) it was quite uncertain which perspective we could offer to students. This took a very long time.'*

Issues arising due to the organizational structure of LCS

First of all, it is of importance to see how employees within universities describe the organizational structure themselves. The conducted interviews were quite in line with the statements made in chapter 1 and 2. Most interviewees describe the university setting as highly decentralized and highly fragmented. This is also highlighted in case C4a: *'We are pretty fragmented. We have nine faculties. That is a lot.'* However, case C5a indicates that it can become even more fragmented: *'At our university, you have a group which is part of 3 other groups which are united in one department and this department is part of a faculty.'* It looks like this highly decentralized structure hinders the implementation of university policy since employees are focused on themselves and their own activities. Case C2a shows: *'The university environment is quite decentralized. The employees experience a lot of autonomy and this makes it difficult to implement university policy by your employees. They are easily inclined to develop their own rules. They like to experiment on their own.'* Moreover, observations indicate that employees have always experienced that they have the freedom to lecture how they prefer. This is also emphasized by case C2a: *'We have employees who are not too fond of control (top-down) and directors. However, this is not unique for just this university only, but this accounts for all universities.'* The statement that this is a widespread issue that is present in multiple universities seems valid since this issue is also found in case C5a. This case argues that lecturers feel a certain pressure to maintain the continuance of lectures. Therefore, they feel obliged to act quickly in order to meet certain deadlines: *'As a lecturer it is your job to give lectures. You have the responsibility to adjust your material and to shift towards, in this case, an E-learning class setting. A lot of things are still your own responsibilities.'* The above observations indicate that the self-oriented and self-direction characteristics of employees within universities causes that all employees set their own rules and guidelines. Observations show that employees are used to working on their own and continue to do so even when circumstances change. COVID-19 changed the external environment of universities rather quickly and this demanded a quick response. A possible consequence of the highly fragmented structure of universities in such situations seems, as mentioned before, that every lecturer or small department starts developing their own platform (e.g. Zoom, Skype, Teams, WebEx) in order to continue lecturing. Indications are that this was to such an extent that the overview of all platforms was lost. This is also stressed by case C3a: *'There are even platforms that I don't know of. (...) It has become a matter of debate that every teacher uses his own platform for online education.'* Besides the wide variety of developed platforms regarding E-learning, communication has also become an issue. The self-direction of employees resulted in many different statements across the university which were, in some situations, not always correct. This is shown in

case C2b: *“What was noticeable was that lecturers, educational programs or departments started communicating themselves in which they got ahead of themselves. This makes it quite complicated.”* This situation was also seen in case C6b: *“We had a couple of times that people jumped to conclusions which we afterwards had to correct. This causes confusion and uncertainty among your employees.”* The inconsistency of the applied policies appears not only to be an issue among lecturers. As explained in case C1a, these inconsistencies are also noticeable on faculty level: *“There have been some differences among faculties. We had to switch to online education overnight. There has been one faculty that decided to postpone education for two weeks. Other faculties indeed switched to online education within the weekend.”* This could be due to the fact that the degrees of communication and coordination among different faculties is rather low. Moreover, the highly decentralized structure causes employees to feel high degrees of autonomy. Therefore, decision-makers mostly seem to do what they consider to be best for the organization. This is also noticeable in case C5b in which a dean argues: *“People tend to think that they can tell me what to do. In some cases, they can make my job more difficult, but in general I do what I consider to be best. This is sometimes experienced as difficult by central management teams.”* The main reason for this way of thinking is that, within LCS, there is no such thing as a one-size-fits-all-approach. Universities consist of a wide variety of disciplines. Each discipline applies its own methods and therefore, the approaches also differ. This is also emphasized in case C2a: *“It (i.e. applied solutions) strongly differs and is mostly dependent on the type of education that they provide.”* Most likely, there is some degree of customization necessary. What works best for one teacher may not be an option for a different teacher. This is also argued in case C2a: *“For this one course, it was possible to use last years’ web lectures. For the other, this was worthless or even non-existing and in that case you have to use knowledge clips. For another course, you might have so many students that a virtual classroom is no option and then you have to switch to Zoom.”*

Striving for a collective approach

Due to the observations it seems that universities, in response to the changing circumstances caused by COVID-19, adopted a wide variety of different approaches in order to continue lecturing. The wide variety of developed platforms, some degrees of contrasting information and self-focus of employees does have its pros and cons. The main consequence of the high degrees of autonomy of employees appears to be that a collective approach is often difficult to achieve. Case C3b indicates that organizational policies are not always implemented as expected: *“You can take a decision as executive board however, this does not always imply that this directly results in implementation. If such a decision is not supported by other departments within the organization, it has the possibility to be forgotten.”* In the case of the university’s response towards COVID-19, it resulted in the fact that employees did not always recognize or acknowledge the authority of others. This might also hinder the efficiency of organizations since it takes time for all departments to respond collectively. A clear example is presented

in case C3b: *‘As a crisis team member you are authorized to execute a command. This was not clear for all stakeholders. This resulted in the fact that sometimes no response was given to certain decisions although there was a clear mandate from the central crisis team. This was mostly due to the fact that people did not fully understand the function of such a crisis team and that they were allowed to make such decisions.’* This is also observed in the fact that lecturers decided to diverge from the general guidelines that are present within the organization (case C5a): *‘There can be all kinds of guidelines and communication however, there needs to be something that works for us. Therefore, we started orientating what approach was best for us.’* Although the intentions seem right, these deviations were mostly seen as cumbersome. This is also shown in case C3a: *‘It is pretty annoying, because you cannot without a doubt assume that the initiated approach is also collectively supported by the organization.’* Also: *‘Even if a decision was made, it always took some time before the decision reached everyone. This was mostly due to the fact that most employees acted based on their own authorizations.’* One of the responses appeared to be that the organizations tried to maintain strong ties with all departments. By facilitating easy ways of communication, it was possible to create some degree of togetherness. This is also expressed in case C1a: *‘We tried to maintain short ties and to give our deans the possibility to ask questions and to receive answers immediately. This allowed us to create a huge feeling of togetherness. This way, we tried to avoid that everyone chose a different direction.’* Degrees of centralization and communication within the university are also discussed later on in this chapter.

Short and long-term consequences of autonomous employees

Besides the variety of problematic issues, the highly fragmented structure also seems to have its positive side. Since most employees were focused on their own deadlines and were able to make their own decisions, it allowed the universities to respond rather efficiently to the changing circumstances. This is also seen in case C3b: *‘Yes, it (i.e. the autonomy and decentralization) also had its advantages. For instance, employees have been quite creative in the restart of education and the shift from physical education towards digital education. They (i.e. employees) did this for the most part themselves.’* Most people gave the impression that their education was barely subject to delays. This is also seen in case C6a: *‘A big advantage was that people took their responsibility and were able to shift very quickly. I was impressed with the loyalty and involvement of our lecturers.’* However, as indicated earlier, the self-direction of employees appeared to become a problem in the long-term. Case C3b eventually described it as an ‘untenable situation’. This situation is also explained in more detail in case C2b: *‘In the long-term it became a challenge, because everyone had found a different solution and everyone was starting to promote their own platform. One preferred Zoom, the other Skype and a third one used WebEx. Moreover, everyone was convinced that their solution was most optimal and should be professionalized.’* Students experienced the wide variety of platforms less positively (C4b): *‘I developed knowledge clips and others used a voice memo to support their slides. A colleague used last*

years' recorded lectures. The student evaluations indicate that the students did not really appreciate all of this.' In order to implement a more collective approach, it is argued that it is key to set some guidelines. No guidelines can cause the organization to go in too many different directions (C2b): *'What matters is to set some guidelines. In most situations, people already figured something out on their own.'*

Table 3 general overview SQ1

SQ1: To what extent does the organizational structure of LCS (low degree of internal linkages), in an uncertain and complex environment, affect the nature of the coordination process?		
Concepts	Observations	Analyses
Self-oriented, self-direction and short-term focus.	Employees are focused on their own activities.	Collective approach is not possible when employees move into different directions.
Self-oriented and self-direction.	Introduced guidelines or policies are not always accepted by the whole organization.	People tend to rely on their autonomy and therefore do not always do as what is expected of them. This makes it difficult to implement major changes.
Self-oriented and self-direction.	A wide variety of platforms arises.	The wide variety of platforms is caused by the high degrees of autonomy that lecturers experience. This is to such an extent that a general overview of all platforms is lost.
Flexibility.	Faculties responded differently.	There is an inconsistency in the policies adopted. However, this flexibility is necessary to respond as appropriately to all the different practices.
Responsiveness.	All cases shifted towards a completely unknown environment within a couple of days.	Degrees of adaptability and flexibility are present. Organizational structure of LCS helps to make such shifts easier.

4.3 Enhancing coordination within LCS in times of high uncertainty and complexity

This section focuses on how LCS adapt their decision-making processes in order to increase their resilience. LCS' decision-making is known for being highly decentralized. Most research indicates that this structure is less applicable in times of high uncertainty and high complexity. Altogether, this section relates to sub question two: *To what extent do LCS adapt their decision-making processes (decentralized) to enhance coordination and to become more resilient?*

Desire for uniformity

As stated in the previous section, most authority was on lower levels. However, it seems that this also gave some problematic issues. The coherence within the organization seemed mostly absent. Therefore, it is of importance to analyze how LCS try to prevent this from happening. Case C5b indicates that a transition in decision-making power is, in some occasions, desirable: *'Universities are by definition a decentralized organization. However, that does not indicate that you cannot centralize on some parts. This is mostly true during crisis response.'* The COVID-19 pandemic appeared to create such a turbulent environment which asked for a more centralized decision-making strategy. Observations

indicate that one key argument for a more centralized approach was to increase the pace of decision-making and efficiency of the organization. This is also shown in case C4a: *“This changed the organization. So, normally everyone used to manage their tasks on their own, but now there was a necessity for more centralized decision-making in order to increase the decision-making speed and to provide unambiguous communication.”* A second reason for a more centralized approach was to increase the uniformity within the organization. For one thing this was necessary on a faculty level (case C1a): *“There was a clear decision to hold top management responsible for managing the university. There is an inclination to have a consistent approach towards a crisis. You want to prevent one faculty from choosing option A and another faculty from choosing option B. This is not desirable in such a situation.”* Moreover, this also appeared necessary on a lower level as indicated by case C1a: *“You want to prevent that a kind of ‘cowboy freeride world’ arises in which everyone does their own thing. That is something that you do not want. Therefore, you would like to have a handhold and that is currently present.”*

Introducing central crisis management teams

The previous observations appear to indicate that a more centralized decision-making strategy is desirable. Observations have shown that most organizations achieved this by introducing a central crisis management team. This also showed that there was little consultation of lower levels. On most occasions, only top-level decision-makers were part of this crisis management team. This is clearly visible in case C2a: *“The university established a crisis management team. This mostly included directors of operations and deans. All national policies were then translated to university policies by means of this crisis team.”* The importance of these crisis teams is also expressed in case C4a who states that a central authority is seen as the only option to function as an organization: *“I think that that is their only possibility to function well. You need to have the possibility to make decisions at the moment you discuss it. You really need that speed in regard to decision-making. You do not have the time to let others review an intended decision.”* This is also confirmed in case C6b: *“When there is a crisis, decisions need to be made quickly. Well, the top-level of the organization is most suitable to do so.”*

Setting guidelines

Most decisions that were made by the crisis team were on a more general level. For instance, indications are that these decisions include the continuance of lectures on campus, the binding study advice (BSA), the implemented digital platforms and the examination within the university. An example is given by means of case C5a: *“I have heard that some universities decided to continue online education for the rest of the year. Their decisions regarding on campus activities were only made in case of relaxations to COVID-19 restrictions.”* Signs show that these decisions provided guidelines for lower levels in the organization and also helped to respond to the lack of internal linkages within the organization. Case

C3b states: *‘‘At a certain moment we communicated which solutions we supported and which ones were not allowed.’’* As mentioned in paragraph 4.2, the university is considered to be quite diverse. The executive board deals with many different faculties and specializations. Therefore, the organizations provided the lower departments with guidelines within which they could act. The formulation and implementation of these guidelines is also mentioned in case C2a: *‘‘I think the diversity of the university was taken into account very well. This was done by formulating the general rules on university level and to have the faculties translate this to lower levels more specifically.’’* In some cases, the faculties had no other option than to implement the developed policy of the executive board (case C2b): *‘‘During some periods, the university was able to proclaim a certain set of specific rules to which all the different faculties had to listen’’* Setting guidelines might be contradictory to the self-direction of lecturers who prefer to set their own guidelines. However, by providing guidance, it looks that the university tried to achieve that their approach was widely held within the organization. This is explained in more detail in case C3b: *‘‘You try to offer a standard solution from higher up and you provide guidance for that solution. This makes it easier for a lecturer to use this solution as well. This guidance is not only technical, but also by means of training or in regard to educational content. This way you set guidelines, but also try to help your employees.’’* These standard solutions were offered in many different ways. Most organizations tried to communicate clearly which solutions were supported and which were not. This can, for example, be done by means of a decision tree as shown in case C2a: *‘‘Also with examination, depending on the type of exam, a decision tree was made available in order to guide lecturers and to help them to make the right decision that fit their type of education and examination best.’’* These set guidelines were eventually experienced as rather conveniently as mentioned in case C1b: *‘‘I think that it is a good thing to have uniformity. I cannot imagine that everyone uses a different system. I think it creates a lot of chaos when some people use Zoom whereas other employees use Teams.’’*

Periodic intervention of crisis team

Observations also indicate that the top-level decision-makers were mostly involved when the situation was most complex and uncertain. Observations show that this was mostly the case during the beginning of the pandemic (March 2020) and during the initiation of new governmental regulations (e.g. introduction of mandatory face-masks and the night curfew). In times of more stability, the organizations shifted back to their normal decision-making practices. Case C3b shows more detail: *‘‘The crisis team was profoundly dominant in the acute phases of this corona crisis. Then there was the need for more rapid decisions. Its urgent nature eventually decreased which gave space to make decisions more carefully. We scaled down as soon as this was possible.’’* Scaling down seems to have its advantages and disadvantages. First of all, scaling down allowed the organizations to go back to their original way of working (e.g. independencies of employees). This is also seen in case C6a: *‘‘You also have to stop*

on time. Otherwise, you create an environment in which everyone tends to await the decisions of the central crisis team.” However, a disadvantage is that there was, again, an increase of new initiatives throughout the organization. This is also expressed by case C4a: “You immediately saw a lot of decentralized initiatives pop-up once the COVID-19 relaxations were announced.” Interviews indicate that these decentralized initiatives were also noticeable in the early stages of the COVID-19 pandemic and therefore definitely something that the universities could have expected. This therefore seems to indicate low levels of learning. This is also emphasized by a statement in case C1a: “Last year, after the summer, we thought it was possible to elevate our crisis management team. Well, that appeared to be an illusion.” In these situations, the crisis team tried to regain their central position in order to streamline this process of new developments (C4a): “I tried to gather all these new initiatives and to stress the fact that I was in charge of the final decisions.” Altogether, it seems that there were mostly periodic interventions when the urgency was the highest.

Table 4: general overview SQ2

SQ2: To what extent do LCS adapt their decision-making process (decentralized) to enhance coordination and to become more resilient

Concepts	Observations	Analyses
Top-level decision-makers, responsiveness.	Organizations introduced crisis management teams that focused on the decision-making in response to COVID-19.	Centralization helped LCS to enhance efficient communication and rapid decision-making in times of high uncertainty and complexity. Also this helped to increase the uniformity within the organization.
No consultation of lower level workers.	Employees of lower levels within the organization were less involved in the decision-making process at the beginning of the pandemic.	The crisis management teams mostly involved top-level decision-makers such as the executive board, deans and directors.
Increased efficiency.	Crisis management teams mostly formulated decisions on a general level.	Decisions provided guidelines for lower levels in the organization and also helped to respond to the lack of internal linkages within the organization.
Power distributed to lower levels.	Crisis management teams were not always active and problems returned when these teams scaled down.	Organizations tend to have low levels of learning in this case. They could have expected the wide variety of initiatives would rise again and could have anticipated this beforehand.
Blended strategy.	Indications of blended decision-making.	General approach that eventually is adopted by LCS is more general decision-making on higher levels within the organization and more specific decisions and initiatives within lower levels of the organization.

4.4 Problem solving strategies within LCS in times of uncertainty and complexity

This paragraph identifies which problem solving strategies are adopted by LCS in times of high uncertainty and complexity. This section analyzes to what extent universities either used their traditional resources or developed new resources in order to deal with the problems at hand. Altogether, this section is in line with sub question three: *To what extent do LCS, in an uncertain and complex environment, modify their problem solving strategy?*

Low levels of innovation

Findings seem to indicate that universities did not experience a crisis such as COVID-19 for a long time. Case C2a also expressed how rarely these extreme events such as COVID-19 are: *‘I think that the last time we experienced such a crisis was during World War II. Therefore, I think it is reasonable that we were not that well prepared.’* That universities are known for operating in a stable environment is already argued by Mintzberg (2009) and Lunenburg (2012). Operating in a stable environment for a couple of decades also seems to have influenced the way of thinking. When asked to what degree one tries to innovate in their way of teaching, case C1b answered: *‘To be honest, I don’t. I will lecture my course. I have been lecturing this course for ten years and for the past ten years, it has been the same. (...) I do not feel the urgency to keep developing my course. To change four lectures for example. Why would I? The course was well established and everyone was satisfied.’* The fast changing environment caused by COVID-19 also highlighted some degrees of unpreparedness and also a possible lack of motivation to innovate (case C5a): *‘Everyone was struggling about how to offer their education. Before COVID-19, everyone adopted their own way of teaching and was satisfied with doing so.’*

Momentum for renewal

This way of exploitative thinking seems to have changed due to COVID-19 and forced lecturers to rethink their lecturing style (case C2a): *‘I think that this gave us the momentum for educational innovation. The challenge is to maintain this way of thinking since it takes a lot of energy.’* The vision that prevailed was that, besides the well-being of students and employees, the continuance of education was priority number one. Therefore, the organizations were forced to make a quick switch and adapt to this new and changeable environment in order to do so. In fact, the conducted interviews discovered that universities tried this by means of at least two ways. First, some organizations tried to use traditional resources if possible. For instance, case C3a stated: *‘Our facility service mostly relied on the schedule we use during the summer. So whenever possible, we relied on things that were familiar to us.’* This was also seen in the way of examination (case C3a): *‘In regard to examination, we also used traditional sources. For example, they replaced written examinations on campus with essays or open-book tests.’* Secondly, which is more in line with the formulated vision, was to test new ideas. So, besides the use of more traditional resources, universities also tried to innovate. As indicated in paragraph 4.2 the

autonomy of lecturers seems to have helped in the fact that many new solutions were raised. Employees were given the freedom to be creative and provide input which is confirmed in case C2b: *“The university pretty quickly advocated lecturers to do what was necessary and think of things we could do. (...) This helped to mobilize a lot of brainpower and the lecturers pretty quickly developed their own solutions.”*

A couple of newly developed solutions are on the next page:

Table 5: found solutions

Case	New implementation	Reason
C1b	Implementation of new type of examination	<i>“Another important insight which we did not really discuss is the examination. This is so much more convenient to do online. I really think it will develop even further so that we put students in lecture halls behind computers.”</i>
C2a	Knowledge clips	<i>“Now, I just recorded knowledge clips, flipped the classroom and enhanced the discussion with students. I loved the breakout room feature in Zoom. This also allowed the students to have social contacts.”</i>
C3a	Fraud control	<i>“Our faculty pretty often used Cirrus in combination with Proctorio. This was due to the fact that we have pretty large exams with pretty many knowledge questions. In this case, Cirrus combined with Proctorio is a very useful instrument.”</i>
C4a	Introduction of TA	<i>“We started to use teaching assistants to, for example, manage the chat box during a lecture so that the lecturer could focus on his story and less on the interaction. These are new forms that have been developed and we probably still use in the future.”</i>
C5a	Expand possibilities to lecture	<i>“There are mostly systems introduced that fit with Canvas or a different conference option. All solutions are focused on lecturing and the corresponding interaction. (...) But also different ways to make clips. You can go to a studio, you can use Panopto which is an app that you could use. Those possibilities were present.”</i>
C5b	Reallocation of teaching	<i>“I advocated to put down a couple of tents on campus. This allowed people to also do things outside. This way you could still record lectures and also have some students be physically present to have some interaction.”</i>
C5b	Platform to have an interactive meeting	<i>“You see a lot of new findings. At a certain point, I was invited to see how people held meetings with some kind of small characters that they could move across the room.” (...) This was completely new to me.”</i>
C6b	Implementation of new type of examination	<i>“We also looked at podcasts as a possible way for examination. You can also think of small video clips that students have to record as a possible way of examination. There has been a bunch of innovative ideas in the field of education.”</i>

Support and experimentation

These new introduced practices were mostly facilitated by so-called ‘teaching and learning’ centers (C2a), ‘teaching support’ (C4b) or E-learning specialists (C5a). Having a support department allowed the organization to ease the shift from physical teaching towards an online environment that was, for some lecturers, unfamiliar territory. Case C2a describes how such a department is used: *“The Teaching & Learning center functioned as a great source of information for lecturers. This is where lecturers were informed about all the different possibilities they had at their disposal. The teachers were able to ask questions and they were offered guidance if necessary.”* Besides the support of such departments, it was also noticeable how many universities developed themselves by means of experimentation. It appeared that there was no prior knowledge to fall back on and therefore, in some cases, the only option was to experiment with different platforms. Case C3a provides more detail: *“Our meetings... well that*

has been a learning school for us. You start with skype since we were already switching to Skype for Business, but then you find out that Skype is not the optimal platform. That is why we now work with Teams and sometimes with Zoom.” This same process was seen in case C6b. By means of experimentation, universities started to see which platforms were most convenient: *“We started with StarLeaf and we have also used Zoom. Eventually, we saw that MS Teams had the most secure environment and therefore, that was propagated as the most important way of communicating.”*

Disruptive external environments enhancing explorative activities

The observations mentioned above seem to indicate a shift in mentality. It seems that people started to explore new possibilities and started to innovate. Case C2a indicates that this interest in innovating the educational environment was, for some people, already on the agenda: *“If I speak for myself, I really felt that the normal lectures and discussions were boring and I wanted to change that and now I was forced to.”* Besides the interest in innovation, case C5a also expressed that experimentation during this pandemic is understandable: *“I can imagine that you start to experiment as a lecturer when you prefer something else than Canvas and therefore, work with a different platform.”* The question that arises here is why the exploration of new activities is mainly absent in a stable environment. The gathered data show indications that explain this phenomenon. A first indication that innovation is normally less present is due to the fact that lecturers tend to stick to things that are familiar. This is also seen in case C1a: *“A university can be seen as quite conservative. People tend to do what they have always done. (...) Holding on to things which are familiar is very nice and new things and other things are different and something you need to get used to.”* A second reason is that many employees experience a high workload. Employees focus on their daily activities and may experience a lack of time to search for new ideas. This is also seen in case C2a: *“Well, normally I did not have any time for that. The pressure was too high and now I was forced to innovate.”* A final reason might be that, on some occasions, education is not the first priority of lecturers. Analyzed data indicates that most lecturers are passionate by doing research and to get that research published. For instance case C4b argues: *“I am not educated as a lecturer. I did my PhD and if I wanted to continue to do my research, I had to become an assistant professor or higher. So that also means that you have to lecture.”* This is even stronger expressed in case C1b: *“Education (compared to research) has always been a neglected part within the university.”*

Future perspective on explorative versus exploitative activities

The observations above seem to indicate that, on the one hand, there has been an external pressure which forced employees to search for new solutions. On the other hand, the findings show that there is a culture in which innovation is probably less valued. Even some teachers expect that some innovations do not maintain and that most things will go back to how it previously was. A scenario is given in case C4b: *“I think that most lecturers will go back to physical teaching. That is something that they already have*

and which they can immediately use and that's it! I think that almost all of them will go back to how it was." However, it looks like top management tries to prevent this from happening. Therefore, emphasis is put on the good things that the universities developed during this pandemic. This is claimed by case C4a: "We want to prevent that we go back to how it was without keeping the good things. Some things have become a lot easier or simpler." Given the statement made in case C4b, it seems a reasonable way of thinking of top management and indicates that a role for top management will exist after the pandemic in order to steer the organization into the right direction.

Table 6: general overview SQ3

SQ3: To what extent do LCS, in an uncertain and complex environment, modify their problem solving strategy?		
Concepts	Observations	Analyses
Exploitation.	Low levels of innovation before COVID-19.	The stable environment created a mentality in which exploiting current resources was preferred.
Exploitation.	Employees are mostly enthusiastic about doing research.	The lack of innovation is also due to the priorities of employees.
Search for ideas and innovation.	Many new solutions were raised during COVID-19.	A turbulent environment forces employees to get out of their comfort zone and to explore new possibilities in order to continue daily activities.
Experimentation.	Development of supportive a department where people could ask questions.	Having a support department eases the process for employees to move from only exploitation towards more explorative activities.
Top-level decision-makers.	Employees indicated to go back to traditional resources.	There is an important role for top management to make sure that organizations find a balance between exploitation and exploration.

4.5 Communication and learning by LCS in times of uncertainty and complexity

This last section highlights the findings of how information exchange can enhance communication and learning within LCS and how IT-systems improve this process. Chapter 2 indicated that IT-systems might help organizations to increase their efficiency while maintaining a loosely coupled structure. Eventually, this paragraph relates to sub question four: *To what extent do LCS, in an uncertain and complex environment, integrate new ways of communication and learning within their coordination process?* The analyzed data has shown that the high degrees of uncertainty and complexity affected the coordination process regarding communication and learning in a couple of ways. The following items will be discussed: communication in general, processes, resources and behavior.

Communication in general

First of all, it is noticeable that organizations responded differently in regard to the exchange of information related to the COVID-19 pandemic. In fact, two different methods of top-down information exchange have been found. First of all, some organizations tried to preserve their transparency by means of only singular announcements which applied to students as well as employees. This way, all involved

parties are aware of the full situations and could therefore, act accordingly. This is also expressed in case C4a: *‘We decided to send a ‘mail to all’ to all employees and all students. This situation really involved education. It influenced students as well as our employees. (...) We considered sending separate emails to students and employees, but we soon noticed that our announcements concerned both parties. Issues related to students are also of importance to our lecturers.’* This way of communication can be considered to be efficient since it saves a lot of time. However, not in all cases is all information relevant for all parties. This can cause people to lose interest in reading these emails. Therefore, other organizations applied multiple approaches in order to reach all different parties specifically. This is highlighted in case C1a: *‘In the beginning we initiated our university TV with daily updates. (...) Of course, we used our familiar channels such as all staff and all students’ mails. Moreover, we launched a corona web page which is accessible for everyone. Also we have frequently asked questions. We also have information on our intranet. Also we have interviews with the board which we publish in our university magazine.’* So this seems to indicate that some organizations used more platforms to distribute information throughout the organization. Altogether, what appears to be similar for all organizations, is that they all launched a web page in order to store all relevant information in one place. Providing all relevant information in one place seems to help organizations to reduce uncertainties and therefore help to improve the organizational preparedness. This is also expressed in case C3b: *‘The Corona web page was maintained by our central team. I think that this is, besides the top-down communication, one of the most important instruments we use to clarify how the university operates.’* Case C2b indicates which positive effects this has: *‘It was clearly indicated that this was the one place where all information would be communicated. So all the noise people hear within the organization is not relevant.’* Making use of one main platform to share information also appeared to help organizations to send unambiguous information. This prevented uncertainties within the organization. Moreover, this also ensured that the storage of data and seeking for information was simplified.

The processes

Besides the more general ways of communication, data also shows that organizations altered the processes in order to make the information exchange between departments more efficient. First of all, some organizations tried to make their information exchange more effective by elevating some formal steps that normally had to be taken. This is shown in case C4a: *‘A mail to all is quite complicated. Normally all kinds of people have to give their permission to send an email and now this is no longer necessary. There are less steps that have to be taken. This has made the process more efficient.’* Moreover, it was also observed that organizations lifted restrictions in order to enhance the learning capacity within the organization. Making private educational resources available for all lecturers helped them to adjust their lecturers based on examples and hence, it enhanced the adaptive capacity of the organization. This is also expressed by case C4a: *‘We have an environment for lecturers and before*

you had to be authorized and you were only able to see resources that were meant for you. I remember that we implemented some relaxations so that people were able to see teaching materials which were published by other lecturers. This way, you can see how other people give lectures.’’

The resources

Besides the general communication and the processes, the universities also applied a variety of resources in order to cope with the high degrees of uncertainty and complexity. As mentioned before, the universities shared information with the rest of the organization rather quickly. This can also be seen in case C6a: *‘‘If there are important things that we discussed, I mail all directors and deans in advance and afterwards, around 5 pm, I send an email to our university council. (...) I notify them about what is going to happen. So we inform everyone the same day.’’* This appears to indicate that emails enhance the timeliness delivery of information.

Besides the emails that universities sent, they also uploaded policy documents. These documents helped to provide more clarity within the organization. On the one hand, it clarified what procedures the university followed which is seen in case C3b: *‘‘The OCW already published a report back in March 2020. They provided us with some general guidelines that showed how the situation was handled. It also showed how we should handle regular decision-making processes as well as crisis decision-making processes.’’* On the other hand, the published reports also helped to substantiate why certain decisions have been made. This is shown in case C5b: *‘‘We conducted an evaluation with several experienced professors. From this evaluation we drew up a document. This contains a lot of information about how the university dealt with COVID-19.’’*

Furthermore, observations showed that universities intensified their cooperation with external parties such as the VSNU. This Association of Universities has always been an important factor that facilitates the cooperation between universities in order to work towards a strong university sector. In regard to COVID-19, the VSNU facilitated a crisis consultation between all Dutch universities. This allowed all universities to share their information, learn from others and to act accordingly. This is also shown in case C1a: *‘‘We also had a crisis consultation meeting with the VSNU which included the chairman of all executive boards. This included information in regard to education as well as business operations. This information helped us to anticipate as good as possible and to adapt where necessary.’’*

Also, some universities implemented, or are currently in transition towards, integrated IT-systems. These platforms seem to help to share information throughout the organization more easily. This also indicates that IT might have a supportive role in regard to the exchange of information which can also be seen in case C1a: *‘‘We made the transition towards OneDrive which simplifies our process to share things with one another. I really do think that is a supportive factor that helps to exchange information with each other in a safe and responsible way.’’* Case C2a indicates the development of these integrated platforms will help the information exchange among employees: *‘‘Things will change*

since we will make the transition towards a Windows365 environment in which you can create communities. This helps to structurally exchange information.”

Resources among lecturers

Observations show that lectures also adopted new ways of communicating in order to enhance their capabilities. For example, the exchange of information was facilitated by internal platforms such as the intranet (case C6a): *“Our intranet is used intensively. The intranet helps us to communicate between faculties. Also, the intranet included many references to things that could be useful for others.”* Also some universities implemented a forum which supported the exchange of ideas and views on certain issues. This is mostly explained in case C1b: *“We indeed had a forum which helped lecturers to communicate with each other. They expressed what things worked and what did not.”* This was eventually specified: *“They introduced a new course in Canvas. Here you could find different tabs with all kinds of information. This was non-existent before COVID.”*

Furthermore, lecturers also started sharing their best practices. Indications are that these ideas were mostly formulated bottom-up and then spread through the rest of the organization by lecturers themselves or by means of directors and deans. Case C4a indicates: *“We did have some kind of best practices. So lecturers who had good examples started sharing those examples to inspire others. We also paid attention to this in our central communication.”* Furthermore, case C6a also clearly indicates that a more central direction helps to steer the organization in the right direction and to provide employees with new ideas. Referring back to paragraph 4.2, this might also compensate for the lack of internal linkages within the university: *“The lecturers received a notification every two weeks. In these messages we showed examples about how things could be done differently. We are such a big organization, with so many faculties that some people are not aware of the different solutions that others found. So that was useful.”*

Behavior

Finally, also a difference in behavior was noticeable. Communication among employees intensified whereas this was normally considered to be absent. This is also expressed in case C1b: *“I think that there was much more communication among us as lecturers than before. There used to be zero communication between lecturers.”* Communication among lecturers mostly increased due to the wide variety of new, mostly technical, solutions that were developed. In order to overcome some digital challenges, lecturers tried to help each other by sharing their knowledge with others. This is also indicated in case C5b: *“I have the impression that people learned from each other rather quickly. They got in touch more often and tried to share their best practices and experiences with each other. (...) Look, everyone needs to teach themselves new practices. In that case, you probably look at your colleagues and see how they organized their job.”* Furthermore, lectures tried to replace the lack of

physical contact by means of virtual offices. This again highlights the usefulness of the lecturers' creativity (case C4b): *'I know that some colleagues installed virtual offices. (...) This allows you to enter different rooms in which you can talk to your colleagues.'* Eventually, these new ways of communication help to share new ideas and solutions throughout the organization. This is clearly stated in case C3b: *'Well you can see it as an oil slick. If one person adopts a nice idea, it is likely that others will take over the idea as well. So this spreads gradually throughout the organization.'*

Table 7: general overview SQ4

SQ4: To what extent do LCS, in an uncertain and complex environment, integrate new ways of communication and learning within their coordination process?		
Concepts	Observations	Analyses
Integrated IT-system throughout the organization and storing information.	Organizations mostly used the web page to distribute information.	Providing all relevant information in one place helps organizations to reduce uncertainties and therefore helps to improve the organizational preparedness to send unambiguous information.
Timeliness delivery of information.	Organizations elevated procedural steps.	There is a need for fast response, communication and decision-making throughout the organization. Therefore, elevating some steps helps to speed the communication process.
Integrated IT-systems throughout the organization and storing, retrieving and putting use of information.	Information was collected and shared by integrated IT-systems such as forums and the intranet.	Having an integrated IT-systems can help to promote sharing ideas and best practices. Moreover, it helps with the learning capacity of the organization.
Integrated IT-systems throughout the organization, gathering external data and storing, retrieving and putting use of information.	Organizations are trying to make information available as efficiently as possible by means of different resources.	Clear communication systems that are integrated throughout the organization and the publication of policy reports help to provide clarity within the organization.
Receiving and seeking information.	Behavior among employees changed. Communication among lower level employees and between departments was normally mostly absent.	Communication among lecturers mostly increased to compensate for the lack of knowledge they had in regard to this completely new setting they had to operate in and also due to the wide variety of new, mostly technical, solutions that were developed.

5. Conclusion

The following section entails the most important conclusions in regard to the formulated sub questions and the related propositions. Furthermore, this section gives answer to the main research question of this master's thesis: *“Which factors determine to what degree loosely coupled systems are able to achieve resilience in environments that are characterized by high levels of uncertainty and complexity?”*

5.1 Conclusion sub question and propositions

Sub question 1: To what extent does the organizational structure of LCS (low degree of internal linkages), in an uncertain and complex environment, affect the nature of the coordination process?

It can be concluded that the highly fragmented structure of LCS has, to some degree, a negative influence on organizational resilience. The lack of internal linkages and mostly the self-oriented and self-directed characteristics of its employees pertaining to this can be seen as a two edged sword. On the one hand, it is quite difficult for executive boards and faculty directors to implement a collective approach in order to deal with the repercussions of COVID-19 or other crises. People tend to develop their own solutions and practices in order to deal with the problems at hand. On the other hand, the results in chapter 4 do indicate that this loosely coupled structure allowed the organizations to make a rapid transition. The self-oriented and self-directed characteristics of employees resulted in a lot of creativity and flexibility. It allowed the organization to adjust rapidly to the new environment which shows high degrees of responsiveness. In the short term, this resulted in the fact that universities were able to shift to an online environment rather quickly. In the long term, this resulted in a wide variety of different applications and programs which increased the uncertainty and dissatisfaction among students and even among employees. Last, in the conceptual model (chapter 2), one can see that it was expected that the highly fragmented structure of LCS had a negative impact on resilience. Therefore, a small adjustment in this conceptual model needs to be made. The fragmented structure of LCS is not per definition a ‘bad’ thing. A note to be made, in line with the research of Rowan (2002), is that universities indeed become more bureaucratized. One cannot argue that there is complete freedom at the bottom of the organization. A nice metaphor was given in case C6a: *“We are not a big tanker, but we are an armada of small ships that move into the same direction. We are on the big ship that checks if everyone is still moving into the right direction.”*

Proposition 1: The highly fragmented internal linkages hinders LCS’ ability to develop a collective approach in times of high uncertainty and complexity.

The found results in chapter 4 do support this proposition. The lack of internal linkages within LCS causes employees to be highly self-oriented and self-directed. In times of high uncertainty and complexity, rapid decision-making is necessary. Most lecturers were up a river without a paddle and

therefore, started to deal with the situation themselves. This created many different approaches and therefore hindered universities to have a collective approach. Moreover, employees within LCS tend to be highly autonomous. Decisions made by others are not easily accepted and therefore it took time to integrate an approach that was widely accepted throughout the organization.

Sub question 2: To what extent do LCS adapt their decision-making process (decentralized) to enhance coordination and to become more resilient?

Paragraph 4.3 indicated that LCS shifted towards a more centralized decision-making authority. At the time COVID-19 struck (i.e. March 2020) most important decisions were made by the executive board and the crisis management team. This allowed the universities to increase their response speed in regard to the quickly changing external circumstances. Moreover, this centralization of decision-making helped the organizations to initiate a more collective approach. The university set some guidelines and boundaries in which the faculties and employees were allowed to act. This helped to steer the organization in a specific direction which then increased the adaptive capacity of the organization. Therefore, it also moderates the effect that the organizational structure has on resilience. However, it needs to be stressed that this was mostly present in times that the urgency was the highest. Eventually, more power was given back to lower levels within the organization. This indicates that the executive board formulated the most important guidelines for all the faculties and that these faculties were given back the responsibilities to act accordingly. This allowed the faculties to act on their specific needs which increased the flexibility of the organization. In line with the work of Dohaney et al. (2020), universities adopted a more blended decision-making approach during COVID-19. Using the best of both worlds allowed the organizations to increase their adaptive capacity and thus to enhance their resilience. On the one hand, the organizations set boundaries for the faculties. They try to steer the organization into a certain direction and try to let the organization adapt to the changing environment. However, on the other hand, LCS try to hand over responsibility to the lower departments. Altogether, there is a distinct role for top management. In order to maintain effectiveness, the executive board should make decisions that guide the organization in the preferred direction. This helps to limit the wide variety of different solutions developed.

Proposition 2: LCS integrate a more centralized decision-making approach in times of high uncertainty and complexity.

The results did find substantiated arguments that proposition 2 is accepted. As shown above, centralized decision-making was mostly present in times of high uncertainty and complexity. Eventually, authority was given back to lower-level employees when the stability in the external environment returned. It shows an interplay in regard to the power distribution between multiple levels within LCS.

Sub question 3: To what extent do LCS, in an uncertain and complex environment, modify their problem solving strategy?

Section 4.4 showed how LCS changed their problem solving strategy towards a more explorative approach. Most interviewees indicated that the traditional way of working was no longer applicable and therefore, they had to develop new solutions. The absence of these solutions indicates a degree of unpreparedness. The characterizing structure of LCS helped universities to develop new solutions rather quickly and therefore also indicates degrees of flexibility and adaptability. Not only now, but also in the long-term since people have more possibilities to lecture. However, innovation is, in this case, mostly forced due to a rapidly changing environment and relatively absent when operating in a stable environment. Employees tend to stick to what they are used to and do not feel the urgency to learn and develop education. To conclude, there is a role for top management to formulate a vision that promotes the sensing and seizing of new opportunities.

Proposition 3: In times of high complexity and uncertainty, LCS are forced to undertake more exploratory activities to find new solutions.

Proposition 3 is also supported. The conclusion above shows that employees started to make use of new resources in order to deal with the highly complex and uncertain environment. Employees felt pressured to find new solutions in order to guarantee the continuance of lectures.

Sub question 4: To what extent do LCS, in an uncertain and complex environment, integrate new ways of communication and learning within their coordination process?

It can be concluded that the COVID-19 pandemic affected the communication process in multiple ways. The most important thing is that an environment of great uncertainty and complexity asks for clear communication. Therefore, all universities developed a so-called 'corona web page'. This web page allowed all universities to store their data efficiently. Moreover, this also facilitated employees to seek for new information. Furthermore, this dynamic environment demanded quick response speed and therefore, universities reduced the amount of bureaucratic processes. This helped the organization to be more flexible and to adapt more rapidly. Also, universities tried to expand their resources in order to gather more external data and to make more information accessible. Moreover, universities started to adopt integrated IT-systems to enhance communication and learning among employees. Creating communities helps employees to learn from each other and using the Cloud helps to share information more easily. Lastly, employees also started to behave differently. More processes were developed which allowed employees to learn from each other (e.g. forums, virtual offices). Communication between departments was normally mostly absent due to the highly fragmented structure of LCS, but increased during COVID-19. This indicates that there was now a higher need to receive information and therefore,

employees started to seek information at other departments. This increased the adaptability and responsiveness of the organization since not every employee had to reinvent the wheel.

Proposition 4: Information exchange, by means of IT-systems, enhances communication and learning.

Finally, the results indicate that also this last proposition is supported. Findings clearly show that the availability of information has increased due to IT-systems. An example of this is the creation of a forum or internal platform to share ideas and possible solutions. Furthermore, employees intensified their search for new information and did so by means of conference meetings such as Microsoft Teams and Zoom. These digital solutions helped them to gain new information from other employees more rapidly. However, there is one side note that needs to be made. Most physical contact was replaced by means of digital solutions. This increased the efficiency of the organization. However, one can question if this is in all cases desirable. Employees did not have the option to knock on the room next door to get some answers. Therefore, it is argued that there needs to be a refined balance between the physical as well as digital exchange of information among employees.

5.2 Conclusion of main research question

This section answers the main research question of this master's thesis. It indicates how LCS achieved resilience. The concept of resilience was measured by means of the following indicators: preparedness (e.g. preparatory actions, planning and training), responsiveness (e.g. problem framing, impact analysis and maintenance of social unity), adaptive capacity (moving away from conventional decision-making practices, outside the box thinking and challenging current resources) and learning (e.g. assessing threats and gathering external information).

Preparedness

In the beginning of the COVID-19 pandemic, one can argue that most universities were not prepared. There was a lack of precautionary actions and there was mostly a short term focus. This was mostly due to the fact that there was no existing prior knowledge. However, the results indicate a clear switch towards a more long-term oriented view. By hiring external experts and by formulating scenario's universities try to prepare for the future. Moreover, these scenarios helped them to develop a plan and to offer their employees a perspective. Furthermore, the set guidelines and procedures were eventually in place, which was mostly a result of the centralized decision-making processes of the organization. Therefore, universities were more prepared to cope with possible later repercussions of COVID-19. These guidelines can also be used when future crises appear.

Responsiveness

Secondly, universities also enhanced their flexibility. The removal of bureaucratic procedures allowed the organizations to maintain short ties throughout the organization. The flexibility of the universities is also seen in how lecturers fulfilled their job. The lack of internal linkages allowed employees to adopt their most efficient way of working and this allowed the university to respond rather quickly. This is contrary to the work of Weick (1976; 1982) who argues that LCS tend to respond relatively slow. Also the organizational responsiveness is shown in the fact that more centralized decision-making processes enhanced the uniformity. Moreover, there was the possibility to experiment with different digital platforms before choosing the most efficient one. Furthermore, the organization increased its dynamic interactions and information flow by means of IT-systems. This also enhanced the learning capabilities of the organization. This is later explained in more detail.

Adaptability

Third, the results show that universities show high degrees of adaptive capacity. A great example of this is the fact that most universities were able to shift from a physical environment towards an online environment within a couple of days. Their enhanced adaptive capacity could be explained by means of their increased exploratory activities which allowed them to find multiple solutions to the problems at hand. Most universities already had some plans to make this transition. However, this process speeded immensely due to the COVID-19 pandemic. In contrast to the work of Weick (1976; 1982) who states that LCS are less capable to adapt to disruptive events, this study indicates that universities are able to reconfigure their plans and operate accordingly.

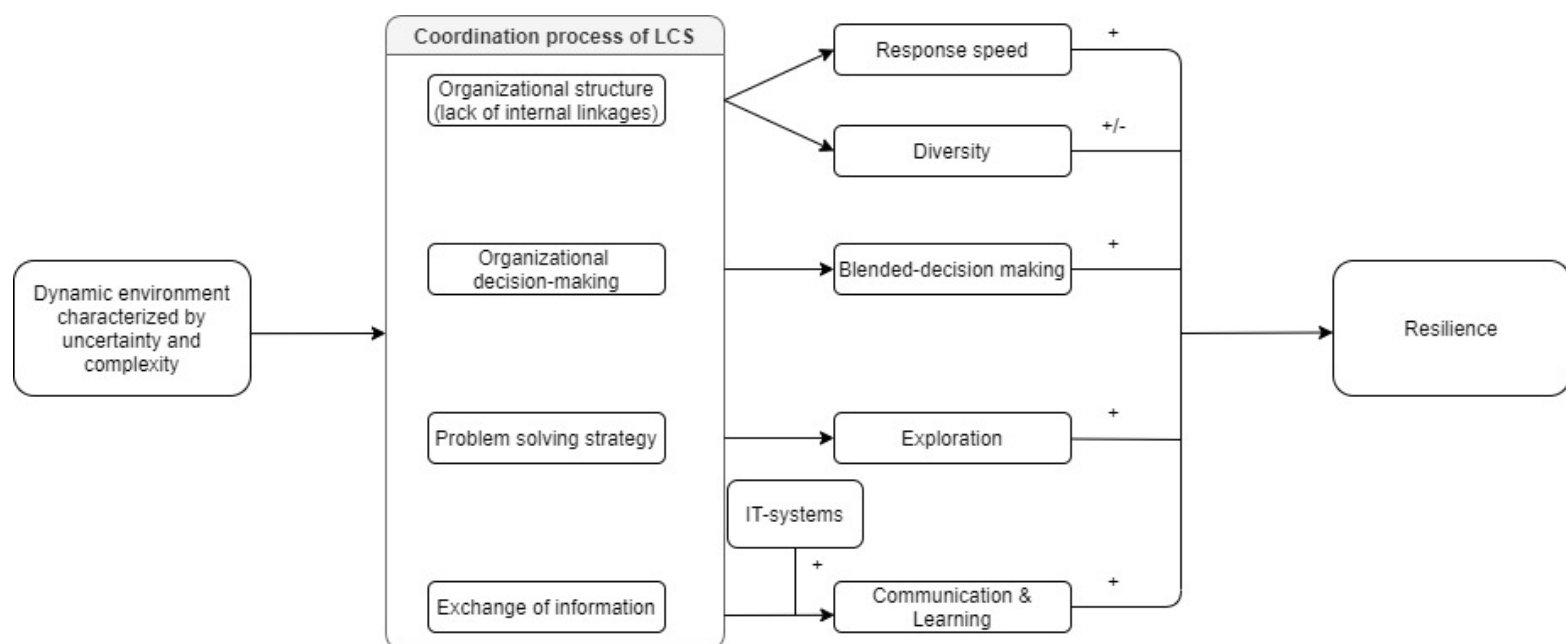
Learning

Learning can be considered to be an important indicator since no prior knowledge was available. The results show that there has been a switch in the mentality of employees. Specifically, more things seem possible than before. These new insights allowed employees to see all the new possibilities that they have (e.g. new ways of teaching and communicating). This also gives room for educational improvement. Also, the universities gathered external data in order to seize new possibilities such as the reopening of the universities and possible threats such as the obligation of wearing mouth-masks. An important factor is that the communication between departments also increased which allowed employees to learn from each other. The increased usage of IT-systems allowed the organizations to share information more easily than before. Moreover, the introduction of strategic response teams also help organizations to structurally learn from their external environment and to respond accordingly. Altogether, the learned lessons from this pandemic are evaluated and stored efficiently. These lessons can be used during future crises. This then again, enhances the preparedness of the organization, but also its responsiveness and adaptability.

5.3 Adjusted conceptual model

The conducted qualitative research and the analyzed data eventually resulted in some adjustments in regard to the conceptual model. One can see that not having a collective approach is no longer considered to have a negative influence on organizational resilience. In fact, the lack of internal linkages increases the response speed of the organization. As mentioned before, the diversity within the organization has its positive (short-term) and negative (long-term) sides. In the short-term, LCS can use their creativity to rapidly initiate new ideas. In the long-term, LCS might go into too many different directions which decreases the efficiency of the organization.

Figure 6: adjusted conceptual model



6. Discussion

This last chapter discusses the theoretical as well as the practical contributions of this master's thesis. Furthermore, the research limitations have been highlighted and following these, possible future research questions are formulated.

6.1 Theoretical contributions

This master's thesis contributes to the work of Dohaney et al. (2020). Findings indicate how the development of online learning can indeed help LCS to enhance their resilience. For example, the wide variety of new developed online learning and lecturing possibilities increased the flexibility of the organization. Moreover, it enhanced the preparedness for future crises. Also, it confirmed the current theory that face-to-face interactions remain important. This research also contributes to the generalization of the results found by Dohaney et al. (2020) by analyzing the concepts of LCS and resilience in a different context. Subsequently, this thesis also highlights findings that contradict the work of, for example, Weick (1982) who stated that LCS tend to respond rather slowly to fast changing environments. His work argues that the lack of coordination and communication between departments hinders LCS to diffuse changes across the organization. However, the findings within this research indicate that LCS, in fact, responded rather quickly to the changing circumstances. The high degrees of fragmentation and autonomy forced employees to use their creativity and to react rapidly. This allowed them to initiate new solutions without the interference of other departments. Subsequently, all cases showed indications of a fast switch towards an E-learning environment which contrast the article of Libbenga (2020) in which he argued that most universities struggled to do so. Furthermore, the findings also question the statements made by Rantakari (2013) who argues that organizations in stable environments mostly operate by means of centralized decision-making. This thesis found that this is less applicable to LCS and, more specifically, the opposite was found. LCS tend to adopt a decentralized decision-making processes during times of stability and are more likely to shift towards a centralized decision-making approach when dealing with high degrees of uncertainty and complexity. In fact, the findings are more in line with the work of Burke (2014) in which it is stated that LCS should find a balance between loose and tightly coupling. The findings within this master's thesis indicate that there was a continuous interplay between top-level and lower-level decision-making and hence a blended decision-making approach was adopted. Moreover, this thesis confirms the work of Gachet and Brézillon (2021). They also stated that more hybrid decision-making processes should be adopted in order to respond to rapid changes. Moreover, they argued that organizations should 'cut down' long decision paths. The findings in this research clearly indicate that long procedures were 'skipped' in order to initiate change more rapidly. Finally, this research confirms the work of Jefferson (2006) who states that IT-systems can help organizations with the communication, integration and planning of actions. This master's thesis also highlights that IT-systems are especially useful in regard to seeking and sharing

information. The diffusion of new ideas is mostly facilitated by means of digital platforms and hence, it enhances the communication as well as the implementation of new solutions.

6.2 Practical contributions

This master's thesis also contains some important managerial insights. The introduction as well as the conducted interviews both indicated that there was almost no prior knowledge that organizations could use. Therefore, the main practical contribution of this master's thesis is by showing how LCS can adopt certain strategies that allow them to cope with highly uncertain and complex environments. However, there are some things that these organizations should take into account. There is a key role for the top management teams within LCS to make use of the best of both worlds. More clearly, this thesis indicated that LCS should take advantage of the autonomy and creativity of its employees. Too much autonomy and creativity, on the other hand, causes the organization to move towards too many directions. Therefore, top management teams should set clear guidelines and steer the organization into a certain direction to maintain uniformity.

Furthermore, this thesis indicated that the organizations should clearly shift towards more exploratory activities. The findings showed that, in this case, universities were normally less focused on innovation and more focused on exploiting their current resources. Top management should put emphasis on the possibilities to explore new resources. They should also clearly indicate how these resources can be used and what the main advantages of these resources are. One can see that some organizations already put more focus on such initiatives by means of learning centers. Eventually, organizations should try to achieve a balance between the exploration and exploitation of resources.

Third, this thesis argues that gained knowledge should be documented and evaluated by managers. Efficient data storage helps to increase the learning capabilities of employees and the organization as a whole since information is more easily accessible. Evaluating how the organization responded to COVID-19 can also indicate points for improvement which will help the organization to enhance its responsiveness. The results also indicate that there might be a tendency for employees to go back to how it was. Again, top management should try to alter this mentality. This can be done by guiding employees in the possible new possibilities that are available.

Altogether, this master's thesis serves as a guide that can help LCS to overcome times of uncertainty and complexity. It shows how top management can take the lead and guide the organization into the right direction. Eventually, these insights can help LCS to develop a well-balanced loosely/tightly coupled approach in times of high uncertainty and complexity.

6.3 Research limitations

Besides the theoretical and practical contributions of this research, one should also be aware of its limitations. After thorough evaluation, a couple of limitations have been identified, which are:

Limited generalization. First of all, the limited number of cases used in this research complicates the generalizations of this research. The analyzed cases already showed some small differences among each other. For example, compared to the other cases, case 6ab showed higher degrees of centralization. Therefore, it is not completely certain that the found results fully apply to all cases. However, this could have been improved by using multiple methods of data collection. The triangulation of these methods improves the quality of the findings (Bleijenbergh, 2013). However, the possibility to conduct multiple methods of data collection was constrained by the deadline of this master's thesis.

Limited depth in each case. The selected cases only consist of two interviewees each with different positions within the university. The results have shown that people can differ in regard to their opinion and their experiences. Therefore, one should take notice that their opinion does not always represent the full case. Interviewing more employees on multiple levels within the organization could have helped to improve the generalizations of this research.

Context specific. One should take into account that this research specifically focused on Dutch universities. It could be argued that foreign universities adopt different practices. This could, for example, be because of cultural differences. This also affects the generalizations of the results. Furthermore, although universities are seen as the paragon of LCS, one should be aware of the fact that the results may vary per industry. For example, the construction industry is considered to be a loosely coupled system as well (Sandberg et al., 2020). However, organizations within this industry might deal differently with highly uncertain and complex environments.

Influence of third parties. This thesis puts less emphasis on the influences of external parties such as the government. During this pandemic, universities were mostly awaiting the governmental decisions before internal decisions could take place. This could have affected the decision-making strategies of universities.

Decreased reliability due to posed questions. Last, in some cases, interviewees were more open to speak-up and therefore more willingly to answer. This altered the posed questions to some extent. On the one hand, this decreased the reliability of the results. On the other hand, this increased the validity of the findings. Extra questions were asked whenever necessary.

6.4 Further research

This last section comprises indications for future research. This master's thesis came across several themes that are worth analyzing further, namely:

Test generalizability. Future research should focus on to what extent these findings are generalizable to other LCS as well. Universities are known for the fact that they mostly operate in stable environments, but this does not have to account for all types of LCS such as the construction industry. Different environments could have an impact on organizational resilience.

Conducting quantitative research. The findings of this master's thesis are based on empirical evidence. Therefore, resilience is not measured by means of quantitative data. Future research should, by means of a quantitative approach, analyze to what extent LCS enhance their resilience. This could indicate to what extent the experienced resilience is also visible in the organizational results (e.g. profit, new students, new research projects).

Conducting longitudinal study. COVID-19 was still present when writing this master's thesis and therefore, it was not yet possible to analyze the long-term effects of the COVID-19 pandemic. Therefore, future research should eventually also take into account what went well and where there are possible points of improvements in the long term. This can be done by means of a longitudinal study.

Solving motivational issues among employees. This master's thesis highlighted the conflicting demands for teaching and research which causes employees to normally exploit instead of explore resources. This indicates that innovation mostly only takes place in case it is highly necessary. Therefore, future research should focus on how these motivation issues among lecturers can be solved and on how the focus on exploitation and exploration can become more balanced (ambidexterity).

Implementation of integrated IT-systems in LCS. This master's thesis also highlighted the importance of IT-systems in regard to information exchange. It also showed that organizations are indeed considering the transition towards one integrated system such as Office365. Also, chapter 2 highlighted that IT can help LCS to gain control while maintaining their loosely coupled structure. However, this thesis did not highlight how such an integrated IT-system should be implemented. Therefore, future research should focus on how an IT-system can be integrated throughout the whole organization and how this can enhance organizational resilience.

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Appendices

- Appendix 1: planning
- Appendix 2: specifications learning organization
- Appendix 3: invitation interview
- Appendix 4: tree structures
- Appendix 5: unstructured interview questions
- Appendix 6: semi-structured interview questions
- Appendix 7: interview details
- Appendix 8: Data collection process

Appendix 1: planning

The table below shows a conceptual overview of the expected timeline during this master's thesis. It provides a useful oversight that indicates how this master's thesis is conducted. This approximate planning is subject to unforeseen changes. However, the student will do its utmost best to follow this schedule.

Activity	Date	Week	Place
Submission of Research Proposal	26 March 2021	12	Submission by e-mail to supervisor and second reader
Processing last feedback comments	29 March 2021 - 4 April 2021	13	Home
Contact interviewees for orientation interview (phase 1)	29 March 2021 - 4 April 2021	13	Home
Interview first 3 respondents (phase 1)	5 April 2021 - 19 April 2021	14 - 15	Zoom, telephone
Write and code interviews phase one	5 April 2021 – 19 April 2021	14 - 15	Home
Revisit research proposal after assessment	9 April 2021 – 16 April 2021	14 - 15	Home
Alter interview questions phase 2 and contact interviewees phase 2	20 April 2021 – 4 May 2021	16 - 17	Home
Interview respondents phase 2	5 May 2021 – 26 May 2021	18 - 21	Zoom, telephone
Write and code interviews phase two	5 May 2021 – 26 May 2021	18 - 21	Home
* Submit revised Research Proposal	14 May 2021	19	Submission by e-mail to supervisor and second reader
Conduct analysis. Start with writing chapter 4 results	17 May 2021 - 23 May 2021	20	Home
Finish writing chapter 4 results.	24 May 2021 - 30 May 2021	21	Home
Write chapter 5 conclusion, implications and future research	31 May 2021 – 6 June 2021	22	Home
Write pre-face, abstract and final check	7 June 2021 13 June 2021	23	Home
Submit master thesis	21 June 2021	24	Submit to supervisor and second reader
Defense master thesis	End of June – Beginning of July	26 - 28	Zoom – Radboud University

* In case first submission is graded insufficient.

Appendix 2: specifications learning organization

This appendix highlights the most important factors of the learning organization. Secondly, it highlights several strategies that can help organizations to make a shift towards a learning organization.

1. Key factors

Systems thinking

Senge (1990) argues that organizations tend to use simplified frameworks in order to analyze complex systems. Thus, organizations look at small parts instead of the whole system. Moreover, people tend to think that solutions can be found near problems. However, problems could also originate from other parts of the systems. This indicates that solutions may also be further away. Systems thinking can be seen as a conceptual framework and tools that allow organizations to see underlying relations that are normally not discovered. This allows organizations to see problems that normally are not identified.

Personal mastery

Personal mastery is a rather abstract discipline. It goes further than just to be competent and possess a certain set of skills. Personal mastery focuses on one's need to continue learning. Having a high level of personal mastery allows employees to notice incompetence and possible growth opportunities (Senge 1990, as cited in, Smith, 2001).

Mental models

Mental models can be seen as the way people see the world. It has a lot in common with the different type of perspectives mentioned by Mintzberg (2009). It is argued that our mental model has a significant impact on the way we make decisions. This does also influence strategizing. Thus, operating by means of a certain mental model/perspective, means that employees need to learn new skills and orientations (Senge 1990, as cited in, Smith 2001).

Building shared vision

Fourth, building a shared vision can help organizations to achieve long term goals. It increases clarity, enthusiasm and commitment within the organization (Senge 1990, as cited in, Smith, 2001).

Team learning

Team learning can be seen as the process in which members within specific departments align and develop certain capabilities in order to achieve organizational goals. Senge (1990) argues that starting a dialogue among team members will allow organizations to handle more complex situations.

King (2001) formulated six different strategies that should be implemented sequentially over time in order to transform into a learning organization. These are discussed next. After thoroughly

analyzing all strategies, it can be concluded that it is key to develop an environment in which individual members as well as departments are encouraged to generate, reform and improve capabilities. By doing so, an organization can develop innovative products or services (King, 2001). An example of this approach is shown by Seville, Hawker and Lyttle (2011) who showed how a New-Zealand university proactively tried to learn from other organizations' experiences in order to deal with future crises.

2. Change strategies

The information systems infrastructure strategy

This strategy focusses on the collection of data and its transformation into more explicit and useable data. This strategy helps organization to recognize valuable data and to transform it in such a way that it can be practically used in the organization. This strategy mostly consist of the use of new software and systems and the appropriate training for employees. This strategy should be implemented first since it acts as a foundation for the other strategies.

The intellectual property management strategy

This strategy focusses on leveraging explicit assets in the form of, among others, patents, brands and research reports. Intellectual property is more easily accessible by means of a well-founded information system infrastructure. In order to succeed in this strategy, organizations could opt for an incentive system in order to promote the creation of intellectual property. This strategy is implemented as second. Using intellectual property allows organizations to generate revenues rapidly.

The individual learning strategy

Individual learning puts emphasis on the training and development of employees. This strategy is key in order to seize the opportunity for formal as well as informal learning. It should be stressed that organizations should focus on tacit as well as explicit knowledge. Tacit knowledge cannot be seen and is transferred through other experts. This strategy should be implemented as third. After a decent foundation is built, it is key that the organization creates a learning culture in which individuals are encouraged individual develop themselves.

The organizational learning strategy

This strategy's center of attention is that social capital can be developed, reformed and improved by means of group and organizational capabilities in order to adapt to a rapid changing environment. This strategy's goal is to guide this development by means of organizational processes. Processes that could be used are, for instance, change management and the employment of organizational development. This strategy will help organizations to not only learn individual, but also learn as groups.

The knowledge management strategy

This strategy focuses on the development and distribution of tacit knowledge. It is key to develop an environment in which employees are encouraged to share information. This is in contrast to the 'knowledge-is-power' culture. This strategy is similar to the organizational learning strategy. By means of expert networks and electronic workspaces, organizations can promote organizational learning.

The innovation strategy

This strategy indicates a proactive process that allow organizations to generate, develop and implement new products or services. This is the final step. After building a decent foundation and promote individual learning and organizational learning, it is key to use all generated knowledge in order to develop new capabilities, products and services.

Appendix 3: invitation interview

Dear sir / madam,

As a student from the Radboud University, Nijmegen School of Management (NSM), I would like to invite you for an interview of approximately 30-60 minutes. The following interview is used for a masters' thesis regarding the decision-making processes within loosely coupled organizations. Since universities are seen as the perfect example of loosely coupled organizations, I analyze this topic by means of a case study that focuses on universities and their strategic-decision making process and strategy formation during Covid-19. Therefore, I think your insights might help me with my research.

1) I would like to invite you for an unstructured interview in which I would like to discuss how COVID-19 impacted your daily activities within the university. This gives me a broader understanding of how the situation within universities changed.

2). I would like to invite you for a semi-structured interview in which I would like to discuss which strategic decision-making processes and strategy formation the university adopted in order to cope with the high degrees of uncertainty and complexity. By means of this interview, I am able to answer my main research question.

I would like to stress the fact that the information collected by means of this interview is kept completely confidential and all personal information is anonymized. Furthermore, I would like to emphasize that you are allowed to stop this interview at any time or refuse to answer any question that you might feel uncomfortable with. Also, I would like to create an environment in which you are completely free to answer according to your preference.

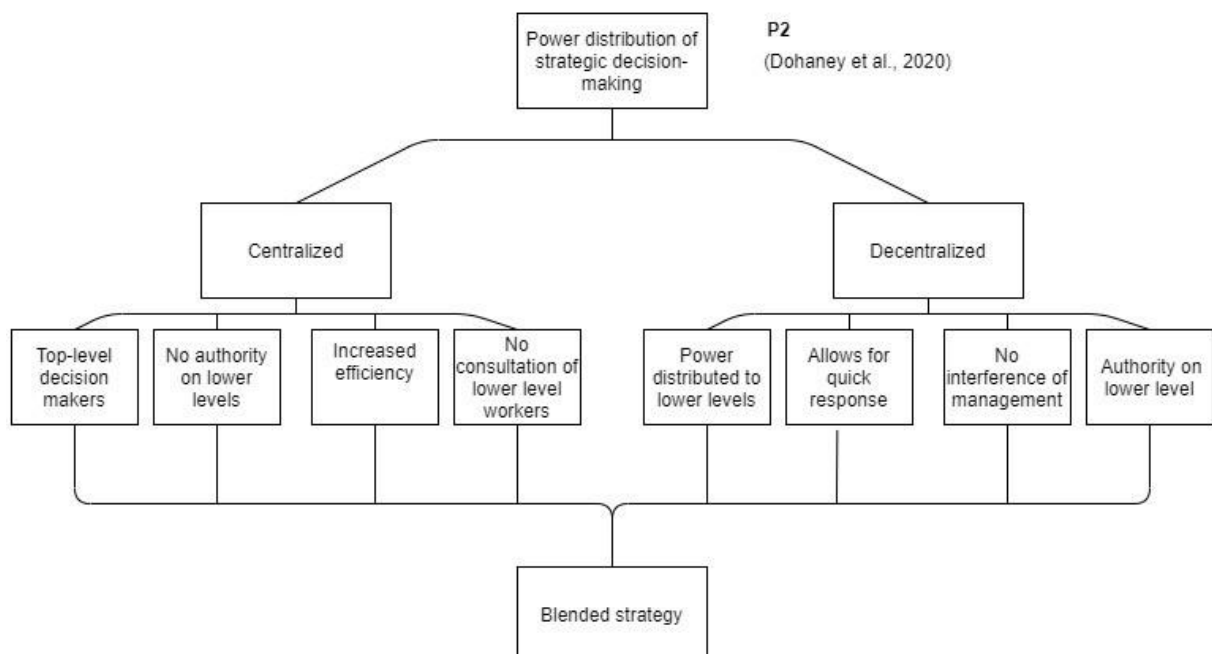
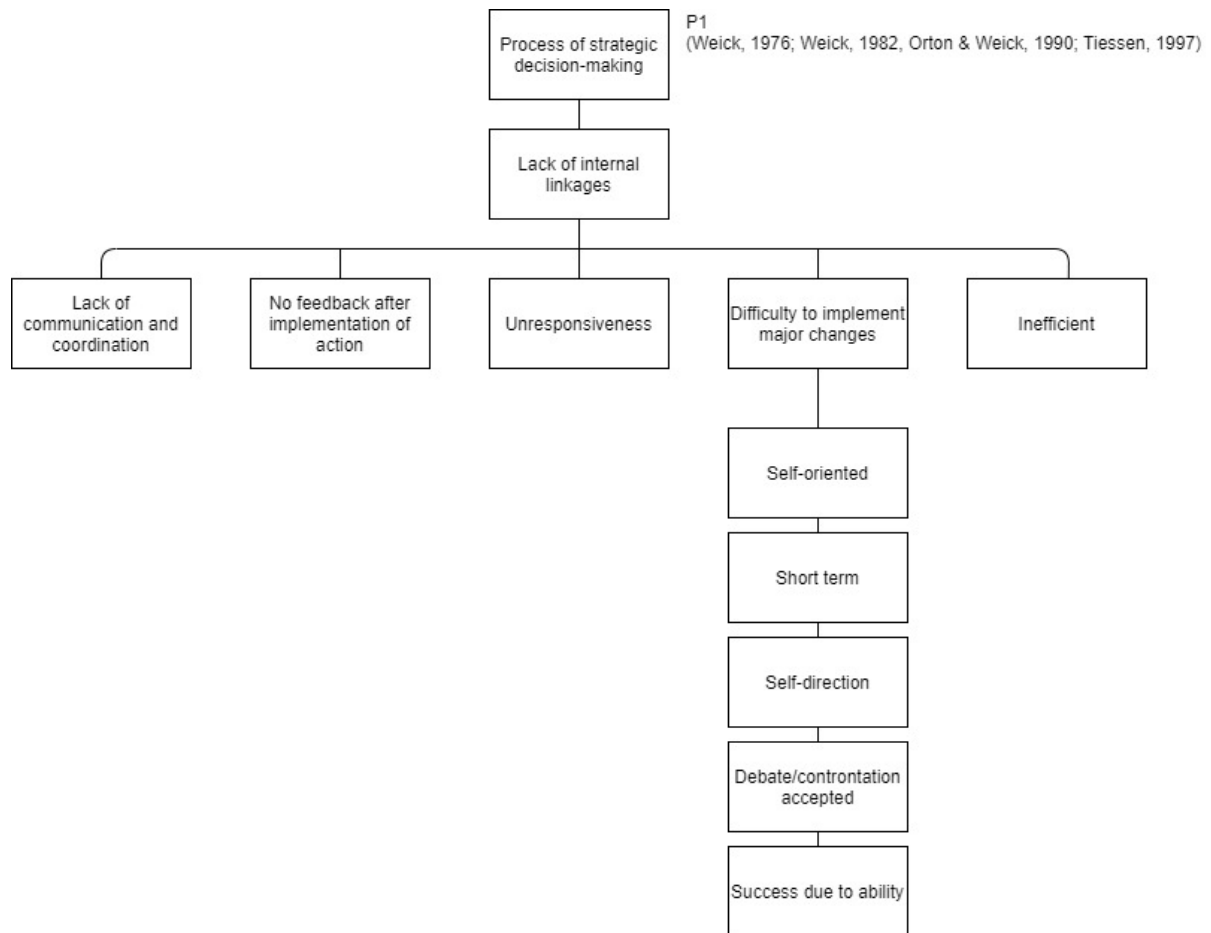
I am looking forward to hearing from you. Hopefully, we can contribute to academic literature together!

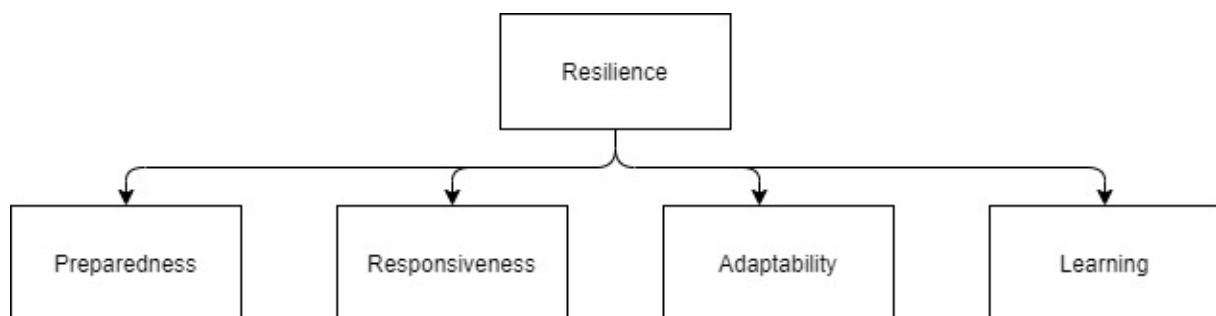
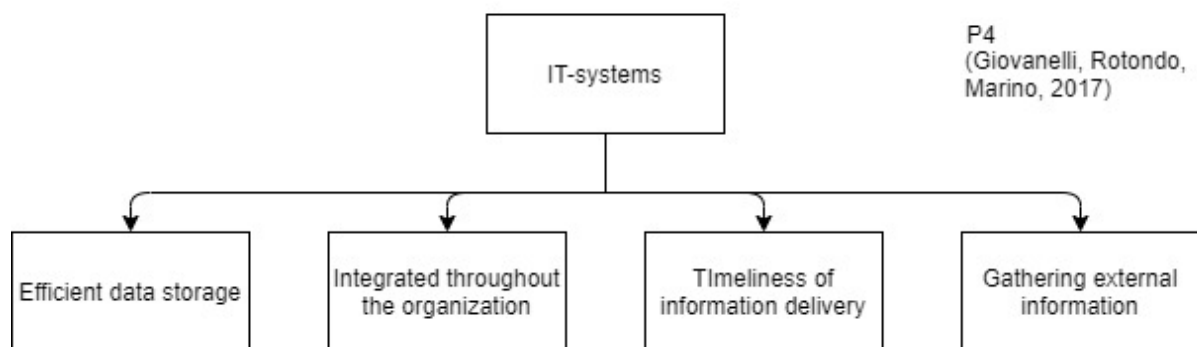
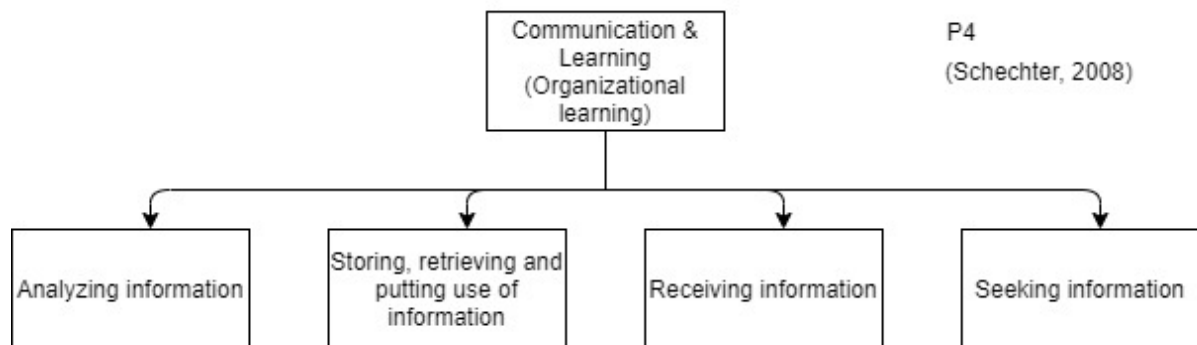
Kind regards,



Bas Pijpers

Appendix 4: tree structures





Appendix 5: unstructured interview questions

The questions mentioned below are meant to give a broader understanding of how COVID-19 impacted universities and how the involved actors experienced this disruptive event? Moreover, it also allows us to gain more insight in how COVID-19 altered their job/tasks.

1. What is your role within the university?
2. What are normally your tasks within the university?
3. How do you normally experience your job? (stressful / entertaining / motivating?)
4. How did COVID-19 impact your job?
5. How did your daily tasks change?
6. How did you experience your job during high degrees of complexity and uncertainty caused by COVID-19?
7. How did this make you feel?
8. What did you find especially important regarding your role within the university?
9. How did you try to achieve the best possible outcomes within the university during COVID-19?
10. If you had to describe the situation within universities caused by COVID-19 to others, how would you describe it?
11. Do you believe that this pandemic has changed the way how you look to future crises?

Appendix 6: semi-structured interview questions

The questions mentioned below are meant to give deep insight in how universities as loosely coupled organizations deal with high degrees of uncertainty and complexity and how they adopted successful decision-making processes. This part involves a semi-structured interview which is divided in several parts.

SQ1: To what extent does the organizational structure of LCS (low degree of internal linkages), in an uncertain and complex environment, affect the nature of the coordination process?

- **P1: The highly fragmented internal linkages hinders LCS' ability to develop a collective approach in times of high uncertainty and complexity**

1. What is your role within the university?
2. To what extent do you think the university has a decentralized structure?
3. How is this structure noticeable?
4. What are the consequences of a decentralized structure in situations such as COVID-19?
5. From a scale 1-10, how efficient do you think that the university responded to COVID-19?
6. To what extent was there communication and coordination among different departments?
7. To what extent does this hinder the university to respond collectively to the situation? (e.g. initiate major changes)
8. How fast did the university respond as a collective?
9. What was the university's approach towards COVID-19? (e.g. individually/fragmented)
10. To what extent does the autonomy of lecturers hinder or effectuate the approach towards COVID-19?
11. How was this noticeable?
12. Does the decentralized structure of the university hinder the flexibility or resilience?
13. To what extent was it possible to have one common vision throughout the organization?

SQ2: To what extent do LCS adapt their decision-making process (decentralized) to enhance coordination and to become more resilient?

- **P2: LCS integrate a more centralized decision-making approach in times of high uncertainty and complexity.**

1. From a scale 1-10, how centralized was the decision-making within the university during COVID-19?
2. By whom are most decisions made during COVID-19? (was this (de)centralized?)
3. Is there a central authority that is involved in the decision-making?
4. What is the exact role of this central authority?

5. Why was this necessary?
6. How did the university made the decisions during COVID-19? (proactively/reactively, which information was used? Did this enhance efficiency?)
7. Which decisions have been made by the university?
8. How did these decisions help during COVID-19?
9. How did these decisions help the university to improve its flexibility?
10. Does this make the university more resilient?)
11. How were these decisions translated to the rest of the university?
12. What vision did the university have in relation to COVID-19?
13. How did this vision help the university?
14. How did a central authority help with the formulation of this vision?
15. Were there issues that the university was not able to solve?
16. What became more difficult due COVID-19?

SQ3: To what extent do LCS, in an uncertain and complex environment, modify their problem solving strategy?

- **P3: In times of high complexity and uncertainty, LCS are forced to undertake more exploratory activities to find new solutions**

1. To what extent did the university make use of traditional resources during COVID-19?
2. What things were especially difficult in the beginning of COVID-19?
3. From a scale 1-10, how much emphasis was put on finding new solutions?
4. To what extent did the university try to innovate to deal with COVID-19?
5. How flexible was the university in developing new solutions?
6. For what issues did the university find new solutions?
7. For what issues did the university not find new solutions?
8. How did the university search for new solutions?
9. How easy was it for employees to implement new solutions?
10. How likely is it that the university will still make use of these new solutions after COVID-19?
11. Did these new solutions make the university more flexible and resilient?

SQ4: To what extent do LCS, in an uncertain and complex environment, integrate new ways of communication and learning within their coordination process?

- **P4: Information exchange, by means of IT-systems, enhances communication and learning.**

1. How did information exchange take place within the university before COVID-19?

2. To what extent did this change during COVID-19?
3. From a scale 1-10, to what extent did IT-systems help to enhance the exchange of information and therewith also communication and learning?
4. To what extent did the university develop new IT-systems in order to enhance the exchange of information?
5. How did IT-systems help to improve communication among employees within the university?
6. How did the university search for new solutions regarding IT?
7. How did IT-systems help to improve organizational learning within the university? (e.g. development of new skills or development of new possibilities)
8. To what extent do IT-systems help to enhance university's resilience and flexibility?
9. Are there any issues that the university has not solved regarding IT-systems?
10. What will the future role of IT-systems be?
11. Does the university try to keep developing their IT-systems?

Appendix 7: interview details

	Contact person	Position	University	Date	Time
	Phase one				
1		Lecturer		19 April 2021	10:30 – 11:00
2		Senior Research Fellow T-AP Social Innovation		21 April 2021	14:00 – 14:30
3		Assistant professor		23 April 2021	13:00 – 13:30
4		Lecturer		26 April 2021	10.00 – 10.30
	Phase two				
1		Vice-dean education		21 April 2021	09:00 – 10:00
2		Secretary of faculty		22 April 2021	10:00 – 11:00
3		Director operations		23 April 2021	15:00 – 16:00
4		Lecturer		10 May 2021	10:00 – 11:00
5		Secretary executive board		11 May 2021	14:30 – 15:30
6		Chairman crisis team (CTO)		17 May 2021	13:00 – 14:00
7		Lecturer		17 May 2021	14:30 – 15:30
8		Policy Advisor		18 May 2021	11:00 – 12:00
9		Lecturer		18 May 2021	16:00 – 17:00
10		Dean faculty		19 May 2021	10:00 – 11:00
11		Chairman executive board		27 May 2021	11:00 – 12:00
12		Lecturer		27 May 2021	13:00 – 14:00

Appendix 8: Data collection process

