



**Master of Science
Innovation Management**

How has the Covid-19 pandemic effected innovation in
the healthcare system in Iceland?

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Declaration of Research Work Integrity

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature of any degree. This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by giving explicit references. A bibliography is appended.

By signing the present document, I confirm and agree that I have read RU's ethics code of conduct and fully understand the consequences of violating these rules in regards of my thesis.

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Date and place

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Abstract

This study aims to demonstrate the positive relationship between the Covid-19 pandemic and innovation in the Icelandic healthcare system, using a conceptual model of public sector corporate entrepreneurship. The study aims to explore and examine predecessor for innovation in the public sector and give a detailed information on how the effects of the Covid-19 pandemic has had on innovation in the healthcare system and answering the question: *How has the Covid-19 pandemic effected innovation in the healthcare system in Iceland?*

Qualitative method, where semi-structured interviews were conducted with five large stakeholders of the healthcare system in Iceland, was used with the objective to determine the effect from the Covid-19 pandemic on innovation. The study provides an in-depth breakdown of corporate entrepreneurship dimensions, based on public sector organizations and external environment factors, that are predecessor for innovation. Findings from the research indicate that the healthcare system in Iceland has a positive attitude towards innovation, but lack of resources and communication can prove as being a prohibiting factor for innovation to occur. Therefore, by exploiting the opportunity to analyze how the catalyzing effects on how the Covid-19 pandemic effected innovation, the healthcare system can gain further information on how to embrace innovation. All participants in the study, acknowledged the positive relationship between Covid-19 pandemic and innovation, and provided vital information on how innovative solutions can be beneficial for the healthcare system. Empirical findings suggest that the effects from the Covid-19 pandemic on innovation, consist mainly of: Increased flexibility, better use and sharing of resources, more motivation and encouragement as well as increased communication.

Additionally, the research gives a foundation for the relevancy to investment and manage innovation in the healthcare system and provides a platform for future research in healthcare innovation in Iceland.

Keywords: *Innovation, Corporate Entrepreneurship, Public Sector Organizations, Covid-19 Pandemic, Healthcare System.*

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1. Introduction

Since the finance system in Iceland collapsed in 2008, fast improvements in technology and rapid growth of new startups have given the Icelandic economy a new color. Today, Iceland has a variety of many different startups (EU-startups, 2019). Furthermore, many new startup ventures have successfully launched new products and services while other companies seek innovations to improve and adapt their current business models to new demands. During this time, since the economic crisis in 2008, startups have gained stronger footholds and received more support from both the government and from the private sector. Innovation and entrepreneurial behavior has been identified and shown its increased importance for all companies regardless of size and sectors (Kraus, 2013), including the public sector.

Large organizations today have the tendency to lack innovative initiative. The reason being, amongst other things, is the stability within the organization, stable revenue streams and lack of competition (Mulgan, 2007). Innovation within larger organizations tends to lack the urgent need to change. If the organization is fulfilling its duty on a day-to-day basis, then changing it lacks motive and need (Nahlinder, 2003). Therefore, it seems that the innovations inside these types of organizations are not important and don't affect the core of the business. When the motivation for changing is not part of the structure and culture inside organizations, it can lead to more vulnerability in times of crisis (Chesbrough and Garman, 2012).

However, innovation during crisis can be very effective inside large government organizations, because crisis calls for new solutions and fast response. Crisis also gives an opportunity for innovation. In a short period of time, many new innovate ideas towards the healthcare system have been introduced, including new drugs and medical devices, improved healthcare processes, manufacturing and supply chain breakthroughs and novel collaboration techniques (Clark, 2020). The topic of how economic crisis affects innovative initiatives is widely debated and no consensus within the literature on the effect economy crisis has had on innovative activities (Peris-Ortiz et al., 2014). For the purpose of this study, the economic crisis as a result of the Covid-19 pandemic is linked to similar crisis as stated in the literature of the study.

The aim of this research is to explore the innovation and entrepreneurship in the public sector. Furthermore, how crisis affects public sector corporate entrepreneurship and innovation, using the Covid-19 pandemic crisis and how it affects innovation within the public sector. Research in this field is lacking and furthermore, pandemic like Covid-19 does not occur

frequently. In fact, the Covid-19 pandemic is unique due to its specific impact on the healthcare system and similar pandemics have not yielded the same reaction from the government (Stjórnarráð Íslands, 2020). This research focuses on analyzing how crisis motivates innovative initiative by encouraging entrepreneurial thinking. Also, it aims to emphasize the importance of innovation and entrepreneurship in the healthcare system and to see how the Icelandic healthcare system responded in innovative ways during the Covid-19 crisis.

In this research the main focus will be to analyze innovation and entrepreneurship caused by Covid-19, in the form of new ways of organizing and new technical solutions, among others. This research can be beneficial for the healthcare system and it could provide vital information on how innovation and entrepreneurship within the organizations can help and strengthen the healthcare system. The crisis created by Covid-19 offers an opening to further investigating innovation, especially in the healthcare sector. The purposed research question in the thesis is very important towards the healthcare system in Iceland. To get an overview of the new innovations and how they affect the healthcare system gives a vital information on the importance of constant innovation in large and public organizations. Using the opportunity to exploit the positive effect the Covid-19 crisis has had on new innovations in the healthcare system in Iceland is vital and cannot be ignored.

1.1 The research

The objective of this research is to analyze factors related to corporate entrepreneurship and therefore determined the affect Covid-19 crisis has had on innovation within the public sector since corporate entrepreneurship can be used to determine innovative effects within organizations. The conceptual model is based on Kearney et al. (2008) conceptual model of public sector corporate entrepreneurship.

The proposed conceptual framework of the thesis will consist of a qualitative research method using semi-structured interview guide. The research question relies on understanding ongoing situation caused by Covid-19 and actions in response. This is achieved by using open ended questions which can lead to better understanding and gives room to explore the research topic better (Creswell, 2014). This is especially important since the research topic is very new and not many other similar researches in Iceland exists and therefore, the research is particularly innovative because of its relations with the Covid-19 pandemic.

1.2 Research question

From the discussion on the effect the Covid-19 crisis has had on innovation in the healthcare sector, the research question for the study is as stated:

How has the Covid-19 pandemic effected innovation in the healthcare system in Iceland?

1.3 The structure of the paper

The thesis is structured as follows: The first chapter introduces the research topic. Second chapter provides background to the research. Third chapter gives an overview of literature review on relevant theories and research related and connected to the research question. Fourth chapter shows the conceptual framework for the thesis. Chapter five describes the research method. Chapter six summaries the results. In chapter seven the results are discussed and finally, chapter eight, states the conclusions and recommendations.

2. Background to the research

This chapter gives an overview of the recent events in the Icelandic healthcare system, during the times of the Covid-19 pandemic. The main objective of this chapter is to summarize the highlighted events, covered by the media in Iceland and other challenges facing the healthcare system. The chapter also points out innovative initiatives in the healthcare system, prior and during the Covid-19 pandemic, that give foundation and support the proposed research question of the theses.

2.1 Covid-19 – What is it?

Covid-19 is an infectious disease caused by the newly discovered coronavirus, SARS-CoV-2. Most people that encounter the Covid-19 disease experience mild to moderate respiratory illness and their recovery does not include any special treatment. However, there has been noted that people with underlying medical problems are at higher risk and more likely to develop a serious illness (World Health Organization, n.d). Currently, as of September 2020, there are no vaccines or treatments for Covid-19. The most important response to anticipate and moderate down transmission is to be well educated as to the Covid-19 infection, the illness it causes and how it spreads. Therefore, handwashing washing is recommended along with utilizing an alcohol-based rub as often as possible and limit touching the face area (World Health Organization, n.d).

2.2 Government objectives and actions

The healthcare system in Iceland is fundamentally a cooperation of many stakeholders, both in the private and the public sector. In general, healthcare services are provided both from hospitals and health clinics toward the patients, and technological and other services such as supplies and educational information, from private sector (Stjórnarráð Íslands, n.d.). In subchapter 2.2, the main focus is pointing out government objectives and actions, by exploring and summarizing interviews from different stakeholders within the healthcare system. All

interviews and direct quotations are not from the research's interviews. However, some of the stakeholders in this chapter are also interviewees in the research.

“The problem is a matter for society as a whole,” is a quote from Páll Matthíasson, the CEO of Landspítali, the national hospital of Iceland, (hereafter: LSH) when asked in an interview in January 2020 about the current status of the emergency room in the largest hospital in Iceland. In the same article, it is mentioned that the hospitals lack capacity in the emergency room results in overfilling of the emergency room and more constraints on the employees (Morgunblaðið, 2020). This article supports Páll's beginnings statement in the chapter, and the research relevance. It points out that in order to solve the hospital's problem of the overcapacity in the emergency room for example, the hospital alone cannot solve it, using their own resources. This example of the overcapacity in the emergency rooms is not particularly new, but the timeline from this article points out the need for reforming and it is still ongoing.

However, when the Covid-19 disease was first diagnosed in Iceland, a special outpatient department for patients diagnosed with the Covid-19, was set up in a very short period of time (Landspítali, 2020). In the construction of the Covid-19 department, it is noted that factors such as resources and other logistical problems were solved in a short period of time. The department was staffed by multidisciplinary team where the safety of the patient is at its highest capacity (Landspítali, 2020). Therefore, it is interesting to compare the specialized Covid-19 department and the action taken to set it up, to the adhering problems of the capacity in the emergency rooms. What is the ruling factor in the decision to create a whole new department versus making improvements in another in critical need for change?

Other members of the authorities support that learning from the specialized Covid-19 department can be beneficial in other scenarios. Alma Möller, the Director of Health in Iceland, pointed out in an interview that restructuring of epidemic activities and telehealth services can be further implemented, when asked about the learnings towards the healthcare system (“Heilbrigðiskerfið getur”, 2020):

We have been working on this, but it has been rather slow, but since then the telehealth service has taken a leap in this epidemic, so these are examples of lessons learned and also the way we differentiate between certain services, emergency services and non-emergency, the Covid-19 walking department can of course be a model for general diseases and so on.

Similar distinguishes in responses from the government towards the healthcare system during the Covid-19 pandemic, empathize fast improvements and quick solutions. Svandís Svavarsdóttir, the Director of Health in Iceland announced that one billion Icelandic krona's will be spent on projects in the healthcare system in 2020, according to a proposal for a parliamentary resolution on a temporary investment effort by the government to counteract the recession in the economy following the pandemic of the coronavirus (Stjórnarráð Íslands, 2020). Svandís said:

It cannot be said too often that the healthcare system is one of the most important pillars of any society as we are getting to know these days to a greater extent than we could have imagined. Therefore, no one needs to be in doubt about the necessity and importance of projects that are in the interest of our health system and the strengthening of its infrastructure (Stjórnarráð Íslands, 2020).

The projects from the government's investment to counteract the Covid-19 pandemic include: Rehabilitation ward of Landspítali by Grensás, improvements towards the premises of health institutions in the countryside and a special contribution to innovation in health services (Stjórnarráð Íslands, 2020). These projects can lead to improvement in the healthcare system. However, it could be argued, that implementation could have been prior to the Covid-19 pandemic as the outcome of the projects will benefit a healthcare system, free of Covid-19. Given that the Covid-19 pandemic will end prior to the end of the projects.

The positive effects towards improvements in the healthcare sector from the Covid-19 pandemic are not limited to financial assistance. In an interview with Guðjón Vilhjálmsson, the manager of health solutions at Origo (an IT service company), Guðjón stated that the Covid-19 pandemic will have positive impact on the world of healthcare solutions permanently (Morgunblaðið, 2020-c). Further discussion of both Origo and Guðjón can be found in subchapter 5.2.1.5. In that regard, Guðjón mentions that he believes that various solutions in the pipeline will not only simplify the work of healthcare professionals, but also equalize people's access to services. He mentions as an example the inhabitants of more scattered settlements; Electronic solutions can give people the opportunity to seek healthcare from home that they would otherwise have to traveled a long way in order to receive (Kristjánsson, 2020):

It can be said that we have taken a big step five years ahead with this adaptation, both of healthcare professionals and clients, to technology. I also think this will push investment in this area (Guðjón Vilhjálmsson, as cited in Kristjánsson, 2020).

2.3 Controversy and relevance of the research

In an article recently published in Morgunblaðið, Dr. Ásgeir Guðnason at LSH, criticizes inaction from the government towards the healthcare system and their lack of improvement action during the past years (Ásgeir Guðnason, 2020). Dr. Ásgeir Guðnason is an orthopedic surgeon who works as a specialist in joint replacement surgery and reoperation of prostheses at LSH. In his article, he also points out the ongoing problem of long waiting lists for surgeries and lack of actions into solving that problem. Therefore, Guðnason also raises the question on how large-scale problems can be solved relatively quickly during the Covid-19 crisis but at the same time, other ongoing problems cannot be solved (Ásgeir Guðnason, 2020).

Screening was performed by Íslensk erfðagreining [DeCode Genetics] because the National Hospital, the University Hospital itself, could not do it at the time. What happened when this company stopped screening? Then Landspítalinn was suddenly able to solve the problem. Probably because they had to do it. Therefore, I ask, are the waiting lists at Landspítali after prosthetic surgeries a hopeless task or not? (Ásgeir Guðnason, 2020, p. 42).

Although, the problem pointed out by Dr. Ásgeir Guðnason is targeted to a specific problem within the LSH, it gives an understanding on general frustration and response from healthcare workers towards lack of problem solving.

In conclusion of this chapter, it's evident that the Covid-19 pandemic appears to be a catalyst in solving complex and large problems which cannot be solved the traditional way. Both in action taken by the government and in fast implementation of new technologies into the healthcare system, using new and creative solutions. Therefore, looking at the healthcare system and analyzing how the factors that contribute to innovation during the Covid-19 crisis evolve and change, can lead to better understanding of innovation within the healthcare system. Learnings from the Covid-19 pandemic can help to capture innovative learning methods and increase innovation within the healthcare system. As supported by Dougherty and Hardy (1996), providing new products and implementing new services are an important factor for any organization in order to adapt to changes in competition, markets and technology (Dougherty and Hardy, 1996). Therefore, it is the researchers aim to prove and state the relevance for this research as well as connect innovation to the healthcare system and determine the affect the Covid-19 pandemic has had on innovation, as stated in the proposed research question. The research aims to answer the question on how the Covid-19 pandemic has effected innovation

in the healthcare system in Iceland by using Kearney et al. (2008) conceptual model as framework. Further discussion on the conceptual model can be found in chapter 4.

3. Literature review

This chapter gives an overview and summarizes, compares and critiques the most relevant scholarly sources on the research topic. Theories in this chapter include innovation, institutional theory and formal organizations, innovation and entrepreneurship in crisis, corporate entrepreneurship, public sector corporate entrepreneurship, innovative process in the public sector and benefits of innovation in the healthcare system. The goal with the chapter is to show the relationship between crisis and increased corporate entrepreneurship and how it influences innovation in public sector organizations such as the healthcare system.

The findings in the literature show a gap in the relation between crisis and innovation towards the healthcare systems. This is especially true when determining the Covid-19 pandemic and how it influences innovation within the healthcare system in Iceland.

For the purpose of this research, corporate entrepreneurship is defined as entrepreneurial activities within organizations that lead to innovative initiatives and activities, with main focus on organizations within the public sector. Therefore, by analyzing the effect of the Covid-19 pandemic on the ten dimensions for the research conceptual model that influence corporate entrepreneurship, the innovate effects can be determined as stated in the research question. As the research is based on Kearney et al. (2008), chapter 4 introduces the conceptual model of the research and provides further details of the framework, how it connects to the research question as well as providing in-depth literature of each dimension.

3.1 Innovation

Innovation has a diversity of definitions, depending on its application within organizations. For the purpose of this research, the focus is on innovation within organizations and emphasizes different aspects of innovation that are linked to organizational performance. Innovation is closely linked to change, as organizations use innovation as a tool to influence the surroundings or changing their environments, both internal and external (Damanpour, 1991). In that regard, Ettlé and Reza (1992) point out that innovation involves different types of changes, as organizations vary in resources, strategies, capabilities and requirements. Therefore, in order for organizations to embrace innovation, it is a key factor to be open and positive towards changes.

Thompson's (1965) definition of innovation is: "*Innovation is the generation, acceptance and implementation of new ideas, processes products or services*" (Thompson, 1965, p. 2). This definition, although being simple and introduced in the 60's, is descriptive and concise as has held its relevance to this day. Close to Thompson's definition, similar emphasis on organizations are noted in more recent literature as Wong et al. (2008) define innovations in this way: "*Innovation can be defined as the effective application of processes and products new to the organization and designed to benefit it and its stakeholders*" (Wong et al., 2008, p. 2). Wong, in this definition, shares common aspects with Thompson, and the focus on the innovative process rather than the products.

Knight (1967) defines innovation as "*the adoption of a change which is new to an organization and to the relevant environment*" (Knight, 1967, p. 478). From this definition, it is evident, that in order for organizations to cope with changes, its vital to stay innovative. Knight's definition also acknowledges the importance of environmental factors. Knight (1967) pointed out the organizational innovating as two phases; creation of the idea and its development, and the introduction and implementation of the idea. At the time, Knight's distinction between the two phases was unconventional, and towards the latter one, pointing out that the innovator is not always the creator of ideas or products (Knight, 1967).

For many organizations, innovation is an important source of growth and a key determinant of competitive advantage. Innovation requires the coordinated efforts from many different stakeholders and the integration of measures across special skills, application areas and contexts (Lam, 2010). Therefore, it is evident that the creation of organizations is a fundamental part of the innovation process (Van de Ven et al., 1999). Lam (2010) also points out, that the ability for organizations to be innovative is dependent on being able to utilize creative resources and implement new technologies.

3.1.1 Innovation in times of crisis

Throughout last decades, crisis have played a pivotal role in development of our society and a acknowledged catalyst for innovation (Peris-Ortiz et al., 2014; Devece et al, 2016; Iacobuta and Socoliuc, 2014), with the latest example of the economy crisis followed by the collapsing of the Icelandic banking system in 2008

Many academics have argued the affect crisis has on entrepreneurship and innovation.

Fairlie (2013) points out that innovative initiatives as a result of entrepreneurial ventures are fewer during times of crisis. In that regard, companies that invest in innovation throughout tough economic times can perform better when the growth returns (Chesbrough and Garman, 2012). However, although entrepreneurial ventures are fewer, they can perform better in regard to quality and growth, depending on if they have certain characteristics (Devece et al., 2016). These certain characteristics relate better to ventures that seek to capitalize on market opportunities, as the entrepreneur is better capable to identify opportunities in his own market due to his specific knowledge of the market (Devece et al., 2016). Amit and Muller (1995) point out that economic crisis is a push factor for entrepreneurship. In that regard, the push factors include external condition that alternatively provide people with opportunity to engage with entrepreneurship (Amit and Muller, 1995).

Further studies support the relationship with pandemics and entrepreneurship. Similar findings can support the innovative initiative from pandemics, like the H1N1 pandemic in 2009. The H1N1 pandemic exposed both the strengths and weaknesses in the global plan to deal with the emerging threats of new infectious diseases (Fineberg, 2014). Therefore, pointing out and supporting that crisis caused by pandemics have not yet been thoroughly examined, prior to the Covid-19 pandemic. Since crisis caused by pandemic is relatively new for our generation, little literature can be found on the direct connection between pandemic crisis and entrepreneurship. However, for the purpose of this research, the focus is to determine the affect the Covid-19 pandemic has on innovation within the healthcare sector and therefore the Covid-19 pandemic is positively linked to crisis as a catalyst for innovation and entrepreneurship as stated in the literature above.

3.1.2 Innovation in the public sector

Many scholars have argued the placement of innovation in the public sector, but most acknowledge its existence in one way or another. Some literature states that innovation in private sector differs from the public sector, mostly due to more bureaucracy and regulations being inhibitory factors for the public sector (Jónsdóttir, 2014). In that regard, within innovation in the public sector, there is lack of ownership or placing someone responsible with the innovative work (Nählinder, 2013). That results in less pressure to pursue and finance innovation. Furthermore, barriers between departments and little cross functional cooperation

inhibit innovative mindset as well as fear of making mistakes and little or no rewards for implementing new ideas (Nählinder, 2013).

Researches in relation to innovation within the public sector in Iceland are few. Furthermore, the need for exploiting and enhance knowledge and importance of innovation in the public sector is truly beneficial for all parties involved. Jónsdóttir (2014) provides empirical data from the Icelandic public sector, where managers describe insufficient conditions for expanding the availability of services and complication in division of labor, quality standards and communications. When it comes to the forces promoting changes in the society, expansion of operations and the need for change plays an important role (Miettinen, 2009).

Bessant (2005) states that a key challenge for managers within the public sector, is learning to manage innovation, in an environment that calls for new kinds of services as well as improvement of process efficiency in implementation of new services. Rainey et al. (1976) pointed out that within the public sector, managers have less flexibility compared to their colleagues in the private sector. Others scholars have similar findings and argue that conflict within traditional values within the public sector can halter the occurrence of innovation (Goodsell, 1993; Terry, 1998; Gawthrop, 1999, as cited in Kearney et al., 2008). On contrary, Baldrige and Brunham (1975) suggest that due to complexity, large size and heterogeneous, within the public sector such as governments and ministries, are more likely to be innovative compared to small homogenous organizations. In that regard, Baldrige and Brunham (1975) point out that the reason being is that large organization create problems of control, coordination as well as management, that require innovative solutions (Baldrige and Brunham, 1975). From this, it is evident that although innovation can occur within the public sector, it might not be as favorable and desirable compared to the private sector. Therefore, requirements for the public sector are fundamentally different from companies in the private sector, and include more often non-profit-driven and non-discriminatory organizations, as well as they often have a monopoly and serve citizens rather than customers.

3.2 Entrepreneurship

For the purpose of this research, understanding and connecting innovation and entrepreneurship is key. Further in the literature review, a division within entrepreneurship will be discussed, corporate entrepreneurship, which is a dominant factor in the conceptual

framework for the research. Similar to previous chapters, the focus of entrepreneurship in this chapter is toward organizations.

Stevenson and Jarillo (1990) suggest that entrepreneurial organizations pursue opportunities regardless of the resources they control. In that regard, the opportunities are defined as not feasible. Thus, making opportunities a relativistic concept as it differs between individuals because different individuals have different desires and capabilities (Stevenson and Jarillo, 1990). Therefore, it is noted that the levels of entrepreneurship within the organization and pursues of opportunities are critically dependent on individuals' attitude within the organization, ranked below top managers (Stevenson and Jarillo, 1990).

In more recent years, there has been a noticeable trend in the study of entrepreneurship, as it focuses less on the new ventures of “small businesses“ and more towards organizations and how entrepreneurship represents organizational behavior (Cornwall and Perlman, 1990; Chell, 2001; Zaho, 2005). Entrepreneurship, according to Miller (1983), is made from three dimensions; Risk-taking, proactivity and innovation. Others have added to Miller's dimensions and in that regards, Slevin and Covin (1990) argues that three dimensions are not enough to ensure organizational success: *“A successful firm not only engages in entrepreneurial managerial behavior, but also has the appropriate culture and organizational structure to support such behavior”* (Slevin and Covin, 1990, p. 43).

Lumkin and Dess (1996) defined entrepreneurship as the creation of new ventures, from entrepreneurial orientation as well as providing the entrepreneurial orientation framework. Therefore, establishing a relationship between organization performance and entrepreneurial behavior. Similar findings from Wiklund (1998) support Lumkin and Dess distinction on the relationship between organization performance and entrepreneurial behavioral, and Wiklund also determined a strong connection between entrepreneurial orientation and entrepreneurial behavior.

3.3 Corporate entrepreneurship

For the aim of this study, the focus and definitons of corporate entrepreneurship are used towards organizations within the public sector. It refers to the method that exists within an organization that ends up in innovative activities such as: The event of recent and existing services, technologies, administrative techniques, and new improved strategies (Kearney et al.,

2008). Further concepts and more focused literature for corporate entrepreneurship will be reviewed under the chapter of the dimensions of the conceptual framework.

The relevance of corporate entrepreneurship within an established organization began to increase in the late 80's as the focus and interest of organizations was aiming at enhancing innovation, encourage risk-taking and being more proactive towards external environment changes (Zahra, 1991). Corporate entrepreneurship can occur in various types of organization ranging from small to large, non-profit, public sector and startups (Morris et al., 2008). These definitions give a better understanding and support that entrepreneurship is not just within new startups but can also occur within any organizations of different sizes and types. Thus, not limited to small or new business ventures as well as not being limited to the private sector.

Zahra (1993) states that activities in regard to corporate entrepreneurship are positively associated with the organization's financial performance. Academic research and observations identify corporate entrepreneurship as entrepreneurial behavior within an established organization (Kearney et al., 2008). Corporate entrepreneurship can therefore be conceptualized as the organizations' ability to use their own resources towards promoting and generating innovation internally. In order for the organization to generate innovation internally, there is a need for motivated individuals and groups to take action as well as being motivated from the characteristics of the environment and the organization (Russel, 1999). Similarly, Sharma and Chrisman (2007) define corporate entrepreneurship as a group of individuals, working within established organizations that instigate renewal or innovation within the organization. Thus, it is evident that corporate entrepreneurship aims to increase innovation within established organizations. Therefore, giving support for the conceptual model of the research, which is focused on corporate entrepreneurship, in order to determine the effect of innovation.

3.3.1 Public sector entrepreneurship

Related to innovation in the public sector is entrepreneurship in the public sector. It is common to overlook the importance of public entrepreneurship and also to seek what influences and promotes entrepreneurship within the public sector. Many theories support and suggest that entrepreneurial orientation leads to better organizational performance (Hinz and Ingerfurth, 2013).

In a German research, the relationship between entrepreneurial organization and performance in the healthcare sector is tested and if ownership under challenging conditions matter. In this case, the ownerships refers to hospitals that are privately owned and public hospitals. The research tests four different hypothesis. Two of the hypotheses reflect how the environmental factors affect the performance. It is widely argued that the actions of the organization are affected by the environmental context (Emery and Trist, 2008). Environmental factors consist of various elements such as hostility, environmental turbulence, diversity, complexity and market dynamism. As suggested, results support the hypothesis that organizations entrepreneurship has a significant positive influence on performance (Hinz and Ingerfurth, 2013). The research also shows that the impact from the environmental factors remain stable in relation with the organizational entrepreneurship and positive influence on the organizational performance (Hinz and Ingerfurth, 2013). However, the missing factor in the environmental sections is the effect of a pandemic like Covid-19. The research also shows that the ownership matters in regards of organizational entrepreneurship and that a significant difference can be found, in that regard, between private owned hospitals versus public hospitals.

4. Conceptual framework

In this chapter, the conceptual framework for the research is introduced as well as discussion of the reason and relevance for the choice of the framework. The dimensions count ten in total and are each considered antecedent towards innovation, if ignored. The chapter concludes in-depth analyses and relevant literature of the ten dimensions of the conceptual framework.

4.1 Conceptual model of public sector corporate entrepreneurship

The proposed conceptual model for the research is based on Kearney et al. (2008) conceptual model of public sector corporate entrepreneurship. The reason behind the selection of the conceptual framework, is mainly due to its direct connection to the public sector, to which the health care system belongs. The framework consists of two major themes; Public sector organization and external environment. The public sector organization theme corresponds to the following dimensions; Structure/formalization, decision-making, rewards, risk-taking and proactivity. The external environment theme corresponds to the following dimensions; Political, Complexity, munificence and change. The two themes have a positive relationship with corporate entrepreneurship which is a manifestation for innovation within public sector organizations (Kearney et al., 2008). Therefore, by using Kearney et al. (2008) conceptual model of public sector corporate entrepreneurship, the effect of Covid-19 on innovation can be determined due to the fact that all ten dimensions of the framework represents precursors for innovation in the public sector. Furthermore, within the conceptual model, corporate entrepreneurship is positively related to performance within the public organization, mainly with growth, performance and productivity (Kearney et al., 2008). Therefore, innovation is highly beneficial for the public sector.

In order to answer the proposed research question, an interview guide (Appendix A) is built on each dimension of the framework. Therefore, it is both to get a general understanding of how the company/organization is facing each dimension as well to know how the Covid-19 crisis has affected their contributes towards the dimensions. As the company selection is a broad spectrum of stakeholders within the healthcare system in Iceland, both working in the private and public sector, it is relevant to use framework that can fit all interviews. The reason being is to take into account the different stakeholders and further analyze their placement within the framework. Both in how they fit in the two themes of the model, public sector

organization and external environment in general, and where the Covid-19 pandemic shows increased positive relationship towards corporate entrepreneurship. Therefore, the effect Covid-19 has on innovation in the healthcare system in Iceland, can be determined as increased positive relationship toward corporate entrepreneurship, resulting as more innovation within the healthcare system.

It is also relevant to note the number of dimensions within the model. Although, ten dimensions could be considered high and give less focus on the research question, the researcher believes all dimension are relevant and also, that not all dimensions are relevant to each company/organization. Therefore, the relevancy of all dimensions is not equal within each company/organization and in some cases, can't be applied to the results and will be further stated in the result chapter. Featured below (Figure 1) is a figure of the conceptual model.

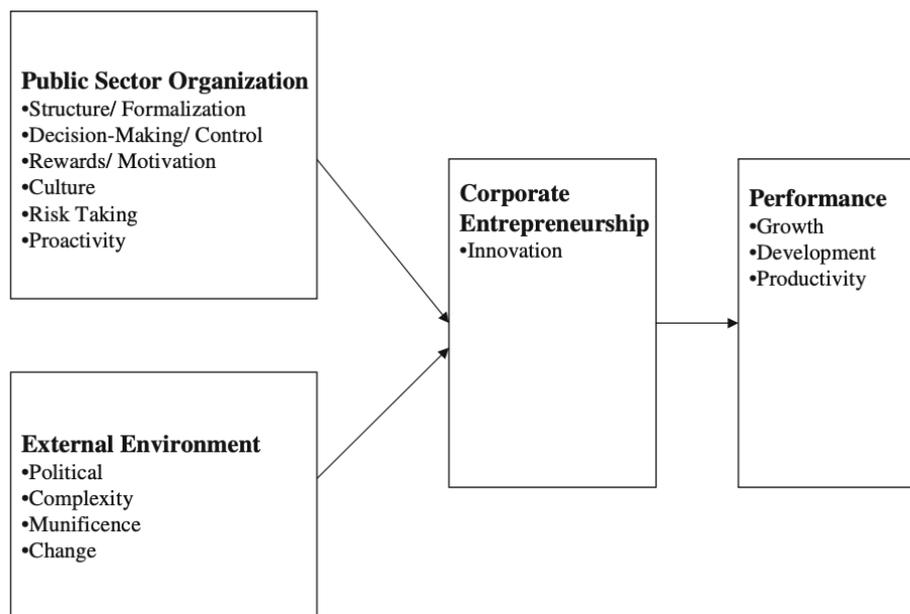


Figure 1 - *Public sector corporate entrepreneurship model (Kearney et al., 2008).*

4.2 Dimensions of the conceptual framework

This chapter provides literature of each dimension of the conceptual model, with focus on public sector organizations.

4.2.1 Public Sector Organization

4.2.1.1 *Structure formalization.*

Different structure formalizations have different impact on corporate entrepreneurship. Departmentalization can occur in all types of firms, regardless of size and sector (Robbins and Judge, 2009) and therefore it can be argued that not all structures have impact on corporate entrepreneurship. In that regard, it can also be argued that some dimensions of the structure formalization do not have influential impact on entrepreneurial behavior in established organizations where others do have an impact.

However, there are two types of organizational structures that have been proven to be highly linked to corporate entrepreneurship. They are as follows; Mechanistic and the organic structure. Miller (1996) points out that mechanistic structure leaves less room for entrepreneurial initiative whereas organic structure encourages and is more effective in pursuing entrepreneurship. Mechanistic firms have the tendency to have more involvement in control and coordination as well as they have higher degree of centralization and higher levels of hierarchy (Nelson and Quick, 2005). Covin and Slevin (1991) pointed out that less hierarchy within organizations can contribute a structural attribute towards entrepreneurship. If the tasks and rules within the organization are formalized, the organization is less likely to pursue alternative solutions that call for entrepreneurial initiative (Morris et al., 2007). A crucial factor in order for the public sector to support and embrace entrepreneurship is a need for flexibility and adaptation within the public sector (Kearney et al., 2008). In the organic structure, the employees get more encouragement in collaborating and to think creatively. Organic structure also fosters some of the highest levels of entrepreneurship (Slevin and Covin, 1990). The decisions made within the organization structure are influenced and empowered by the employees, based on their ability to capture and act on their initiative rather than decisions made at a higher level (Morris et al., 2007). Other typical characteristic of an organic firm is its ability to adapt quickly, especially in fast environment changes (Grant, 1996) and its flexibility and fast decision making, as well as quick adaptation due to low levels of formalization (Nelson and Quick, 2005).

4.2.1.2 Decision making and control

Within the organization, the need for structure and decision-making systems for managing is fundamental. However, the structure needs to have some flexibility, otherwise it can halter or destroy flexibility, intuition, flair and creativity in the organization (Thompson, 1999). As a result, Thomson (1999) also pointed out that managers in non-entrepreneurial organizations can experience themselves constrained and frustrated. Another common sight within the public sector is that structure and formalization, resulting in increased formal control, that can be inhibiting factor towards decision-making (Zahra, 1991). Therefore, by allowing for flexibility in decision-making, can increase innovative initiative and strengthen entrepreneurial orientation within organizations. In general, employee working within the public sector can be more leaning towards formal control and therefore, lacking in flexibly within decision-making. As, pointed out by Kearney et al., (2008) organizations that have more flexibility, less formal control and decentralized decision-making are positively related to increased corporate entrepreneurship.

4.2.1.3 Rewards and motivation

Rewards and motivation hold a key role in the world of entrepreneurship. Many beneficial derivatives can be gained for empowering entrepreneurship within organizations. Organizations that provide high rewards and motivation have been more positively related to the organizational performance and more positively related to corporate entrepreneurship (Kearney et al., 2008)

In entrepreneurial organization, managers are not to penalized for failed risky projects (Jennings and Lumpkin, 1989). Pascal and Athos (1981) point out that innovative firms are more likely to encourage managers to take risk and develop skills that help to push ideas into action. For managers to pursue on taking calculated risk, the environment for failure must have a reasonable tolerance for failure (Hornsby et al., 2002). Hornsby (2002) also points that if good performance is not recognized, employees are less likely to show initiative to take on risky projects.

Thought the concept of organizations motivating and rewarding managers may sound obvious, it is hard to consistently align the concept throughout the organization and therefore, it can be difficult to achieve.

4.2.1.4 Culture

Knight (1986) and Legge and Hindle (1997) give support to a key factor in managing corporate entrepreneurship involves managing a culture that: views all staff as self-perceiving entrepreneurs, applauds failures and successes and provides screening mechanisms to aid and facilitate innovative direction and process (Kearny et al., 2008). Zahra (1993) suggests that organizational culture is a dominating factor in order for organizations to embrace entrepreneurship.

Within large organizations, there is a dilemma in creating atmosphere that supports entrepreneurial activities and at the same time, balancing corporate control (Sathe, 1985). This suggests that for public sector organizations, creating atmosphere supporting entrepreneurial activities can include higher levels of dilemmas, as public organizations have the tendency to be large and have high levels of corporate control. As a result, corporate entrepreneurship is more positively related to organizations with a culture that is flexible and supports entrepreneurship and innovations (Kearny et al., 2008).

4.2.1.5 Risk-taking

Literature on entrepreneurship ranks risk-taking high, as well as being considered as an important element in entrepreneurial orientation, which refers to the “*processes, practices, and decision-making activities that lead to new entry*” (Lumpkin and Dess, 1996, p. 136). Furthermore, risk-taking has been identified as a trait for the entrepreneur, especially towards startups and other high-tech companies that often have higher risk of failing. The reason being is mainly due to fierce competition from fast-moving technologies, where high capital is required in order to gain substantial profit and has high risk of failing (Cabrales et al., 2008).

Risk-taking can be packed into two dimensions: By measuring risk-taking within the firm’s activities in identifying and creating new opportunities and by seizing risk-taking that can be reflected in activities in firm’s development and commercialization in order to address pre-identified opportunities (Guo and Jiang, 2019).

In relation to the public sector, making decisions that require risk are not particularly desirable. However, they cannot be ignored due to the fact that the environment within the public sector is not as predictable and stable as pointed out in the literature. Also, within the

public sector, high level of uncertainty and certain characteristics of high-level jobs, can result in the tendency to avoid taking risks (Bozeman and Kingsley, 1998).

Therefore, it is evident that all types of firms encounter and deal with risk at some level, whether the risk is considered low and therefore using small amount of resources, or high, involving more uncertainty and commitment of large resources (Lumpkin and Dess, 1996).

4.2.1.6 Proactiveness

When it comes on implementation, proactivity plays an important role. Lieberman and Montgomery (1988) from a strategic point of view, suggested that proactivity can be described as an advantageous strategy. From this, it can be suggested as the relationship between advantageous strategy and entrepreneurial opportunities in time of crisis.

Proactivity has been defined in various ways. Lumpkin and Dess (1996) suggest that proactivity is the initiative resulting from pursuing and anticipating new opportunities. In that regard, proactivity also relates to assess the market needs, as well as anticipating the future needs of the market (Lumpkin and Dess, 1996). The relation between proactivity and environment has been noted. Miller and Friesen (1978) defined the connection and argued how proactivity can shape the environment through, for example, new technologies and products. Similarly, Miller (1983) suggests proactiveness is described as the first one to invent and push out new proactive innovations.

The relationship between proactiveness and entrepreneurship has been established as entrepreneur can be defined as someone who can pursue an opportunity, regardless of resources he controls (Bateman and Crant, 1993). This suggest that proactiveness can be found within the public sector, as the resources controlled are not relevant. However, as suggested by Morris and Jones (1999), within the public sector, the proactiveness involves and relies on participating and solving public sector problems prior to occurring.

4.2.2 External Environment

Within Kearney et al. conceptual model of the public sector entrepreneurship, second and not less important factor, is the external environment. In that regard, scholars commonly state in previous literature the fundamental effects from the external environment has on influencing corporate entrepreneurship.

The four elements regarding the external environment are as follows: Political, complexity, munificence and change. As the research question aims to answer the affect the Covid-19 pandemic has had on innovation within the healthcare system, and as the Covid-19 pandemic has proven to influence participation of many different parties and call for external action that the four elements can provide. The healthcare system in Iceland relies on quality control internally and financial and logistical support externally.

4.2.2.1 Political

Nutt (2005) stated that external environment within public sector organizations is highly influenced by political considerations and contains. For public sector organizations, political contains can resolve in more frequent changes in the organization policy and imposition of short-term public administration deadlines (Kearny et al., 2008). Entrepreneurship is fluid in the sense that it adapts to the social structure within the institution which is politically defined. It can be a strong growth driver under propitious conditions but can also be channeled in unproductive and harmful directions (Douhan et al., 2007). Entrepreneurship is therefore connected to the political system. The strong relation to property rights is a connection between entrepreneurship and private ownership, versus public ownership and redistribution. Rent-seeking and unethical capitalism, through the political system, provides greater incentives for benefit than the economy under unfavorable institutional circumstances (Douhan et al., 2007). An introduction to the political economy is required to understand how the political system forms the institutional structure. Douhan et al. (2007) also point out that the distribution of political power is decided in part by economic capital.

Therefore, it is evident that impact of entrepreneurial activity from political influences, affect wealth formation and wealth redistribution. In that regard, Kearney et al. (2008), suggest that corporate entrepreneurship is more positively related to organizational performance, within organizations that can adapt and change as the political environment evolves.

4.2.2.2 Complexity

According to Kearney et al. (2008), environment within the public sector is becoming more complex compared to previous decades. Complexity within the public sector is commonly

described as ‘highly turbulent’ which can lead to more dynamic and hostile environmental conditions. Morris and Jones (1999) suggest that discontinuities in the environment can threaten the implementation of existing actions, but also, create opportunities for innovation.

Davis et al. (1991), Morris and Sexton (1996) and Zahra (1996) suggest when looking at complexity on organizational levels, it is noted that entrepreneurial orientation is positively associated to performance under conditions of turbulence environments.

4.2.2.3 Munificence

Within any organization, the need for adaption and implementation of new technologies are vital for organizational growth. Kirzner (1979) points out that entrepreneurs have a distinctive ability to notice overlooked opportunities on the market. This supports that entrepreneurs are likely to identify opportunities, and as for the public sector, this underlines the importance of public entrepreneurship. In that regard, the relationship between identifying opportunities and munificent environment is noted. Tang (2008) suggests that there is a positive relationship between entrepreneurial munificence and alertness for opportunities.

Dess and Beard (1984) point out that munificent can be characterized as how the environment supports organizational growth. Furthermore, it has been noted that munificent environments can enable the firm’s ability to access external resources, supporting them in solving internal and external problems (Hambrick and Finkelstein, 1987).

4.2.2.4 Change

Changes within the environment are common and happen more frequently as the supply for new technologies increases as well as becoming more advanced. It has been noted that changes within the environment can affect entrepreneurship. Miller (1983) stated that more dynamic and hostile environment will make firm more entrepreneurial. Others have pointed out that changes in competitive environments and utilizations of new technological advancements are believed to impact entrepreneurship (Guth and Gindberg, 1990). In that regard, Kearney et al. (2008) point out that technological opportunities, industry growth and changes in demand can be positively related to increase corporate entrepreneurship.

5. Methodology

In this chapter, the methodology and research method are introduced and reviewed. The chapter also argues why the underlying method of the research was used and its relevance to the research question. Later in the chapter, the participants in the study are introduced and how they were sampled is explained. The chapter concludes with the conduct of the research.

5.1 Qualitative research

According to Creswell (2014), qualitative studies focus on studies where the researcher aims for open and diverse answers from different participants. Qualitative research is mostly used by conducting interviews between the researcher and the participant, where the topic is decided beforehand, but the dialogue of the interview can vary and the researcher has no pre-determined preferences regarding the content (Creswell, 2014). It is also relevant to consider that qualitative research includes social interaction between individuals such as feeling, passion and behavior where otherwise don't account to quantitative research (Creswell, 2014). Other factors that characterize quantitative research include that literature plays a minor role, mainly due to the fact that it only needs to justify the problem or research question. This factor is considered highly relevant to the research question as literature specific to Covid-19 is lacking. Another factor is that the data is collected from a small number of participants in order to gain and obtain their views (Creswell, 2014). In order to answer the stated research question, it is a key factor to gain the participants' view and their experience of facing the Covid-19 pandemic.

When conducting qualitative research, there are certain characteristics that require attention and the researcher should be aware of. Firstly, it is highly important to acknowledge the fact that the interviewee may not give the desired answers that fit the objective of the research. This dilemma is a byproduct of using open-ended questions. Therefore, the researcher should not influence the participants with social interactions and to avoid these problems, the researched must stay calm and encourage open conversations (Creswell, 2014).

5.1.1 Research design

In order to answer the stated research question of the thesis, the research is conducted by using qualitative research. The reason being, is mainly since qualitative research allows for a deeper

understanding compared to quantitative research in that regard. Also, as the research is focused more on the individual's experience and focuses on a response to a unique pandemic, open-ended questions and dialogues are key to capture the innovation effects of the Covid-19 pandemic. By using open-ended question, the participant can fully express his or her experience and emotions unconstructed and that allows for deeper understanding. All interviews were conducted by using one-on-one format.

Creswell (2014) points out that qualitative research fits best when little information is known on the variables that needs to be explored and therefore, explore the problem and develop a detailed information on the phenomenon. This is the key for the purposed method of the research and supports the purposed hypothesis of the research question, which is based on highly recent events in the world as a whole. Therefore, since the research topic is very new and not many other similar researches in Iceland exist, the research is particularly fit for qualitative research. Also, the focus of the research is to provide information to the innovative effects of the Covid-19 pandemic on the healthcare system and little information and literature on is topic is known.

5.1.2 Sampling

Devers and Frankel (2000) point out that purposive sampling is often used in qualitative research with good results. Purposive sampling is a strategic sampling method, primality used to enhance the understanding of selected individuals in order to develop theories (Devers and Frankel, 2000). Therefore, by using purposive sampling the goal is to seek individuals who are able to provide the greatest insight into the purposed research question. Purposive sampling has been proven successful in deviant cases (Miles and Huberman, 1994) and therefore giving support for the sampling method for this thesis.

Individuals, sampled for this research consists of three categories; Managers/CEO in companies within the private sector, but fundamentally working directly towards the healthcare system, managers/CEO of hospitals or a healthcare institution and finally, ministries and government. This broad spectrum of stakeholders within the healthcare system in Iceland, could be considered to scattered or not give precise focus. However, the researchers aim is to point out that in order to conduct the research, the need for different stakeholders is important as the healthcare is built on many stakeholders.

5.2 Participants

From the sampling method described earlier in the chapter, the criteria for participants was on managers of companies, working within the healthcare sector, in the private and public sector as well as governments. For the companies within the private sector, the aim was to pursue companies either selling pharmaceutical services or technological solutions towards the healthcare system. Companies within the public sector, for the purpose of this research, are hospitals and health clinics in Iceland. Government institutes include the ministries related to the healthcare system.

5.2.1 List of companies and interviewees

5.2.1.1 LSH

Landspítali or better known by the acronym, LSH, is the National University Hospital of Iceland. LSH is the largest workplace in Iceland with around 6000 employees currently staffed. LSH is funded by the Ministry of Welfare and supervised by the Directorate of Health. LSH provides both specialized and general care, with the capacity of approximately 700 beds. Their aim is to provide health service of the highest quality well as empathize on compassion, progress, safety and professionalism and therefore, being competitive on a worldwide scale. LSH focuses on three main roles; patient service, teaching and training of clinical staff and researches in the field of science (LSH, n.d). Therefore, the contribution from LSH towards the healthcare system is vital and considered very high.

Páll Matthíasson, the CEO of LSH, was interviewed for the research. As a member of top management of the largest workplace in Iceland, Páll has a good overview of the impact the Covid-19 pandemic has had on LSH as well as their response and experience during the pandemic. Therefore, making him an ideal candidate to interview.

5.2.1.2 Heilsugæslan

Heilsugæslan is a cluster of medical clinics, operated by the government. Values within Heilsugæslan are respect, cooperation, professionalism. With those values in mind their main role is to provide the residents of the capital area with accessible, continuous and comprehensive healthcare services. The service is based on professional expertise and

extensive interdisciplinary collaboration. Within Heilsugæslan, there are 15 health clinics in all areas of Reykjavík, and they all aim to provide uniform service across (Heilsugæsla höfuðborgarsvæðisins (HH), n.d).

Óskar Reykdalsson, the CEO of Heilsugæslan, was interviewed for the research. As a CEO, Óskar is a member of the top-level management and therefore, has a good overview of Heilsugæslan's response and the conclusions learned from the Covid-19 pandemic. Heilsugæslan worked on many cases as a response to the Covid-19 pandemic and faced many challenges that can provide information on changes in innovation within the healthcare system.

5.2.1.3 The Ministry of Health

Established in January 2019 as a separate unit, the Ministry of Health is a derivative from the Ministry of Welfare. The ministry's responsibilities are administration and policy making of health in Iceland, build on regulation, laws and other relevant directives. The Ministry's main tasks and issues include: Health insurances, patient rights, pharmaceutical affairs, promotion of information technology in the health services in Iceland, public health and operation of hospitals, health centers and other providers of health services (The Ministry of Health, n.d).

Sigríður Jónsdóttir from the Ministry of Health was interviewed for the research. Sigríður is a specialist in strategy and policies within the ministry. Sigríður was in charge of various projects during the Covid-19 pandemic and has a good insight towards the responses and experiences from the government during the Covid-19 pandemic.

5.2.1.4 Vistor

Vistor's history dates to the year 1956, when seven pharmacists combined to introduce reforms in the pharmaceutical sales for the Icelandic nation and established the purchasing association of pharmacists, Pharmaco hf. Vistor's main activities include providing sales force and marketing activities, regulatory services as well as clinical operations services. Their values are reliability, candor and progress. Vistor plays a vital role towards the healthcare system as they have the largest market share for pharmaceuticals in Iceland as well as providing other services to the healthcare system, including regulatory and educational (Vistor, n.d).

Gunnur Helgadóttir is the general manager of Vistor and was interviewed for the research. Vistor is one of two private owned companies included in the research. Their role and obligations toward the healthcare system, fit well for the purposed question of the research.

Also, as Vistor's operation is all towards the healthcare system, thus, their insight as well as experience and responses from the Covid-19 pandemic are relevant for the research.

5.2.1.5 Origo

"The Future is Origo" is Origo's slogan and looking at the company's values, it fits quite well for a technological company. Origo is an IT service company and their value are helping other companies enhance technological advancements and therefore, ultimately improve their results, success and security. Recently, Origo received IBM's world-famous Beacon awards for outstanding software defined storage solution with their development of a data solution named Aurora DataCloud (Origo, n.d.). Within Origo is a department, specialized in software solutions for the healthcare industry. Origo's department of healthcare solutions has built solutions, used by thousands of medical personnel, working in hospitals, nursing homes and pharmacies amongst others. Their current solutions are: Electronic medical records (EMR) and electronic health records (EHR), secure communications net used to transfer medical records within the healthcare industry, prescription management for pharmacies, software for managing statistics and reports from Saga, a medical record system that maintains an electronic medical record in Iceland and secure website where users can access their own personal medical data (Origo, n.d.).

Guðjón Vilhjálmsson is Origo's manager for healthcare solutions and was interviewed for the research. As mentioned above, Origo is the largest provider of healthcare solutions for the healthcare system in Iceland. Therefore, it gives an important angle towards the research and shares the effect the Covid-19 pandemic has affected their work and their response and how their experience has developed that outcome.

5.3 Conduction of the research

This subchapter summaries the relevant factors on how the research was conducted. It involves; e-mail correspondence, the interviews procedures, the interview guide and sampling method.

5.3.1 E-mail correspondence

First, an e-mail (see appendix B) was sent to the participants in order to gain their interest to participate in the research. All contact information from the participants was accessed from

their company's website. The e-mail included a short introduction of the research and their relevance for participating was highlighted as the results can benefit the healthcare system in Iceland. The e-mail also informed the participants, that, if needed, their company's identity could be anonymous if preferred. After getting a confirmation e-mail from the participants, a date and other relevant logistics for the meeting were confirmed and an interview booked.

5.3.2 The interviews

All the interviews were conducted at each company location. The reason being was to increase the convenience for interviewees as well creating familiar environment for them for the interview settings. When possible, stairs were used instead for elevators as walking stairs gives better blood circulation and clears the mind, according to the researcher. Also, as customary in the times of the Covid-19 pandemic, there were no handshakes, as well as two-meter distance was kept between both parties. Before all interviews, a small chat was conducted in order to lighten up the mood and building a comfortable atmosphere as well as a small introduction and space to ask further questions if needed prior to the interview. When both parties were settled in, the interviews begun.

In beginning of all interviews, the researcher asked permission to record the interview in order to further analyze it afterwards. The interviews were recorded on an iPhone 11 and typed up in Microsoft Word 2018. After receiving permission to record, the interview started. The interview followed an interview guide (see appendix A) and varied from 27 to 45 minutes. After each interview, the researcher made sure to stop the recording and confirm to the interviewees the interview was concluded. In some interviews, a further conversation developed both related to the research question and other ideas were also discussed. Those findings and ideas were not interpreted to the results.

5.3.3 Interview guide

The interview guide was designed as a semi-structure guide with open ended questions. The questions from the interview guide were in total 43. However not all questions were asked as stated in the interview guide, as the topics intertwine with each other and in some cases the interviewee answered the question related to the dimension, prior to being asked. Also, having more questions rather than less, was important for the researcher, as he lacked experience of conducting interviews. Therefore, having more questions gave the researcher support and

confident, and some of them worked as follow-up questions. The interview guide was built on the ten dimensions of the conceptual model, and carefully categorized into each dimension for easier analysis.

5.3.4 Coding process

The coding process was conducted after gathering all empirical data was completed and written up in Microsoft Word. As the interview guide was semi-structured and divided into dimensions of the model, the coding process was a deductive coding, where the researcher had some predefined codes and compared it to the empirical data.

Each interview was written up and given a preliminary analysis after first read over in order to source out possible themes. After the preliminary analyses, the interviews were coded thematically and compared the dimensions of the model. In most cases each theme was assigned to dimension, but in some cases, the themes could stretch on to other dimension, as some are very similar.

In addition to the themes corresponding to the conceptual model of the research, a new theme was noted and therefore interoperated further in the result chapter. The additional theme will not be interpreted into the conceptual model, but rather, it will be reported separate in the result chapter. The reason being is to give a separation between both results and therefore, more possible foundation for further research for innovation within the healthcare system.

6. Results

In this chapter, the summary of results is presented. The result chapter is divided into the three main themes of the research; public sector organization, external environment and innovation as a result of increased communication.

6.1 Public Sector Organization

6.1.1 Structure/ Formalization

Majority of participating companies have similarity to mechanistic structure and therefore, they have a high hierarchy. It is noted that Origo, and perhaps Vistor, have less hierarchy and show similarity to organic structures. In regard to the effects of the Covid-19 pandemic on this dimension, it is evident that the companies working in the public sector share similar experience of the impact of the Covid-19 pandemic. Therefore, showing more positive relationship towards organics structures and less bureaucracy as result of the Covid-19 pandemic compared to the companies in the private sector, where the Covid-19 pandemic had less impact on structure and formalization.

Heilsugæslan

The structure within Heilsugæslan is more related to mechanistic structure rather than organic. Reason being is, among other things, rigidity due to regulations and quality regulations due to its placement in the healthcare environment. However, Óskar mentions that within their organization, they rank innovation high and on daily basis they work on improving their procedures, simplifying them and improve their work schedule. As Óskar says: *“We have rigidity within our structure, but we still want to constantly pursue improvement actions and we want to criticize ourselves and see if there is anything we can change.”*

Óskar points out some improvement's ideas, such as customer surveys, both externally in relation to improve their service to customers and internally to gain feedback from their staff. Óskar mentions that Heilsugæslan has internal workshops that have the goal to maintain what has been done well and analyze what can be done better. By doing so, Heilsugæslan can improve accessibility or time availability and not just focus on increase the number of

employees. In that regards Óskar points out: *“If you are stuck in some work procedures that does not suit, we can use these methods.”*

When asked about how the Covid-19 pandemic and its impact in this regard, Óskar mentions how the communication between the institutions increased, resolving in better overview and more discussion about structure and big decisions. In this regard, Óskar mentions that all the meetings were online, which eliminated the time used for meetings and logistics that are related to meetings in person, especially when many people are involved. This also helped aligning with opening hours and even out workload, not only within Heilugæslan, but also with private owned clinics. As Óskar says:

As soon as Covid-19 showed up, it became clear that all institutions working on this project had to speak together, and at a certain time period, we had daily meetings. And all this was done via video conferencing, so we did not have to meet in person.

LSH

Similar to Heilugæslan, LSH has more mechanistic structure rather than organic. Páll points out that LSH is a big workplace with around 6000 employees, ranking LSH as the largest workplace in Iceland. In comparison to other public organizations, Páll points out that the organizational chart for LSH is flat with few top-level managers and a minimum pyramid form. Also, Páll mentions that this flat organizational chart gives short distance for the information to travel from ground level to top management. Namely, only three emails, as he refers. Like with Heilugæslan, Páll points out that the formalization is high and mainly due to its relation regarding the size and the strict quality assurance and regulations from working in the healthcare sector. When asked about how LSH places innovation within the structure, Páll says it is quite high. Páll points out that LSH roles involve science and providing service based on evidence-based sources. *“Also, LSH is a teaching hospital and one of the largest institutes when it comes to teaching science, with around 2000 students per year,”* Páll adds.

When asked about if the Covid-19 pandemic had had any influence on how LSH views innovation Páll agreed to a certain point, while also pointing out that the Covid-19 pandemic resulted in them showing their strength on being innovative. However, when asked about communication between departments, Páll says it was easier to get people on board and row in the same directions, as expected in a crisis. People were more willing to work together in order to defeat Covid-19. Whether it was related to stock overview, putting up new outpatient

departments or organizing and scaling up reaction from the departments, the cooperation was excellent. In regard to how the Covid-19 affected flexibility and adaptability, Páll said: *“If it is as easy to get everybody to stay focused and work together under normal circumstances as it is in times of crisis, that management consulting would have nothing to do.”*

Also, Páll points out that their strength to deal with flexibility and adaptability, was sighted during the Covid-19 crisis.

Heilbrigðisráðuneytið - Ministry of Health

The Ministry of Health has more mechanistic structure rather than organic. The structure is complex, but as stated by Sigríður Jónsdóttir, the structure is reflected by their internal and external environment and demands towards the ministry, from the government. When asked about the structure, Sigríður says that the ministry was currently working on implementing new structure where they are focusing on “working less in silos”. In continue of the current plans to improve the structure, Sigríður adds that the Covid-19 pandemic gave them information on how they can use long-distance working and have people working from home and apply more communication and cooperation. When asked about flexibility and adaptability and if the Covid-19 pandemic had had any impact on that, Sigríður said: *„Yes, flexibility with the employees, and also its teared town walls resolving in more cooperation and cooperation mindset. It was kind of like: We should just solve this right now!”*

In addition to that, Sigríður said that it is crucial for the ministry to hold on to this advantage and keep this in their day-to-day tasks. Therefore, is noted that the Covid-19 pandemic did have a positive impact on flexibility and adaptability.

Vistor

Within the company Vistor, there is a certain complexity regarding confidentiality as the company is holding marketing authorization for many different pharmaceutical products, who are internally in competition. In that regard, Gunnur Helgadóttir says that Vistor is more formal and working in silos. However, when it comes to common projects, Vistor is less formal or as Gunnur said: *“When it comes to project that are common throughout the company, we work*

across groups, share different resources and I think these types of project resolve in better results.“

When asked about flexibility and adaptability, Gunnur points out that Vistor is quite strong on that level. Also, Gunnur points out that she is happy with how often Vistor can change its organizational chart and how open the staff is to accept and participate in changes. Gunnur adds to that: *“You really don’t change anything inside the company unless you have the people with you.”* From this, it is evident that Vistor shares more element related to organic structure but at the same time, some elements of mechanistic.

When asked about how Vistor places innovation within their structure, Gunnur says it is generally not high. In regard if the Covid-19 pandemic had had any impact on how Vistor sees innovation, Gunnur pointed out that technical and online communication, got the company to further investigate its future role and adapt further towards technical solutions and how they can use them in the future. But in other ways, the Covid-19 pandemic did not affect Vistor's structure and formalization.

Origo

When asked about the structure within Origo, the company aims to keep the structure fluid so knowledge can easily flow through the company and be useful in a variance of projects across the company. Guðjón added that the company, as it is today, is relatively new, as it was merged from many different companies. This flow of information and resources has been highly useful for Origo and in that regard, Guðjón refers their newest project in screening the border for Covid-19. When it comes to innovation, Origo places its importance high and state it is a core element in their business. In relation towards flexibility and adaptability, Origo is, as pointed out by Guðjón, financially strong and possesses profound knowledge that supports them to take on new projects.

For Origo, the Covid-19 pandemic had somewhat different impact for other companies in the healthcare sector, as for some departments, workload decreased and for others it increased. Guðjón said that their response to the Covid-19 pandemic was to allocate workload and moving employees and share between departments. Therefore, responding to a greater need for flexibility and adaptation within the company. Origo shows minimal hierarchy and their structure is closer to organic structure rather than mechanistic, according to Guðjón.

6.1.2 Decision-Making/Control

The companies from the public sector show similarity in their responses towards decision-making and control as well as gaining more leverage and opportunities to make decisions that are not necessarily within their organizational framework. From the impact of the Covid-19 pandemic, the responses from the public sector companies show more positive effects in this dimension and overall, show that the Covid-19 has had more effect in decision-making compared to the other two participating companies in the private sector.

Heilsugæslan

Due to the amount of different locations and types of health clinics within Heilsugæslan, it is important for each operation to be able to take decisions and each branch has quite the independence to make decisions. Óskar mentions that all the branches meet up and discuss service and learn from each other. As a result, the service and protocols are relatively the same within Heilsugæslan. Óskar also points out that due to regulations, the need to have a certain obligation as how decisions are made towards the operations of each branch, but as long as safety requirements are met towards taking care of patients, decisions about how many employees are working at each time can vary.

When asked about how and if the Covid-19 crisis affected the decision making, Óskar agreed that Covid-19 had some influence. Óskar pointed out that decision was made rather quickly during the Covid-19 pandemic. In that regard he named examples of decisions taken to determine who would be responsible for taking samples to test for Covid-19 and whether Heilsugæslan should implement video calls into their services. Óskar also pointed out how decisions to forward problems to other specialists or between clinics became more flexible and fluid, whereas before the Covid-19 pandemic it was less clear.

LSH

Decision within LSH rely on their nature, if it is a decision with small impact then the employees have a certain amount of flexibility, according to Páll. Larger decisions need approval of the top level management and also if decisions have to be made that are not within the budget or call for changes from the current budget. As Páll describes the route: "*In fact, as*

we have this, all changes from the budget must be made to the relevant manager, taken by the director who discusses it with the executive who brings it into the executive board that decides it.”

Páll also added that in the case of urgent decisions, then Páll himself would approve. As for the impact of the Covid-19 pandemic, Páll agreed the decisions were less inhibited by formal control. Early in the process LSH defined the cost regarding the Covid-19 pandemic, thus making the decision process faster. When the Covid-19 pandemic called for the highest awareness, Páll mentioned that some decisions were made in order to response, as he said:

Then we just went shopping and the usual transport by sea was not working so we were buying a lot directly from China [via air freight], e.g. markets that we did not know and then the result was to actually entrust us to do it again.

Another approach for making improving decisions, was to delegate staff from different positions within LSH in order to improve and speed up the process. As Páll says:

So I set up the Director of Service who is basically a neonatologist and accustomed to making decisions right away and has considerable insight into the equipment needed so he was SAR, [Search and Rescue] he was the one who finally made the decision on purchasing and inventory... but I just decided that and so it will be... and it was absolutely necessary.

Therefore, it is evident that decisional making gained more leverage and emphasis as a result of the Covid-19 pandemic, both with increased speed and new ways of making decisions, by delegating people and therefore, making the whole decision process more efficient.

Heilbrigðisráðuneytið - Ministry of Health

Decision within the Ministry of Health are mostly made in direct relation to the policy within the ministry. As a result, decisions that require fundamental change need top level approval and confirmation from the Minister of Health. Most decisions are therefore made in connection with the ministries policy and therefore, employees have there some flexibility and independence to take decisions, or as Sigríður says: *“It just kind of matters what it is. If it's a policy decision, then it's just taken from the policy that is published here it is health policy.”*

When asked if the Covid-19 had any impact on decision making, Sigríður agreed to that and said:

It was just all set aside, and this was just the focus. Everything else was set aside and Covid-19 issues were just given priority...we just kept it. If it wasn't Covid-19 then it just had to wait ... that's why I think it wasn't hard ... it was just a problem and we were all there... global problems and we just all need to do our best... it was just like that...

As for effect the Covid-19 pandemic had with the decision-making process within the Ministry of Health it is also noted that the ministry was able to focus on the urgent problems and take actions fast and give the employees a chance to make decisions that could challenge the structures and systems, according to Sigríður.

Vistor

Vistor implements within their policy to give employees flexibility and encourages managers to be independent in their decision making and as Gunnur adds: “*And there is no micro-management in every single decision.*” However, Gunnur said that if managers have a decision that requires extraordinary budget, they need an approval – otherwise they have considerable freedom. In addition, Gunnur said that during the Covid-19 pandemic, the decision making, and control did not halt Vistor and overall, the decision-making process inside is fast-paced and easy to adapt to, so for Vistor, it remained the same.

Origo

Origo is focused on giving employees flexibility when it comes to decision making, especially when they are working on innovative projects, as the employees working on the projects usually have much weight towards the success of the project, according to Guðjón. Guðjón points out that decisions that require high resources need to be approved by the top management. When it comes to flexibility, Guðjón points out that Origo, in some cases, gets a broad group of people involved to discuss the decision, thus getting pros and cons in feedback, and as a result, the decision is more rewarding for the employee or as Guðjón says: “*It doesn't*

have to be someone at the top who says 'yes' or 'no,' but more when the group looks at it together, the answer is much better."

Similar to Vistor, during the Covid-19 pandemic, the decision-making remained the same and as stated by Guðjón, the protocols and decisions remained the same as Origo's decision process is less formalized and centralized compared to the public sector.

6.1.3 Rewards/Motivation

Alternative, the motivation and rewards as a result of the Covid-19 pandemic is best reflected in increased communication and the pursue of new collaborative ventures. From the interviews it is noted that the Covid-19 pandemic helps employees to realize that it's okay to fail. Therefore, the Covid-19 pandemic worked more as a motive to pursue new ideas and creating rewards in form of recognition and motivation.

Heilsugæslan

Heilsugæslan has a certain framework as far as providing good and safe services. In all cases, Heilsugæslan follows the latest instructions which are clear and coordinated throughout all the branches, according to Óskar. In that regard, Óskar points out that in some cases there is only one right way and that's the one that is used, and if there were to be changes or improvements it would be changed for all of the Western world. When it comes to motivating employees, Heilsugæslan is focused on encouraging people to think in solutions and try to solve the problems, not necessarily the traditional way. However, to that Óskar also adds that it is not feasible on all platforms - for example related to medicines.

The impact the Covid-19 pandemic has had on motivation within Heilsugæslan is mostly reflected in collaboration within their organization. When needed the most, the collaboration regarding sampling for Covid-19, allowed people to be more flexible to work across clinics. This collaboration, as Óskar pointed out, yielded in more optimization.

LSH

Similar to Heilsugæslan, LSH has a certain framework as far as providing good and safe services. Páll mentions as a result from the Covid-19 pandemic, a certain mindset or learning attitude was detectable. Páll also points out that due to fact how little is known about Covid-19, there was a certain humble attitude and as soon as people accepted the truth, that in fact they did not know anything about this disease, they could take that into account and that meant to change the decisions. In addition, the this Páll says:

[...] and behind that, of course, are these messages to the learning mind that it's okay to fail and this is something we are always trying to tell them, but maybe in a crisis, you realize it even better.

Therefore, when there is crisis and a lot of uncertainty, there is more room to make mistakes and thus it can increase the chances of innovation according the interviewee.

Heilbrigðisráðuneytið - Ministry of Health

The Ministry of Health is currently working on getting caught up with modernity according to Sigríður. Sigríður points out that ideas that support the day-to-day tasks are well received and a new idea is never turned down. In that regards, Sigríður points out that if the idea is with high risk, and failure that could be catastrophic, it will not be supported. In addition, Sigríður mentions that newly implemented idea of creating teams that carry on ideas from the employees to motivate them.

When asked about if the Covid-19 pandemic affected how the ministry rewards and motivated employees, Sigríður pointed out that it probably did and mentioned that in general people tried more things during the Covid-19 pandemic and gained therefore more motivation to try new things. Therefore, motivation for the ministry of health, as a result of the Covid-19 pandemic, is mostly in the form of getting the opportunity to pursue new ideas and do things differently.

Vistor

Vistor is keen on employees taking on projects and trying new things. In that regard, Gunnur said: “...and I say very often that you are allowed to make mistakes... because if you do not

make mistakes then you are also not trying anything new...” Gunnur also adds that within Vistor there is a philosophy in the company and points out that this is crucial when working in the pharmaceutical industry, with environment controlled by regulations and high-quality standards. In addition, Gunnur adds:

Then it's really about trying to think a little outside the box... not just in processes... but how we can do things differently... I'm trying to push it, but then on the other end it has to be fulfilled by all quality requirements.

As for the Covid-19 pandemic, it's noted that rewards and motivation prior to the Covid-19 pandemic was high within Vistor and therefore, a little change occurred internally according to Gunnur.

Origo

Origo is supportive when it comes to innovative ideas from the employees and encourages calculated risk. Guðjón talks about the risk that follows when launching a new idea to the market as it is both consuming time and requires resources from the company and is not guaranteed to return profit.

In regard to the Covid-19 pandemic, Guðjón brings an example of projects from the hospitals that needed to be solved urgently. Ideas such as video calls via computers and new solutions for smartphones to use in residential care. In that regard, Origo was trusted and motivated to find the right technical solution and as Guðjón said: *„Maybe it's just more confidence in us... 'here's the problem... can you solve it?' Because the others just didn't have the time to think about some technical work with us.”*

Therefore, for Origo, the motivation as a result of the Covid-19 pandemic, is mostly related to gaining more confidence and trust to pursue new ideas for the healthcare system as well as getting more responsibility towards implementing and pursuing their vision. In this regard, it is evident that motivation from the government, plays a key role for Origo to be more efficient.

6.1.4 Culture

Heilsugæslan

Culture within Heilsugæslan is encouraging for the employees to embrace innovation and thinking in solutions, according to Óskar. However, it is not an easy task to coordinate between branches and there can be fundamental differences between them and how the culture supports corporate entrepreneurship. In that regard, the location can also make a difference and also personal preference from managers in each branch. But overall, each branch is responsible to determine how they manage and embrace the culture towards innovation. During the Covid-19 pandemic, Óskar mentions how communication internally strengthened cooperation and unity within Heilsugæslan.

LSH

Overall, LSH is open and positive towards innovation. Within LSH, there are many different departments and some of them working with universities in research and development where other work on improving services. With R&D, LSH is in collaboration with Reykjavík University on developing 3D scanners to make complex structures for doctors to practice for surgeries. LSH has also invested in technological services to improve software and new solutions in the healthcare sector.

Heilbrigðisráðuneytið - Ministry of Health

Within the Ministry of Health, Sigríður says that a good idea is never knocked down and that they encourage employees to come up with new ideas. Another relevant factor within the ministry is that they imply that having a top-level manager that believes in innovation, is the most relevant factor for innovation within the ministry. Sigríður adds that one of the reasons for the ministry's success in recent innovative projects are due to the manager's perspective towards innovation: *"She focuses on innovation and she speaks for innovation and is totally walking the talk and it matters a lot and that is why I think we can achieve something now."* In that regard, Sigríður also mentioned that some projects had failed previously, simply due to the lack of action and response from the managers.

When the Covid-19 pandemic erupted Sigríður said that what they learned was that many projects don't have to be as complicated as they are. To that, Sigríður adds: *“Yes, I think so. I just think what we have learned is that this is not as much of an issue as you think.”* The structure within the ministry calls for projects to go a certain route. Looking back, she admits that working on more than one idea could be beneficial and create better flow for innovative ideas and in that support, Sigríður is referring to increased flow of ideas during the Covid-19 pandemic.

Vistor

Vistor is keen on embracing innovative culture, but as Gunnur points out, due to regulations and quality assurance, it can halt innovation within Vistor. During the time of the Covid-19 pandemic, Gunnur mentioned that, although no discount was given toward regulation and quality assurance, more communication and cooperation within Vistor, helped to speed up the process.

Origo

Origo is considerably active when it comes to supporting their employees to embrace and come up with new ideas. Guðjón mentions an event within Origo, called “Superhero Days”: *“We have, for example, have regular here events, which we call “Superhero Days”, where employees are just encouraged to come up with ideas.”* In addition, Guðjón points out that some ideas born from this event, developed into prototypes and some even into projects and became a product within the company. Origo therefore, is considered to embrace an open culture for innovation.

In relation to the Covid-19 pandemic, Guðjón did not see a stronger culture, as he mentioned that culture within Origo is considered as a long-term strategy to that extent that Origo looks at improving innovative culture as highly important and rewarding for the company in the long term. However, there was noticeable difference in more opportunities to engage in innovative projects and the employees gained more leverage to contribute their ideas.

6.1.5 Risk-taking

From the interviews, it's noticeable that cooperation and more flexibility in the environment gives an opportunity to be more risk-taking and it shows that the public sector environment isn't always stable and predictable. The dimension of risk-taking, gives an excellent support and demonstrates the importance of risk-taking. This is especially true for the companies in the public sector, as Vistor and Origo showed more support for risk-taking according to the interviews, prior to the Covid-19 pandemic.

Heilsugæslan

Heilsugæslan, in general, is not taking on risky projects, but rather focuses on maintain ongoing projects and improvement. When asked about if the Covid-19 pandemic had had any influences on how Heilsugæslan encourages risk-taking, Óskar said: *“Yes, and I think we completely revolutionized everyone, and we did this just many times this season, so I think people have completely learned it and are quite willing to do things and take risks...”*

These findings suggest that risk-taking within the Heilsugæslan was highly affected by the Covid-19 pandemic which lead to more encouragement to take risks. This is supported in other dimensions as Heilsugæslan took on some risky projects during the Covid-19 pandemic. Additionally, it supports the positive relationship between risk-taking and performance. In addition, Óskar said that soon as the Covid-19 pandemic cools down, the staff is more likely to return to current setup, but Heilsugæslan is determined to use this lesson in order to improve risk-taking, or as Óskar said:

[...] and when it comes to fall and we go back to it, I think people are quite ready to discuss this and we have had a policy meeting here, a management meeting where we are going over the lessons and how we can utilize it in our systems.

Comparing risk-taking within employees before and during the Covid-19 pandemic, it is evident that the Covid-19 pandemic has influenced and encouraged risk-taking and the willingness to further embrace it.

LSH

LSH evaluates risks accordingly to the magnitude of the risks. In regard to the Covid-19 pandemic, Páll mentioned example of successful and risky project that would otherwise not be feasible. Páll describes how LSH took on the project of sourcing stock from China by sending four airplanes and fill them up with pharmaceutical products in cooperation with the Icelandic embassy in Beijing and the Chinese embassy here in Iceland. This could not be considered a normal procurement procedure within LSH, but supports that LSH encountered many risk-taking activities during the Covid-19 pandemic.

Heilbrigðisráðuneytið - Ministry of Health

The Ministry of Health is somewhat conservative then it comes to risky projects. Sigríður points out that within their environment it is not ideal and says: *“It is not possible to have it in this environment, something ambiguous... unless it just came up like Covid.”* Regarding risky projects and risk-taking Sigríður adds: *„We have always defined what we get out of this, what benefits we could have, but we try to minimize this.”* It is important to add in this regard, the Ministry of Health has an approved policy, in which managers use to make decisions.

When asked if the ministry saw any changes in regard to risk-taking and provoking the policy within the ministry during the Covid-19 period, Sigríður said:

Yes. You just need to have a really good relationship with your colleagues and your boss and those who are involved in this project such as e.g. human resources manager, so this somehow just. Yes, it was just kind of fun to experience what in fact there is a positive willingness to cooperate.

From this it noticeable that cooperation and more flexibility in the environment gives an opening to be more risk-taking and it shows that the public sector environment isn't always stable and predictable.

Vistor

When taking risks, Vistor analyzes them beforehand and goes over the best- and worst-case scenario. It is also relevant for them to know where the risks might lead them in order to have some clue where it is heading, according to Gunnur. As Gunnur puts it:

What the problem was, so I go into it with open eyes and often I put timelines, what am I going to give this scene long before I say no this will not succeed. Then I just think I can say. Okay, we tried this, and we learned from the experience but maybe we should not continue on this.

Gunnur also points out that perhaps, some companies make the mistake of holding on to a project for too long. When asked if the Covid-19 pandemic had had any impact on risk-taking, Gunnur mentions that for Vistor it is clear that they need to focus on implementing more electronic communication and Vistor is already about to begin some risky projects that derived from the Covid-19 pandemic. As Gunnur said: „So, there are actually three projects that are directly related [to risk-taking], that had to be started but in fact, Covid-19 kicks them off.”

Therefore, for Vistor, it is noted that risk-taking was increased by the Covid-19 pandemic and contributed some knowledge for future risk-taking projects.

Origo

Origo, when taking on risky projects, always evaluates the risk and uses a system to determine the risk. By doing so, Origo can map out what the risk is and possibly how the risk can be reduced, if possible. As Guðjón says: “And thus take more calculated risk and in large-scale projects, a security council is involved in assessing this risk.”

In relation to Covid-19, Guðjón refers to newly developed project concerning border screening for the Covid-19 pandemic and how their infrastructure regarding risk-taking helped in urgent times, or as Guðjón puts it:

Because it is so fixed in my mind with the border screening project because it was done so fast that then there was no time to do the basic work as well as one would want to do in such projects. And then there is only one email to the CEO: ‘Is it okay for us to run on this?’ Yes or no. And then just, the answer comes just an hour later in an email. This is an example of how we have the structure and we want to follow

it and we do not want to run with something which could end up in a ditch and without knowing what we are going to do, but it is still possible when big opportunities come to work fast and get top management approval quickly.

This supports that Origo has a good foundation to be risk-taking, and also that the infrastructure to calculate risk is good within the company. As for Origo's response to solve a risky project for the healthcare system, it is evident that the Covid-19 pandemic, in some sense pushed Origo towards taking higher risk in a project that requires fast response.

6.1.6 Proactivity

Proactivity is an important dimension due to the fact that all participants mentioned how the Covid-19 pandemic, helped them realize the benefits of solving problems proactively. In this dimension, there is a unanimous acknowledgement from all the participating companies that they can advance with more proactive projects.

Heilsugæslan

When asked about how Heilsugæslan seeks to pursue opportunities proactively, Óskar said they could do a better job. The main focus for Heilsugæslan is mostly in relation with innovation in technology and implementation of technological solutions. Óskar points out that this part of the operations of implementing technological solutions is handled by a third-party company and also in the office of the Medical Director of Health. Óskar also points out that compared to other countries, Iceland is more effective in proactive solutions. However, Óskar mentioned that due to the market size, Iceland can be at risk when it comes to new technologies as the cost is very similar for nation of 370.000 people as it is for 40.000.000 people.

Óskar said that the Covid-19 pandemic did have an impact on how they seek proactive projects. Heilsugæslan's biggest proactive project during the Covid-19 pandemic was related to limiting visits to Heilsugæslan by using telecommunication solutions and video calls. As Óskar said about the projects:

For example, just like an example project. Then we could send an electronic certificate to "Heilsuvera" and we make an employer certificate and send it in electronically... You do not need to get the certificate here at Heilsugæslan, you can just print it if you want or forward it...

In this regard, Óskar pointed out that one of the biggest day-to-day tasks at Heilsugæslan was to reduce the time patients waited to see a doctor and by limiting the amount of people arriving in person if the problem could be solved without their arrival, so others that needed to show up, had less waiting time. From proactive perspective from the Covid-19 pandemic, it is noted that Heilsugæslan can gain valuable insight on how proactive it can be by reducing waste and make processes more efficient.

LSH

When asked about proactive initiatives, Páll mentioned ongoing projects such as collaboration with the university in RandD and other advancements in implementation of new technologies.

During the Covid-19 pandemic, the fact was there was a noticeable mindpower towards solving problems according to Páll. In that regards, he mentions how easy it was to get people aligned and focused on solving problems as well as eliminate problems before they occurred. Therefore, the flexibility from the employees to work across departments and even create problems, helped tremendously in order to solve problems proactively, according to the interviewee.

In that support, Páll mentions the development and exploitation of the specialized Covid-19 department and the willingness from the employees to cooperate.

Heilbrigðisráðuneytið - Ministry of Health

In relation to proactivity the Ministry of Health is currently focusing on getting towards more proactivity, according to Sigríður. In relation to the ministry's focus on proactive projects, Sigríður says: *"We are building and making the electronic network so that we can always scan our landscape and evaluate the situation based on facts and statistical data whenever we want..."*

Sigríður also mentions that recently, the ministry was ranked by a consulting company on how technologically advanced they are, and on the scale from 1 – 5, the ministry was ranked 2-3. In this regard, Sigríður added that they are currently working on mapping out the needs and building up data warehouse to further improve their response to various problems.

When asked if the Covid-19 pandemic had any impact on how they seek proactive projects, Sigríður said ‘yes’. Sigríður emphasized on how the Covid-19 pandemic made it clear for the ministry how important it is to have overview of both staff for human resources and other key facts in order to react proactively. In this relation, the Covid-19 pandemic gave valuable information towards their ongoing projects, and the importance of proactivity within the ministry.

Vistor

Gunnur says that when it comes to proactivity and proactive projects, Vistor is 50/50. From this, it is noted that although Vistor shows some proactivity, it is not particularly highly ranked. When asked if the Covid-19 pandemic had had any impact on how Vistor seeks proactivity, Gunnur said ‘yes’, and especially within the meeting culture. Gunnur points out that certain items that save time that appeared in the Covid-19 pandemic and other project such as optimization of transport to Iceland and how some project are just as good to work on from home, came to be beneficial. Also, it gave them insight on how proactivity can reduce waste and perhaps demonstrated how Vistor could have missed out if there had not been for the Covid-19 pandemic. In this regard, Gunnur said that Vistor, in continuity of the Covid-19 pandemic, started a pilot project to have one employee work in Spain. With this, Vistor is aiming to further strengthen their global network for future collaboration and as Gunnur said: *“But what may come out of Covid-19 is that this person just goes home to work and shows that this is not a problem. Then it is no problem for us to locate them in Spain and also shows the flexibility of our employees and other things.”*

Therefore, it is well noted that Vistor gained some insight towards becoming more proactive as a result of the Covid-19 pandemic.

Origo

Guðjón mentions that Origo’s proactiveness is mainly focused towards the end user. For Origo’s department of healthcare solutions, this can be complicated because in order for ideas to reach the end user, it has to be implemented into the healthcare system and be supported and driven forward by healthcare employees. In regard to this, Guðjón says:

In general, we kind of look at working with our end users. I often find that the debate on innovation is very much about technology. Innovation and especially in healthcare is about changing procedures. It's about changing the way healthcare is provided, technology can help and always helps, but in the end it's the staff who takes care of the healthcare, the patients, that they need to see how they can make the service better. Or make their working day easier or save money or increase quality. In all such projects, we have always wanted to have the professionals involved in such projects. And we may even be coming up with ideas, but these need to be driven by the person who is using the product.

When asked about if the Covid-19 pandemic had had any impact in regard to proactivity, Guðjón said 'yes.' Guðjón said that there were many projects that Origo was working in that both escalated, not just in embracing the technology but also more willingness and proactivity to implement the ideas into the healthcare system. To this, Guðjón gives the example of video calls and apps for the Home Care, an app for nurses that work in home care, that was estimated to take a year to develop and implement, but the Covid-19 pandemic made both happen within a couple of weeks.

This gives a foundation for that proactivity for Origo towards the end user is dependent for the healthcare systems ability to accept and implement ideas. From this it is also detectable that the Covid-19 pandemic gave more leverage for Origo to push out proactive ideas towards the healthcare system.

6.2 External environment

Comparing the both private sector companies, the theme of external environment proved to be more effected during the Covid-19 pandemic. A well noted similarity in this theme is unity towards working on the same goal, regardless of placement in the private or the public sector.

6.2.1 Political

Heilsugæslan

In general, Óskar says that politics and politicians have the in their best interest to do well. Most decision and political influence are regarding finance. Óskar also adds that politicians in

Iceland are generally not letting their political view shine through their actions. Óskar however points out that during the Covid-19 pandemic, Heilsugæslan got more support both in the political and legal environment, resulting in more innovative and proactive projects. In that regard, Óskar adds that they gained more trust to do their work and also, trusted to take on various tasks during the Covid-19 pandemic.

LSH

During the time of the Covid-19 pandemic, Páll mentions a detectable more support from a political point of view and more cooperation between LSH and the government. Therefore, increase in communication and making LSH be more adaptable to changes within political environment. The interviewee also mentions how times of crisis force the government to better use available resources and points out the positive effects of that.

Heilbrigðisráðuneytið - Ministry of Health

Regarding the Ministry of Health, the dimension of political influences cannot be determined, as the ministry is highly colored by political influences and the Minister of Health represents a political party. No effects from the Covid-19 pandemic was noted by interviewee. However, the interview mentions the communication factor and cooperation as a result of Covid-19.

Vistor

Vistor environment is highly influenced on political environment, says Gunnur. Also, legal changes in pharmaceuticals law can change Vistor's business model and business environment in a very short period of time according to her. Gunnur also mentioned the lack of information flow, towards Vistor, makes it harder for them to respond to changes in political environment.

When asked if Covid-19 had any impact on the political environment towards Vistor, Gunnur said yes and pointed out that the cooperation was exceptionally good, and more communication helped with alignment. Gunnur also pointed out that in the beginning of Covid-19, she would have preferred to have even more communication and that would have been more beneficial and if they had been included sooner, Vistor could have provided more knowledge and resources towards fighting Covid-19. Overall, Gunnur was pleased with the

cooperation between Vistor and the government and said: *“Completely exemplary and better than often before, so if I could take something out of this, it would be that this would continue to be such a collaboration. If we can work together like this, why go back to something else?”*

Origo

Origo’s biggest customer, in the healthcare solutions, is the office of the Medical Director of Health (Landlæknisembættið). Guðjón says, the office of the Medical Director of Health formulates its own vision and policy regarding health issues and how health services should be provided. As a result, this forms how Origo’s products should work and be. This setup, as how new products are developed, are therefore highly influenced by the government. To this, Guðjón also adds that this setup is also controlled by the budget from the government. Guðjón also says that it is not just a problem with finance budget to create new products and services, it is also a lack of implementation. As Guðjón says: *“So, for new products, because it's not just a cost to us, it's a costly effort to implement a procedure. No matter what the procedure is... and the organizations does not have the capacity to do so or staff.”*

When asked about if the Covid-19 pandemic had any effect towards the political environment, Guðjón responded:

Yes. In some cases, it was possible to say that in fact that the government was willing to finance solutions that were used directly in the Covid-19 epidemic and so that institutions that were faced with changing processes on how they provided healthcare could apply to these funds.

In this regard, Guðjón adds that this cooperation and flexibility from the government made a difference and also, he wonders if this procedure during times of the Covid-19 pandemic will continue in the future or go back to current setup.

6.2.2 Complexity

The interviews indicate that complexity within the participating companies was affected highly by the Covid-19 pandemic. Similar distinction from the interviews was noted as the complexity in the Covid-19 pandemic increased collaboration between different actors, playing a key role

in implementation of new innovative ideas. This dimension is particulate relevant as it affects all interviewed companies and, in some cases, emphasize on the importance of collaboration.

Heilsugæslan

During the Covid-19 pandemic, Óskar mentions that important decisions were made in a very short period of time due to shorter communication channels. Heilsugæslan works in an environment that empathizes on procedures and organizational structure. During the Covid-19 pandemic, there were a lot of issues that needed to be addressed or changed and no time was to set procedures and intertwine with the organizational structure, according to Óskar. In this regard, Óskar mentions a project of tourist screening for Covid-19 and how it only took 8 days instead whereas it would have taken 8 months, generally. Óskar also points out that this was a learning experience for Heilsugæslan and gave them insight on how they can enhance their ability to respond to more complex environments in a simpler way, or as Óskar says:

[...] and this is how you could do it when you are making changes to reform activities of such institutions or companies. And I think this has only strengthened us in that it is just a good way. Just take, now we are just going to take care of this. Take the day today or tomorrow - today and tomorrow - and just plan how to do it.

LSH

LSH has a lot of rules and regulations on how to conduct their business and according to Páll, that is not an issue. Páll points out that LSH is currently working on many projects, that would be more suitable for others and points out the issue that people have not agreed on how to transfer the tasks to each other. By that, Páll is referring to the issue that LSH has very expensive and specialized departments within LSH, used for nursing jobs and therefore not utilized to their fullest potential. To this, Páll stated the reason being lack of funding towards the health system and that politicians are not addressing that matter:

We have the largest nursing home in the country, and it is not nice to have special departments under the auspices of nursing work. Why is it like this? Because politicians have not wanted to face the fact that more money needs to be put into the healthcare system. Then I'm not talking about the national hospital. We do not

need more money, just to do our job. There is then of the issue as a whole, so you build a home nursing and nursing homes as needed, etc.

The Covid-19 pandemic however has given some leverage towards responding to their changing environment as LSH gained more political support as well as external resources and the ability to make changes internally. Opening new department for Covid-19 patients would be a good example of that, according to Páll. He also points out the how important is to create a catalyst and motivation, so everybody is aiming for the same goal.

Heilbrigðisráðuneytið - Ministry of Health

The focus within the Ministry of Health is making sure the policy is being enforced according to Sigríður. Within the ministry there are also rules and regulations that require every decision to be held accountable, Sigríður adds. As a result, everything that is published from the ministry is held to high standards and accuracy, making the work process more complex compared to private owned companies or other institutions, according to Sigríður.

Vistor

Vistor's environment is complex due to quality regulations and requirements from suppliers, says Gunnur. However, during the Covid-19 pandemic, Gunnur explains how they realized the supply chain is complex and sensitive, or as she says:

At times like these, it also becomes clear how sensitive our supply chain is. It's a level of complexity. We may need to be more aware of what the supply chain can entangle, and it became clear in Covid-19 when flights were canceled, etc. We are just an island...

Therefore, the Covid-19 pandemic gave Vistor some insight to how the complexity can lead to a vulnerability and the importance of adaptating to fast changing environments.

Origo

Similar, to political, Guðjón says that during times of the Covid-19 pandemic it was a noticeable difference in resources and complexity from the government. If the project was useful towards the Covid-19 pandemic, Origo got all the necessary resources and also contact information to speak directly with the project owner within the healthcare sector according to Guðjón, and that is usually not the case. As Guðjón said: *“We want to get this solution in use and then everything was done to make it work.”*

6.2.3 Munificent

Heilsugæslan

In general, there has been some lack of keeping up within technological opportunities within Heilsugæslan, according to Óskar. However, in relation to the Covid-19 pandemic Óskar said that it was clear that the Covid-19 pandemic motivated Heilsugæslan and pushed them to incorporate new technological solutions. Also, he points out the Heilsugæslan is currently emphasizing on being more focused on scanning the environment in order to adapt better to new technological solutions and new demands for products and service. Óskar says:

That this tells us that we can do this completely and do it relatively quickly. It's just a decision and a priority... and then it's just a matter of prioritizing... there are many issues like that... but this encouraged us to make better use of technology solutions, I think it's quite clear that Covid-19 encourages us to use technology solutions, to make work easier, and to speed up the solutions – I don't think that is a question.

In that regard, it is evident that the Covid-19 pandemic has applied pressure to Heilsugæslan to use more technological solutions.

LSH

LSH managed, during the Covid-19 pandemic, to capture some technological advancements and therefore capture some new opportunities and meeting new demands in remote healthcare according to Páll. In this regard, Páll points out a new app, named ‘Sidekick’ where patients

can list up their syndromes and a doctor or a nurse can respond to their requests. This is a step towards better prioritizing and reducing visits to the emergency room which, according to Páll, is important in order to use LSH resources more efficiently. Overall, during the Covid-19 pandemic, LSH experienced more munificence environment.

Heilbrigðisráðuneytið – Ministry of Health

The Ministry of Health has been trying to get more attention from young people and getting more in touch with improved services and technological opportunities, according to Sigríður. However, Sigríður points out that due too many ongoing projects and lack of staff, the Ministries' focus has not been enough towards these projects and therefore the progress not been efficient as well as lack of environmental need for change.

During the times of the Covid-19 pandemic, the ministry gained some insight and managed to capture some new technological opportunities according to Sigríður. In that regard, Sigríður mentions a specific project that aimed to help reduce Covid-19 related questions and an online information center as well as the possibility to create a robot or some sort of artificial intelligence to handle and give information, therefore making communication more efficient.

Vistor

Gunnur says that Vistor is currently in IT debt. By that, Gunnur means that during last years, Vistor has not been using technological opportunities quite as efficiently as it could. In relation to the Covid-19 pandemic on munificence in the environment, Gunnur says that just by implementing Microsoft Teams as well as developing and improving teleworking, Vistor has also been more aware of other factors, that could possibly support the environment for growth and more productivity according to Gunnur.

Origo

Environmental munificence is dependent on feedback from the healthcare sector, according to Guðjón. As a result of the Covid-19 pandemic, Guðjón says that Origo received more feedback

and willingness to embrace further technological opportunities. Guðjón adds that the Covid-19 pandemic made Origo possible to meet the demand for new products and much faster respond from the healthcare system to implementation to accept new products and procedures. As Guðjón says:

Then there were certain medical clinics (Heilsugæslan) that did not accept drug renewal or messages through Heilsuvera because just... they did not believe in this way and just did not feel it fit with their procedure. And this was turned around... and started using this so that the introduction of such remote health solutions that are perhaps most concerned with those you can care for the patient without him standing right in front of you... and solutions that have been around for years... that all of a sudden it can come much faster therefore throughout.

These findings support and connect to responses from Heilsugæslan on implementation of new technological solutions, as Origo gained more opportunities to introduce ideas to Heilsugæslan, creating a common goal for both parties.

6.2.4 Change

Heilsugæslan

Heilsugæslan has been getting stronger and working on more diverse projects during last years according to Óskar. He also mentions the importance of being noticeable in order to get more traffic in their field of expertise. When asked if the Covid-19 pandemic has had any influence on how Heilsugæslan copes with changes in the market, Óskar responded positively. He adds that during the Covid-19 pandemic, Heilsugæslan was asked more for advice and to be a part of new projects. During the Covid-19 pandemic, Heilsugæslan has been more active in coping with the changes in the environment as well as getting more competitive knowledge. As Óskar says:

[...] often it is creating tension because people feel that it is in competition which maybe is not really that much... but this only strengthens us and it is that we want everyone to know what we do... no extra tasks or do more. Just that everyone knows what we do and everyone looks to us, if we are the right person to look for.

As a result, the Covid-19 pandemic showed the importance for a change in Heilsugæslan and yielding in more open-minded atmosphere for embracing change.

LSH

During the Covid-19 pandemic, LSH started to use the technology more efficiently, both internally but also outwards. According to Páll, the cooperation with other institutions was exceptional and also towards the patients. LSH, during the Covid-19 pandemic, learned that pointing out and identifying the nature of the problem right in the beginning, and then pointing it towards the right direction. The changes in the environment are happening fast and Páll points out that, towards the future, communicating via remote equipment is vital and the Covid-19 pandemic gave LSH great process to adapt and try it out in practice.

Heilbrigðisráðuneytið - Ministry of Health

From the interviews, it's noted that The Ministry of Health's environment in general would be considered stable rather than dynamic. Sigríður also adds that in general, they are not in any direct competition inwards or outwards at the ministry. Sigríður points out that the ministry is making sure that the groundwork is done right. As a result, if the Covid-19 pandemic had had any influence on change in the environment it is not yet established, but Sigríður mentions that during the Covid-19 pandemic there was indeed increased amount of status meeting. Also, it is bound to the Minister of Health each time what part of healthcare service is to be bid out each time to private parties and therefore, how to get the most for the money, according to Sigríður. From this, there might be a change due to the Covid-19 pandemic, in the upcoming years, but only time will tell if that will open up for change in the environment.

Vistor

Vistor has many competitors that work in the same business, according to Gunnur. For Vistor, it's fortunate to have some competition because it keeps them awake on alert and in general, it is good to have competition, regardless of the market, says Gunnur. In this regard, Gunnur points out that the barrier for entry in this market is high and competition is great within the market. This suggests that Vistor is working in more dynamic environment, rather than a stagnant, stable environment. As a result of the Covid-19 pandemic, Gunnur says that Vistor did not experience more dynamic within the environment, but rather "on par" as Gunnur described it.

Origo

When it comes to software for the healthcare system, Origo has the biggest market share, according to Guðjón. But Origo as whole has competitors and their market share in other fields, within the company, is not as much, Guðjón adds. During the Covid-19 pandemic, Guðjón points out the willingness to change and adopt better to the dynamic changes in the environment. As Guðjón says:

Yes, and it's like just this desire of users and just general users in all software... they're just ready to find their way and then something new comes up and it's just a kind of effort to get acquainted with this. I need to possibly change how I work, it's always hard and it needs to kind of work to motivate users. Covid-19 was kind of like motivation, in many cases.

Guðjón also points out that perhaps, the Covid-19 pandemic can motivate new entries to the market and create space to implement even more specific solutions with narrower focus towards the user, and therefore increase changes in the environment.

6.3 Innovation as a result of more communication

Throughout the interviews, the notion of increased communication and cooperation was highly distinguishable from all participants. In theory, it could be argued that the theme of communication and cooperation could be intertwined to the 10 dimensions of the model as increased communication and cooperation share elements within some dimension. However, it is the researches opinion to not include it within the 10 dimensions of the framework and therefore, report it separately. The reason being is that the communication mentioned from the interviewees is mainly between stakeholders; i.e. government, public- and private organizations and focuses on both communications internally and externally, therefore maximizing combined resources in response to problems, caused by the Covid-19 pandemic. Communication also covers both dimensions within public sector organization and external environment.

Regarding Heilsugæslan, Óskar points out that increased communication between other institutions took place during the Covid-19 pandemic. He also mentions how cooperation between the government and Heilsugæslan was excellent and how cooperation between units

will result in more efficiency. The increased communications and cooperation resulted in many new projects, especially in implementation of new technological solutions.

Similar findings were in the interview with Páll at LSH regarding communication and cooperation. Páll mentions how LSH began to use technology. Not only internally, but also externally towards other institutes, working in collaboration with LSH. Páll focused much on alignment and having everybody rowing in the same direction in order to solve common goals as a result of the Covid-19 pandemic. There are still ongoing projects, waiting to be resolved that require cooperative solution and as Páll points out that LSH has a lot of problems that others solve better, but it's somehow that people have not agreed on how to transfer the projects to each other due to lack of communication. In that regard, Páll mentions an important lesson from the Covid-19 pandemic, that is the importance of analyzing the nature of the problem in the beginning and direct it in the right direction – and rarely can LSH solve the problem.

Within the Ministry of Health, there was a willingness and action to keep the advantage in cooperation in future projects. According to the interviewee, the Covid-19 pandemic teared down communication barriers, yielding in much more cooperation and cooperative mindset and added that it was pleasant to experience a really positive partnership. The knowledge acquired from the Covid-19 pandemic for the ministry was also a noticeable increase in more cooperation between ministers and flowing of good ideas across. In that regards, one interviewee mentioned a project called ‘Bakvarðarsveitin’, which originally was only intended for the healthcare system to ensure backup of health educated employees in the worst-case scenario. However, the project ‘Bakvarðarsveitin’ soon became of interest for other institutes, for example the city of Reykjavík, and the Ministry of Health made an effort to help others to setup similar projects.

From even more cooperation during the Covid-19 pandemic, Vistor could have proven to give even further assistance if they were implemented sooner into the preparation phase, according to Gunnur, But otherwise, the cooperation between Vistor and the government was positive, communications increased and resulted in faster responses. By increasing the communication, pending problems became clearer and more efficient distribution of projects. Gunnur also points out that the atmosphere during the Covid-19 pandemic felt more united and therefore, strengthen the response. *“Let's do this well together and work this out well together”* as the interviewee described it. This cooperation between Vistor and the government proved to be highly efficient to solve problems fast and therefore making the best use of resources across sectors. In addition, its Vistors’ aim is to continue this cooperation with the government and maintain it.

Key factor, in order for Origo to introduce new innovative technological solutions, is getting feedback and information from the government and the healthcare system, as the need and demand is driven mostly by the healthcare workers. From the interviews, Guðjón points out that it is not just the creations of technological solution, it is also to meet the needs of the user. Therefore, informing to Origo on how to improve and update working methods, is dependent on information and communication from health professionals. From the interviews, it is evident that from the Covid-19 pandemic, more feedback and willingness to cooperate resulted in more technological solutions. As soon as collaboration and communication between Origo and the government increased, the flow of new technological improvements was introduced in a very short period of time. Sharing information and more communication, combined resources from Origo and the government and as a result, maximized the efficiency for implementing new technological solutions.

7. Discussion

This chapter discusses and connects empirical results to the literature of the research. The study aims to answer how the Covid-19 pandemic effects innovation in the healthcare system in Iceland, using Kearney et al. (2008) ten dimensions of public sector corporate entrepreneurship as guiding framework. Later in the chapter, limitations of the study are discussed, and the chapter concludes with future research.

7.1 Overview of results

Within the two themes of the conceptual framework, public sector organization and the third theme, there is a noticeable difference in interviews from participants from the public sector and the private sector. The overview of results is presented in the following three subchapters.

7.1.1 Public sector organizations

From the participants from private sector companies, the structure and formalization were less effected by the Covid-19 pandemic than for the other, working directly in the public sector. This is supported by Miller (1996) that points out that mechanistic structure leaves less room for entrepreneurial initiative whereas organic structure encourages and is more effective in pursuing entrepreneurship. However, during the Covid-19 pandemic, the interviewees from the public sector show increased flexibility and therefore, act similarly as their colleagues in the private sector in regard to structure and formalization. All participants point out that cooperation resolved in less hierarchy and more willingness to solve problems. This fits Covin and Slevin's (1991) findings that less hierarchy within organization can strengthen entrepreneurship within the organizations. It is also interesting that hierarchical institutions were able to respond with flexibility and shorten communication channels when needed and therefore, supporting the positive relationship between the power of the crisis and the hierarchy. Also, it is possible that this flexibility of the companies and institutions, which are generally considered clumsy, is innovative, at least under certain circumstances.

From the literature in decision making, a common sight within the public sector is that structure and formalization, resulting in increased formal control that can be inhibiting factor towards decision-making (Zahra, 1991). To Zahra's (1991) findings, some participants support

the inhibiting factor of decision making, as their decisions are highly rely on fitting to the organization's policy. However, during the Covid-19 pandemic, all participants show improvement in decision making and mostly in regard to increased speed and faster responses. For the participating companies that have more flexibility in decision making, which were both participating companies for the private sector, there was less difference in decision making during the Covid-19 pandemic.

Organization that provide high rewards and motivation have been more positively related to the organizational performance and more positively related to corporate entrepreneurship (Kearney et al, 2008). As a result, from the Covid-19 pandemic, all the participants show increasement in rewards, and in some cases, the Covid-19 pandemic provided more motivation towards employees within the companies, to try new things. Mostly, the rewards and motivation consisted of recognition of the skills and knowledge of employees, which may have previously been overlooked, prior to the Covid-19 pandemic. As a result, motivating employees to be more flexible facilitates everyone to row in the same direction and rewarding them by recognizing and appraising their initiatives during the Covid-19 pandemic. Between the private and public owned companies, there is a noticeable more effect from the Covid-19 pandemic on rewards and motivation within the public sector. This is supported, as private organization have the tendency to be closer and to be more entrepreneurial oriented than public organizations. In entrepreneurial organization, their key factor is to not penalize for failed risky projects (Jennings and Lumpkin, 1989) and they are more like to motivate managers to take risk (Pascal and Athos, 1981). Therefore, it is evident that motivation and rewards, caused by the need to react and adapt to unprecedented changes due to the Covid-19 pandemic, increased according to the participants. If good performance is not recognized, employees are less likely to show initiative to take on risky projects (Hornsby, 2002).

Culture within the participants companies vary, but they all have a culture that embraces innovation to some extent. Both the participating companies from the private sector are considerably smaller than the participating compared within the public sector and show stronger culture towards innovation compared to the public. This is supported by Sathe's (1985) findings that within large organizations, there is a dilemma in creating atmosphere that can balance entrepreneurial activities and fulfill and balance corporate control. However, as a result of the Covid-19 pandemic towards the organizational culture, all the participants companies experiences stronger culture to some extent show and a better communication and collaboration. It is also noticeable that majority show influences from the Covid-19 pandemic in more flexibility, increased flow of ideas and facilitate innovative processed. As pointed out

by Kearny et al., (2008) corporate entrepreneurship is more positively related to organizations with a culture that is flexible and supports entrepreneurship and innovations. Thus, supporting the empirical findings that the Covid-19 pandemic influenced more innovative culture within companies working in or towards the healthcare system.

Many scholars of innovation rank risk-taking high towards performance and Lumpkin and Dess's (1996) definition of risk-taking is: "*Processes, practices, and decision-making activities that lead to new entry*" (Lumpkin and Dess 1996, p. 136) and that indicates its relevancy towards organizations ability to perform better. Majority of participants support and embrace employees to take risk, but mostly calculated risk. From the participating companies in the private sector, there was a noticeable difference in more calculated risk-taking and more flexibility for risk-taking. During the Covid-19 pandemic all participants showed positive relationship towards more risk-taking. One participant even said: "...so I think people have completely learned it and quite willing to do things and take risks..." Similar findings were detected from other participants and examples for projects requiring risk-taking was clear during the Covid-19 pandemic, especially within the participating companies of the public sector and government. As a result, Bozeman and Kingsley (1998) findings show that high level of uncertainty and with characteristics of high-level jobs within the public sector have the tendency to avoid risk, turned not out to be applicable during the Covid-19 pandemic.

The relationship between proactiveness and innovation has been deterrent in various researches such as the pursue an opportunity, regardless of resources they control (Bateman and Crant, 1993). Important factor within this definition is the key notion of being proactive, regardless of resources controlled as for the public sector is haltered by resources compared to the private sector according to the literature. All the participants point out various proactive projects, that were influenced by the Covid-19 pandemic, that have either been scheduled in the near future or have been launched. Proactive projects evolving from the Covid-19 pandemic range from using technological advancement to better scan the environment for improvements to locating an employee in Spain to increase global cooperation. Furthermore, touching on proactiveness, collaboration and communication yielded in sharing of resources which lead to more opportunities for proactive approaches. From Lumpkin and Dess's (1996) point of view, empirical findings support that proactivity is the initiative resulting from pursuing and anticipating new opportunities. Therefore by reviewing the healthcare system and its overall market needs and by anticipating for future needs of the market (Lumpkin and Dess, 1996), proactivity as a result of the Covid-19 pandemic, has highly increased and supports the

conceptual model of the research that corporate entrepreneurship is more positively related to organizations that support and encourage proactivity (Kearney et al., 2008).

7.1.2 External environment

As pointed out by Nutt (2005), political influences are in the external environment for organization in the public sector. All participants show that during the Covid-19 pandemic, adaptation to changes in the political environment increased and political influences. Majority of participants also point out, that their experience from the Covid-19 pandemic towards political changes, were included and more goodwill to cooperate with the participants companies. For the two of the participants from the private sector, they show to some extent more positive relations in adapting to change as in the political environment. This supports Kearney et al. (2008) suggestions that corporate entrepreneurship is more positively related to organizational performance, within organizations that can adapt and change as the political environment evolves. Therefore, from Kearney et al. (2008) point of view, these findings show that all participants experienced, to some extent, more adaptability towards changes in the political environment.

Entrepreneurial orientation is positively associated to performance under conditions of turbulence environments (Davis et al., 1991; Morris and Sexton, 1996; Zahra, 1996). The majority of the participating companies describe more complex environment during the Covid-19 pandemic, as projects and other important elements to respond to the Covid-19 pandemic, requiring unconventional responses. Some participants, noted that complexity to some extent, worked as a catalyst towards responses towards the Covid-19 pandemic.

When it comes to munificent environments, Hambrick and Finkelstein (1987) suggest that munificent environments can enable the firm's ability to access external resources, therefore, supporting them in solving internal and external problems. Majority of participants point out that they could use their resources better. Furthermore, as a result of the Covid-19 pandemic, all participants gained better insight how they can use their resources, especially towards improvements in implementing technological solutions.

As quoted from one of the participants: *"I need to possibly change how I work, it is always hard, and it needs to kind of work to motivate users. Covid-19 was kind of like motivation, in many cases,"* that empathizes the importance of responding and facing changes in a dynamic environment. All participants experience similar effects from the Covid-19 pandemic towards changes in the external environment. Participating companies from the

private sector describe their environment more dynamic compared to the public sector and therefore, show less impact from Covid-19 towards dynamic changes. Majority of the participants point out examples of changes as a result of the Covid-19 pandemic in demand and increased opportunities in technology. Therefore, according to Kearney et al. (2008), it can be positively related to increased corporate entrepreneurship. According to Guth and Gindberg (1990), changes in both competitive structures and utilizations of technology are believed to impact entrepreneurship, which supports the empirical results as the participants indicated more utilizations of technology in the Covid-19 pandemic, from the fast-changing environment.

It is evident from the participants that external environment factors, effect more the participating companies that work towards in the healthcare system but are privately owned. As a result, the private companies rely on communication, information and cooperation in the external environment theme. As a result, external environment factors during the Covid-19 pandemic yielded more innovation from the private sector, mostly due to communication and combining knowledge and resources.

7.1.3 Innovation as a result of more communication

Organizational theory provides a fundamental understanding towards the reasons why organizations form relationships between each other, and to what extent (Davis, 2016). The additional theme from the empirical result, gives a special empathize on communication and how increased communication results in more cooperation and therefore, better flow of resources and information to participate in innovative ventures. All participants experience more communications between organizations and favor the increased communications, in order to response to problems and challenges derived from the Covid-19 pandemic. From the empirical results, the cooperation between the stakeholders not only resulted in more cooperation, but also in more willingness and more unity. Therefore, by admitting and acknowledging that in order for the healthcare system to be more innovative, there is a need for more communication and recognition. Also, that innovation is a joint venture for all stakeholders within the healthcare system, both companies in the private and public sector as well as the government. This is well noted from the interviews and in that regard, one interviewee mentions: *“Nobody knows anything about this plague [Covid-19], but we still have*

to do something, but we admit that we know nothing and when we learn something, we take it into account...”

Similar phenomena can be spotted in other sectors including, computing and communication, where resources needed for innovation, can be accessed from interorganizational relationships (Powell et al., 1996; Davis, 2016). Therefore, organizations that can share and combine resources, can be more innovative and increased communications and cooperation are vital for managing innovation. Davis (2016) also provides evidence that leading firms that collaborate more with multiple partners gain more resources towards innovation and even more than their competitors (Ozcan and Eisenhardt, 2008; Lavie and Singh, 2012). Although, not directly connected with public organizations like the Icelandic healthcare system, the empirical result provides a positive relationship between communication and innovation and therefore, can be applied to the public sector as a result from the Covid-19 pandemic and its effect in innovation in the healthcare system.

In conclusion of the chapter, the overall discussion of both the ten dimensions of the research conceptual framework and the additional theme show benefits of innovation within the healthcare system. However, counting new products or services as a result from the Covid-19 pandemic should not be a focal point for measuring the innovative impact. Innovation should not be measured in number of new products to the market, or implementation of new services. Innovation should be measured by analyzing all factors that allow for innovation to occur and further embrace them in order for innovation to reoccur. In that regard, Kearney et al. (2008) dimensions of the conceptual model proved to be efficient to determine and analyze factors that embrace innovation for the Icelandic healthcare system. Thus, successfully measuring some effects of the Covid-19 pandemic on innovation in the healthcare system and as a result, suggesting a possible answer to the proposed research question and positively link the Covid-19 pandemic to more innovation in the healthcare system.

7.2 Limitations and future research

Limitations of the research include lack of similar crisis like the Covid-19 pandemic, and its effects towards the healthcare system. An infamous Icelandic saying from the Covid-19 pandemic and widely used to describe the situation is “*fordæmalausir tímar*” which translates

as ‘unprecedented times’. When the research was conducted, the Covid-19 pandemic was not over yet, so there might be further additional factors that were not included in the research. Sample and selection of participants for the research were chosen by the researcher, but not randomly. Also, in regards of participants, as they range in different sectors as well as difference between companies. Therefore, a limitation for the research includes lack of participants. Another limitation of the research consists of conflicts arising from cultural bias and other personal issues, mainly since the researcher has no previous experience in conducting interviews. Final limitation of the research is timing, and time can do so much. The limitations regarding timing, consist of two factors. Firstly, the interviews were all conducted from end of June into the first week of July of 2020, which was during a relatively down time in the Covid-19 pandemic, giving an ease for all interviewees as the pandemic was almost exceeded. Secondly, the second timing factor is in the essence of the circumstances as the battle against Covid-19 was in full swing during the research in August 2020, and further additional information towards innovation in the healthcare system, derived from the Covid-19 pandemic, is still waiting to reach the surface.

For a future research, a quantitative research based on findings from this study, can provide more detailed information and broaden the range of innovation in the healthcare system. Additionally, a quantitative research can reach more stakeholders and also focus more on employees within each organization. As the research is based on public sector organizations, there is an opening to further extend the model to other organizations within the public sector, that were affected by the Covid-19 pandemic such as the education system.

8. Conclusion

The research aims to answer how the Covid-19 pandemic effected innovation in the healthcare system in Iceland, using qualitative research method based on in-depth interviews. Additionally, the research goal was to provide information on how innovation can improve and strengthen the healthcare system in Iceland.

Findings from the research, suggest that all participating companies discovered more opportunities for innovation during the Covid-19 crisis. By using the ten dimensions from the research's conceptual model for activities that influence corporate entrepreneurship in public sector, the empirical result provides a range of factors that indicate increased innovation. These factors make it possible for strengthening and show the importance of fostering and strategically improve certain dimensions, to further embrace innovation. There was a noticeable difference towards innovation within the participating companies working the private sector, compared to those working the public sector, prior to the Covid-19 pandemic. Additionally, as the pandemic hit, the empirical result suggests that dimensions from the conceptual model that were not influenced by the Covid-19 pandemic, were ranked high within the participating company, prior to the pandemic.

Based on the findings of this research literature, the effects of the Covid-19 pandemic on innovation in the healthcare system in Iceland, show positive relationship towards organizational performance. For the healthcare system, managing innovation and corporate entrepreneurship, is highly recommended. For that to happen, the ten dimensions of the conceptual model need to have the management support and commitment, then managing innovation should be feasible.

Empirical results of the research suggest that effects from the Covid-19 pandemic on innovation, consist mainly of: Increased flexibility, better use and sharing of resources, more motivation and encouragement, more risk-taking as well as increased communication and cooperation. Therefore, resulting in various of innovative solutions, beneficial for the healthcare system. The key element from the Covid-19 pandemic effecting innovation was therefore creating the need to pursue and embrace innovation in the healthcare system. Form the empirical results, it is evident that innovation during the Covid-19 pandemic gained more weight. Additionally, having an entrepreneurial and innovative culture, allowed the healthcare system to perform at higher and more efficient capacity, provoke old habits and seek new opportunities and allowing more communication and better alignment. Therefore, the Covid-

19 pandemic acted as a catalyst for innovation in the healthcare system, leaving an opportunity to build stronger innovative culture. In order for the healthcare system to gain most from the innovative effect from the Covid-19 pandemic, future action requires that innovation needs to be well managed and integrated to the core of the organization. Promoting innovation within the healthcare system can be challenging to manage, as suggested by the empirical findings prior to the Covid-19 pandemic. However, if the innovation is successfully managed, it can be proven to be beneficial in advancing the overall performance of the healthcare system in Iceland.

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Appendices

Appendix A – Semi-structured interview guide

Public Sector Organization

Structure/ Formalization

1. Þegar kemur að skipulagi og uppbyggingu fyrirtækisins, hvernig myndir þú staðsetja vægi nýsköpunar í fyrirtækinu/stofnuninni? Mikil, lítil?
2. Telur þú að Covid-19 hafi haft áhrif á hvernig fyrirtækið kortleggi nýsköpun með tilliti til skipulags fyrirtækisins/stofnunar?
3. Að hvaða leyti telur þú telur þú að fyrirtækið sé formfast í skipulagi.
4. Upplifir þú að skipulag fyrirsækisins sé þannig uppsett að starfsmenn vinni mikið þvert á deildir?
5. Upplifðir þú að Covid-19 hafi haft áhrif á reglugerðir og samskipti milli deilda hjá fyrirtækinu/stofnuninni þinni? Ef svo, getur þú nefnt dæmi?
6. Hversu vel er fyrirtækið/starfsmenn þess í stakk búnir að takast á við svegjanleika og aðlögunarhæfni? T.d. auknar kröfur um hraða eða þungir verkferlar
7. Upplifðir þú að Covid-19 haft áhrif á svegjanleika og aðlögunarhæfni innan fyrirtækisins/stofnunarinnar? Ef svo hvernig þá?

Decision-Making/ Control

8. Hvaða þættir hafa áhrif á ákvörðunartökur innan fyrirtækisins? (*t.d. næsti yfirmaður, þurfa margir að samþykkja – form, reglur og strúktúr?*)
9. Upplifir þú að Covid-19 hafi haft áhrif á ákvörðunartökur innann fyrirtækisins/stofnunarinnar? Ef svo, hvernig?
10. Hversu mikinn svegjanleika telur þú stjórnendur innan fyrirtækisins hafi til að taka ákvarðanir?
11. Upplifir þú að Covid-19 haft áhrif á sveignaleika stjórnenda til að taka ákvarðanir undir fordæmalausum tímum? Ef svo, hvernig?

Rewards/ Motivation

12. Mig langar til að vita hvernig og hvort starfsmenn eru hvattir til að taka áhættu og prófa nýjar leiðir – ef við byrjum á áhættu – eru starfsmenn hvattir til slíks – hvernig þá?
13. Leggur fyrirtækið áherslu að hvetja starfsmenn áfram til að prófa nýjar að leiðir til að leysa vandamál? Hvernig þá?
14. Upplifir þú að Covid-19 haft áhrif á hvernig starfsmenn eru hvattir áfram til að prófa nýjar leiðir sem krefjast aukinnar áhættu? Ef svo, hvernig þá?

Culture

15. Telur þú að fyrirtækið/stofnunin leggi á áherslu á nýsköpun og hvetji starfsmenn til þess að takast á við nýsköpun?
16. Hvernig hvetur umhverfi og menning fyrirtækisins starfsmenn áfram til að takast á við nýjungar, nýja ferla og nýjungagjarnar lausnir?
17. Upplifir þú að Covid-19 hafi haft áhrif á hvernig stjórnendur hvetja starfsfólk til að takast á við nýjunar? Ef svo, hvernig þá?
18. Telur þú að Covid-19 hafi gefið starfsmönnum meiri sveigjanleika í starfi til að takast á við nýsköpun?
19. Telur þú að Covid-19 hafi gefið starfsmunnum meiri svigrúm til að gera mistök eða reka sig á þegar kemur að nýsköpun?
20. Telur þú að Covid-19 hafi ýtt undir aukina frumkvöðlamenningu (e. Entrepreneurial culture) í fyrirtækinu/stofnuninni?

Risk-Taking

21. Hvernig tekur fyrirtækið/stofnunin á tvísýnum verkefnum?
22. Hvernig metur stjórnendur fyrirtækisins/stofnunarinnar þörfina við að takast á við verkefni sem krefjast þess að breyta viðmiðum og strúktúr fyrirtækisins og taka áhættur?
23. Telur þú að Covid-19 hafi áhrif á slíkar ákvaðarnir? Hvernig þá?
24. Leggur fyrirtækið áherslu að starfsmenn prófi nýjar að leiðir til að leysa vandamál? Hvernig þá?
25. Upplifir þú að Covid-19 hafi haft áhrif á hvernig starfsmenn taki áhættur og prófi nýjar leiðir?

Proactivity

26. Hvernig sækist fyrirtækið/stofnunin í nýsköpunartengd verkefni?
27. Að hvaða leyti sýnir fyrirtækið frumkvæði í því að sækjast eftir nýjum hugmyndum og tækifærum?
28. Telur þú að Covid-19 hafi haft áhrif á hvernig starfsmenn sýna frumkvæði í starfi? Ef svo, hvernig?
29. Hvernig vinnur fyrirtækið/stofnunin að því aðgreina þarfir og vandamál á markaðnum?
30. Upplifir þú að Covid-19 hafi haft áhrif hvernig fyrirtækið hefur greint nýjar þarfir markaðsins og leyst vandamál á markaðnum? Ef svo hvernig?

External Environment

Political

1. Telur þú að áhrif frá stjórnvöldum hafi áhrif á ákvörðunartöku stjórnenda í þínu fyrirtæki?
2. Hvernig tekst fyrirtækið þitt á við aðlögun á breytingu í pólitíksu og lagalegu umhverfi?
3. Telur þú að Covid-19 hafi haft áhrif á það? Ef svo, getur þú nefnt dæmi?

Complexity

4. Telur þú að rekstrarumhverfi fyrirtækisins sé þungt og aukið flækjustig hafi áhrif á reksturinn?
5. Telur þú að auknar kröfur frá utanaðkomandi þáttum á rekstur fyrirtækisins hafi áhrif á nýsköpun? Ef svo, hvernig?
6. Hefur Covid-19 haft áhrif á þessa þætta? Ef svo, getur þú nefnd dæmi?

Munificence

7. Hvernig tekst fyrirtækið/stofnunin á við nýjar áskoranir í umhverfinu? Þar á ég við t.d. aukin sjálfvirkni og tæknilegar nýjungar?
8. Hvernig telur þú að þessar áskoranir sem setji krefur á fyrirtækið til að aðlaga reksturinn (nútímavæða)?
9. Upplifir þú að Covid-19 hafi haft áhrif á hvernig fyrirtækið hafi tekst á við slíkar áskoranir? Ef svo, getur þú nefnd dæmi?

Change

10. Hvernig myndir þú staðsetja fyrirtækið/stofnunina þitt í samkeppnislegu umhverfi?
11. Hvernig bregðst fyrirtækið þitt aukinni samkeppni eða nýjungum á markað?
12. Telur þú að aukin samkeppni hafi myndast gagnvart þínu fyrirtæki við Covid-19? Ef svo, getur þú nefnd dæmi?
13. Upplifir þú að Covid-19 hafi haft áhrif á hvernig fyrirtækið heftur brugðist við samkeppni? Ef svo, getur þú nefnd dæmi?

Appendix B – E-mail request

Titill: Meistaraverkefni – Áhrif Covid-19 á nýsköpun í heilbrigðiskerfinu

Sæl/! [nafn].

Ég heiti Atli Sæmundsson og er meistaranemi í Háskólanum í Reykjavík á námslínu sem heitir stjórnun nýsköpunar (e. Innovation Management). Ég er vinna að rannsókn sem er jafnframt lokaverkefni mitt í náminu. Hallur Þór Sigurðarson er leiðbeinandi verkefnisins.

Markmið rannsóknarinnar er að kanna áhrif Covid-19 á nýsköpun í heilbrigðiskerfinu og greina þætti sem hafa jákvæð áhrif á nýsköpun og frumkvöðlastarfsemi innan heilbrigðikerfisins. Til þess þarf ég að taka viðtöl og ég tel að þín reynsla geti gefið mér góða innsýn og upplýsingar til að takast á við þessa rannsókn.

Stefnan er að klára viðtöl í júní og ætti viðtalið ekki að taka lengur en klukkustund. Þín þátttaka skiptir mig miklu og myndi veita mér ómetanlegar upplýsingar til að klára verkefnið. Ég er laus hvenær sem þér hentar. Ef þú hefur einhverjar spurningar þá máttu endilega hafa samband eða hringja í mig.

Sé þess óskað þá þarf heitið á þínu fyrirtæki/stofnun ekki að vera birt í rannsókninni.

Bestu kveðjur,
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