SCHOOL OF ECONOMICS AND MANAGEMENT

Pandemic Control

Management Control Systems in response to Covid-19

by

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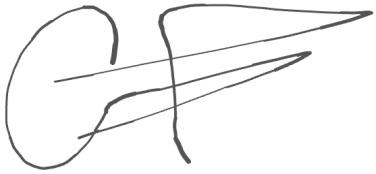

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Abstract

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Five key words:	Management Control Systems, Levers of Control, Formal Controls, Informal Controls, Covid-19
Purpose:	The purpose of this study is to analyze the role of Management Control Systems in Swedish organizations during the Covid-19 pandemic. For this, the use of MCS, the perceived effectiveness and the differences between organizations are observed.
Methodology:	This study is quantitative. A self-completion questionnaire is used to collect data. Descriptive statistics and statistical tests in SPSS are used to analyze the obtained data.
Theoretical perspectives:	The theoretical foundation of the study is based on Simons' Levers of Control framework (1994), informal controls and contingency theory.
Empirical foundation:	Data was collected from top management in Swedish listed companies.
Conclusions:	The results of this study shows that during Covid-19, all the observed controls were used to some extent in organizations, with special emphasis on Boundary systems. Conversely, MCS were perceived to be of low effectiveness when dealing with Covid-19 related challenges. Lastly, only significant differences in the use of MCS are found between small and medium firms, regarding the use of Boundary and Belief Systems, while the rest of controls and their effectiveness is not statistically different between the organizations.

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List of Abbreviations

GFC	Global Financial Crisis
ICU	Intensive Care Unit
LOC	Levers of Control
MC	Management Control
MCS	Management Control Systems
PCA	Principal Component Analysis
PEU	Perceived Environment Uncertainty
PSF	Professional Service Firms

1. Introduction

1.1 Background

Since Anthony's definition of Management Controls (MC) in 1965, literature has evolved and the concept of Management Controls Systems has broadened notoriously. In early days only formal tools like budgets were considered to be Management Controls. Several authors have developed new definitions, with new perspectives and giving new shapes to the concept, incorporating aspects of operational and strategic planning (Ferreira & Otley, 2009; Strauß & Zecher, 2013).

In current days, MC comprises a vast set of tools with different purposes. Among those, budgets, performance measures, procedures guides, codes of conduct, organizational culture, non-written policies and peer pressure can be mentioned (Grabner & Moers, 2013; Laguir, Laguir & Tchemeni, 2019). Authors have developed Management Controls Systems (MCS) frameworks taking into consideration different aspects, such as the type of task being controlled, the type of control, and how those controls are used (Malmi & Brown, 2008; Merchant & Van der Stede, 2012; Simons, 1994; Tessier & Otley, 2012).

Despite the differences between conceptualizations and frameworks, MCS have been acknowledged as effective tools in organizations. Research shows that the use of certain MCS is associated with higher levels of performance (e.g. Dossi & Patelli, 2010), facilitate decision-making (e.g Johnston, Brignall & Fitzgerald, 2002), higher motivation of employees (e.g. Godener & Söderquist, 2004) and innovation (e.g. Bedford, 2015), among others. In the same line, Management Control Systems can be deployed to control employees behavior, provide direction to the organization and foster organizational cultures and values (Laguir, Laguir & Tchemeni, 2019; Passetti, Battaglia, Bianchi & Annesi, 2021). As Simons (1994) shows, the same Levers of Controls can be used to pursue different organizational changes, providing an example of the flexibility of such controls and its importance in implementing strategic changes.

1.2 Problematization

"There are times when there is a major disruption that suddenly implies what worked so far is not going to work anymore and you need a new playbook."

These words by MIT professor Retsef Levi (Levi, Hirst & Carrier, 2021) if they were to be pronounced three years earlier, could have meant something completely different but nowadays, not anymore. If every person on the planet could be asked now to think about the most recent global disruption, they would probably answer, ' the Covid-19 pandemic'.

The start of the Covid-19 pandemic in early 2020 brought multiple consequences to the world, not only in terms of public health, but also political, economical and to the society as a whole. More than 6 million lives were lost around the globe, with responses and strategies varying immensely among countries (Kuhlmann, Hellström, Ramberg & Reiter, 2021; WHO, 2022; Yan, Zhang, Wu, Zhu & Chen, 2020). From day to night politicians needed to make difficult decisions with little information and unknown consequences.

How Covid-19 developed in Sweden can be considered as a 'special case', especially if it is compared with other European countries, or more closely, its Nordic neighbors (Yan et al., 2020; Yarmol-Matusiak, Cipriano & Stranges, 2021). The Swedish Government response to the virus did not rely on enforcement, in comparison to lockdowns and strict restrictions seen in other countries. The Swedish approach was primarily based on public health recommendations rather than impositions to the people. This was possible for different factors, such as a high trust in public entities, a decentralized government and a more loose Swedish culture (Yan et al., 2020). Some restrictions were in place, such as measures to reduce contact in shops, and prohibitions of meetings with more than 50 people and on-site higher education (Nielsen & Lindvall, 2021). The perspective adopted by Sweden was not exempt from criticism, with politicians, health experts and other governments arguing against the selected strategy. The impact of Covid-19 in the Swedish economy resulted in a -2,8% drop in GDP and the loss of over 69000 jobs during the first wave of Covid-19 alone, which, nowadays, have started to recover (Eliason, 2021; Jackson, 2021).

According to contingency theory, as organizations and environments can vary to a great extent, due to size, industry, structure and many more, there is not a one-fits-all approach, although all MCS have the same final goal of facilitating achievement of the different organizational goals. Because of this, to be effective, MCS need to be fitted to their environment and therefore, they are constantly evolving (Bedford, Malmi & Sandelin, 2016).

For managers, the pandemic brought an array of challenges that needed to be addressed urgently and with changing information. In Sweden, despite less restrictive rules, companies were subject to multiple limitations, global commerce was impacted, employees were at risk and some of them were sent home. Therefore, managers needed to think, re-evaluate and even change their strategies and operations to survive. Things to be considered were multiple, ranging from how to continue operations in manufacturing facilities while reducing risk of infection and dealing with supply chain disruptions, to how to keep track of employees' performance and motivation when people were working from home. Overall, the future was uncertain and definitely not business-as-usual, but MCS could be part of the solution.

Previous research has observed high uncertainty scenarios such as natural disasters and economic crises, finding that Management Control Systems and accounting were used by authorities and

managers as tools to deal with the challenges that those scenarios presented (e.g. Becker, Mahlendorf, Schäffer, and Thaten, 2016; Lai, Leoni & Stacchezzini, 2014). These systems were used, among others, to decrease uncertainty, provide accountability, organize new operational settings, and foster cooperation and trust in recovery processes (Passetti et al. 2021; Sargiacomo, 2014; Sargiacomo, Ianni & Everett, 2014). Therefore, the use of MCS could be an effective tool for managers to respond to the new scenario that the pandemic brought.

On the other hand, as noted by Passetti et al. (2021), the role of MCS in previous pandemics events has not been extensively researched. The Covid-19 pandemic provides a global opportunity for researchers to analyze how Management Control Systems were deployed and/or reorganized by managers to respond to uncertain environments along with the different and numerous challenges that Covid-19 brought to organizations around the world. Some authors have started to analyze the use of MCS in organizations to deal with Covid-19 challenges (e.g. Passetti et al., 2021), although, as the pandemic is a recent and still ongoing phenomenon, research on the topic, especially regarding the latest waves of the pandemic, has not yet been fully developed, making the current global scenario an interesting one for this study.

1.3 Purpose

In order to contribute to existing MCS literature in general, and especially the one related to the role of MCS in dealing with the Covid-19 pandemic in organizations, this thesis aims to provide a greater understanding concerning how Swedish listed companies used MCS when facing a shift to a highly uncertain scenario like the Covid-19 pandemic. Therefore, the research question that will be addressed is:

What was the role of MCS in organizations to deal with Covid-related challenges?

To better analyze the above mentioned question the thesis will look at three different aspects concerned with MCS that aims to create a better understanding of the role MCS played. The three different aspects are the following:

- *How were MCS used by organizations to deal with Covid-19 challenges?*
- *Were MCS effective tools for dealing with Covid-19 challenges?*
- *Was the use of MCS different between organizations regarding industry, size and perceived environmental uncertainty?*

For this study, Simons' (1994) Levers of Control (LOC) framework will be used, while also being complemented with Informal controls taking into consideration previous criticism on LOC. A quantitative research approach will be taken through the use of a self-completion

questionnaire, while descriptive statistics and statistical tests will be used to analyze the obtained results.

1.4 Outline

The remainder of the thesis is structured as follows. In the next chapter the literature reviews follows, where relevant theoretical concepts regarding MCS will be discussed. Along with those, contingency theory and the role of management and accounting in crises are also mentioned. Subsequently the method used for the study will be discussed, including, choice of companies, data collection, tests that were conducted and among other considerations taken into account when conducting the study. After the method chapter the findings will follow, where the results of the survey are presented. This is followed by the analysis of the findings along with discussion related to those findings. Finally, in the last chapter, the conclusion is presented, along with limitations to the study.

2. Literature review

2.1 Management Controls Systems

Management controls are a vast set of tools such as rules, budgets, performance measures, incentives, values and other practices that management uses to direct employee behavior in line with organizational goals (Anthony, 1965; Malmi & Brown, 2008). Since Anthony defined management controls in 1965 there have been multiple discussions on the scope and types of controls that managers exert in organizations.

Grabner and Moers (2013) provide an interesting debate on the study of MCs as a system or a package. They note that in order to tackle confusion around MCs it is necessary to first understand the role of MC as a system, meaning that there is a need of studying MCs with a holistic view with special emphasis on interdependencies among different controls. Malmi and Brown (2008) defined MCS as management controls that are not isolated but that instead, are complete systems while MC as a package can be the multiple MCS that co-exist within an organization.

Several frameworks and typologies have emerged to conceptualize MCS. Malmi and Brown (2008) address MCS as a package, providing a framework with 5 different types of controls (i.e. Planning, Cybernetic, Compensation, Administrative, Culture), with Cultural controls providing the foundations for the organization. Focusing on the object of control, Merchant and Van der Stede (2012) divide controls in four (i.e. actions, results, personnel, and culture). An interesting distinction in regard to Simons' Levers of Control (1994) is that his framework focuses on the use given to formal management controls rather than the controls themselves, as he notes that any control can be used in an interactive way by managers. Other authors have also taken this perspective of classification based on use as seen with enabling and coercive controls (Ahrens & Chapman, 2004), and direct and indirect (Haustein, Luther, & Schuster, 2014).

In this study, Simons' Levers of Control (LOC) is used as the reference framework. Although there have been critiques of the LOC by different authors in regard to use of vague conceptualization and for ignoring Informal controls (Fagerlin & Lövstål, 2020; Tessier & Otley, 2012), this framework provides a straightforward and generalizable application to how top managers can implement strategies in organizations with the use of MCS. With this criticism in mind, Informal controls are also analyzed.

2.2 Formal control

Formal controls are written mechanisms initiated by the managers that are aimed at controlling employees' behavior to accomplish certain objectives and implement the organization's strategy (Cardinal, Kreutzer & Miller, 2017; Jaworski., Stathakopoulos & Krishnan, 1993; Laguir, Laguir & Tchemeni, 2019). Formal control, along with Informal one, represent the two main ways managers exert control over their organizations. Unlike Informal controls, formal control tends to be predictable, regular and involve explicitly codified information in forms or rules and guidelines concerning how things should and should not be done and what is allowed and what is not (Richtner & Åhlström, 2010). Examples of this could be specific protocols that have to be followed when producing an item or guidelines on how financial documents should be filled out.

In this paper, formal control will refer to Simons' Levers of Control. Simons' LOC consists of four different key control systems, Diagnostic, Interactive, Beliefs and Boundary which the organizations use to implement their strategy (Laguir, Laguir & Tchemeni, 2019).

2.2.1 Diagnostic Control Systems

Diagnostic control systems are the first of the four formal control systems that Simons (1994) describes in his LOC. Simon (1994) describes Diagnostic control systems as formal systems the managers use to monitor the organization and its outcomes. Along with monitoring the organization's outcomes and results, Diagnostic control systems can be used to locate and correct deviations from pre-set standards within the organization (Tekavčič, Peljhan & Šević, 2008). Diagnostic control systems are also widely used by managers in organizations to monitor key performance variables, as some variables might be of high importance for the success of organizational strategy. In relation to this, Tekavčič, Peljhan, and Šević (2008) also discussed how Diagnostic control systems can help the managers as they themselves do not have to monitor the organization daily. Simons (1994) also argued for how Diagnostic control systems can be used by managers to communicate the organization's strategy to all its employees.

In contrast to Simon's (1994) description, Tessier and Otley (2012) instead discussed how Diagnostic control systems can be seen as a way for managers to exert control rather than a control system on its own. They further argue for this view as Diagnostic control systems only are looked at when deviations from the pre-set standards are observed and that Diagnostic control systems rarely are used when everything is going according to the organization's strategy. This argument can be combined with Bedford's (2015) description of Diagnostic control systems, where he classifies it as a negative system. The thought behind Bedford (2015) classification of Diagnostic control systems as negative falls back on how they focus the attention on deviations from pre-set standards and potential mistakes that can be made when attempting to implement a strategy. Bedford (2015) also discussed that Diagnostic control systems only provide the desired

outcomes but ignores looking at all the obstacles and procedures that have to be avoided and completed to achieve those outcomes.

2.2.2 Interactive Control Systems

Research literature has for a long time discussed whether performance measurements systems should be considered Diagnostic or Interactive (Tuomela, 2005). However, literature has now come to an agreement that performance measurement systems can be either Diagnostic or Interactive (Tuomela, 2005) and that they are connected to all four of Simon's LOC.

Both Tessier and Otley (2012) and Tuomela (2005) describe Interactive control systems as formal information systems that are used by managers to get a better understanding of and involve themselves in their subordinates' day-to-day activities. Simons (1994) pointed out that any control system that is Diagnostic can also be made Interactive, if top managers frequently pay attention and interest to it. Through turning a Diagnostic control system into an Interactive one, managers can enhance knowledge and enable continuous dialogue around it throughout the entire organization. By doing this, top managers can highlight what they see to be the biggest challenges for their (the managers) vision for the future of the organization and involve the entire organization in coming up with a better way of handling it. With Simons (1994) description of Interactive control systems it can also be related to Tessier and Otley's (1994) argument, where they discuss how the use of Interactive controls systems that focuses attention on uncertainties, can help the organization to bring forth new knowledge but also new strategies.

In line with the view on Diagnostic control systems, Tessier and Otley (2012) also discuss how Interactive control systems can be seen as a way the managers exert control rather than a control system on its own. But in contrast to the Diagnostic control systems, both Tessier and Otley (2012) and Bedford (2015) claim that Interactive control systems, along with Beliefs systems, can be categorized as positive control systems. Tuomela (2005) described how Interactive control systems can be seen as a system that emphasizes learning within the organization rather than controlling it, while Bedford (2015) described Interactive control systems as forward looking and inspiring for the organization. Bedford (2015) along with other authors has also noted that Interactive control systems have a positive effect on the organization's overall performance.

2.2.3 Beliefs systems

Simons (1994) describes Belief systems as formal systems that managers use to define, communicate and reinforce the purpose and core values of the organization. In extent to that, Beliefs systems are also used by managers to guide the organization in the right direction. Those Beliefs tend to take the form of formal documents such as mission statements and purposes of the organization that then are shared throughout it. Simons (1994) also mentions that Beliefs systems are sometimes formulated in a vague way so that they can appeal to more employees on

multiple levels. Tuomela (2005) discussed how the use of performance measurements can increase and support the control of an organization through the use of Beliefs systems. This argument falls back on the fact that performance measurements are an effective way for managers to communicate what they see to be important in the organization.

Beliefs systems are along with the Interactive systems classified as positive MCS, as they both help and promote the performance in the organization (Simons, 1994; Tessier & Otley, 2012). However, Tessier and Otley (2012) raise the point that Beliefs systems at times can be ambiguous and almost be comparable to Boundary systems. When discussing this, Tessier and Otley (2012) stated that Beliefs systems that put up to strict values can almost work as boundaries for the employees instead.

2.2.4 Boundary systems

Boundary systems, also part of formal control systems, are explicitly formulated restrictions and rules that managers create for the entire organization to follow (Simons, 1994). These rules and restrictions are created by managers through the use of business practices, directives, and planning systems in the organization. In addition, Boundary systems also include activities and objects that are to be avoided when conducting the day-to-day operations. Simons (1994) also summarized Boundary systems as behavior from the employees that can not be tolerated and should be avoided. Tessier and Otley (2012) described Boundary systems in an organization like brakes on a car, as without them the car cannot operate at full speed. The same concept applies for an organization, which can not be fully efficient without proper boundaries.

When new Boundary systems that are in contrast to what was previously allowed are introduced, it can create confusion and problems within the organization (Simons, 1994). There are multiple reasons why new Boundary systems can appear, e.g. new management, new strategies, or changes in the environment that creates uncertainty (such as Covid-19). However, Tessier and Otley (2012) raised the point that boundaries also can be liberating in contrast to being constraining. This argument can be further explained by the fact that boundaries not only put restrictions on what shouldn't be done, but in a way also portrays appropriate behavior and what should be done. Tessier and Otley (2012) also argue that organizations that already have boundaries perceived new boundaries to be less constraining than those organizations that did not previously have any or very few of them. Because of this, Boundary systems, along with Diagnostic control systems, are classified as negative systems as they put up minimum standards that must be met or states what is considered an unacceptable outcome. Bedford (2015) argued that Boundary systems tend to increase the effectiveness of the organization's Diagnostic control systems. To further explain this, Diagnostic control systems only provide the desired outcome of the organization without specifying how they are to be met, while Boundary systems act as a way to guide the subordinates towards those outcomes.

2.3 Informal control

In extent to formal control, Informal control is also important as it provides another layer of insight into how different management control systems can be designed (Laguir, Laguir & Tchemeni, 2019). While formal control systems delineate more concrete boundaries and directions for employees, Informal control systems try to achieve similar outcomes but through the use of common Beliefs, values and traditions. Those common Beliefs, values and traditions are also unwritten and often used by top management to influence the direction of projects and the behavior of the individual employees (Richtner & Åhlström, 2010). Akroyd and Kober (2020) describes Informal control as uncodified, not deliberately designed and including the firm´s unwritten policies. Akroyd and Kober (2020) further stated that Informal control differs from Formal control in both the way that they are explicitly designed or planned and the way they depend on people being involved in them to maintain them.

While Informal control systems might not be as obvious in design as formal ones, they are however equally effective (Laguir, Laguir & Tchemeni, 2019). However, even though Informal control systems are harder to design they can still be influenced by managers of the organization in an attempt to steer employees' behaviors (Cardinal, Kreutzer & Miller, 2017). According to Laguir, Laguir and Tchemeni (2019), Informal control systems can both be seen as a way to sustain formal control systems but also as a way to circumvent their use. This can be explained through the fact that Informal controls that promote a certain way of behaving, can either strengthen formal control systems that seek to promote similar behavior or even achieve the desired behavior all on its own. Jaworski, Stathakopoulos, and Krishnan (1993) found that companies that use Informal control can achieve higher performance in various contexts than those who only rely on formal control.

Jaworski (1988) described that Informal control often is associated with self-control, personal and cultural control. However, it's not always easy to distinguish formal and Informal control from each other as what is seen as formal control can be seen as Informal control from another perspective. Fagerlin and Lövstål (2020) mentioned that personal control which is commonly seen as a form of Informal control, in line with what Jaworski (1988) described can also be thought of as formal control when different recruitment policies and training programs for the employees are taken into account. On the contrary, it can also be argued that if Beliefs systems, which are part of Simons' levers of Control, are not formally documented, they can instead be thought of as a form of Informal control. Throughout this, it is clear that it is not always simple to categorize one form of control as either Informal or formal.

2.4 Contingency theory

The relation between management control systems and contingency theory is not new, its origins can be traced back to the 1970s, drawing from contingency theory of organizational structures

(Chenhall, 2006; Otley, 2016). Several studies and authors have challenged the one-fits-all perspective when it comes to choosing the MCS tools that are implemented, highlighting that it cannot be done in isolation from the environment where organizations operate (e.g. Bruns & Waterhouse, 1975; Gordon & Miller, 1976). Contingency theory states that management choices are a consequence of the contingent factors present in the organizational environment, and because of this, MCS design choices vary among organizations or even in the same one when those factors change (Otley, 1980). As noted by Fisher (1998), the success of MCS will depend on their proper fit with the contingent factors, expecting higher performance on those organizations that achieve such fit by adapting to environmental changes.

Numerous contingent factors surround organizations, and these can impact it in different ways. There is a high degree of variation on contingency-theory-based research because of the number of factors, conceptual differences and variety of different measures (Chenhall, 2006; Schmid & Kretschmer, 2010). Some authors have conducted reviews on the state of contingency-based research (Chapman, 1997; Chenhall, 2003, 2006; Islam & Hu, 2012) where they address some of the most common contingent factors in literature (e.g. external environment, size, and industry). When reading these articles a fruitful insight into the evolution of such contingent factors throughout time is observable, reflecting the mutating and adaptive nature of organizations. Due to the vast amount of existent factors, only some of them, relevant to this study, will be further discussed.

In regard to the organization's external environment and with a great importance for this study, a distinctive factor is uncertainty. Environmental uncertainty plays a major role in how managers determine which MC tools to use as noted by literature (e.g. Chapman, 1997; Chenhall, 2006; Islam & Hu, 2012) where more uncertain scenarios are associated with a focus on a more flexible use of tools. There is a distinction concerning two types of uncertainty, objective and perceived. Higher Perceived Environmental Uncertainty (PEU) is associated with the use of more sophisticated MC tools and greater use of MCS interactively as a resource to improve decision making by managers (Agbejule, 2005; Gul & Chia, 1994; Janke, Mahlendorf & Weber, 2014) and noted as one of the main relevant factors in MCS choices (Becker et al., 2016). Although a key factor, uncertainty is not the only one when it comes to an organization's external environment, with Chenhall (2006) also noting that turbulence, diversity, ambiguity, hostility and complexity, among others, had also been identified in past research. As previously mentioned, with time, contingent factors have evolved into more and more, adding additional pressure to organizations, with the increase in interorganizational networks, changing structures, and more public pressure on certain areas such as environmental issues and working conditions (Chenhall, 2006; Otley, 2016).

The role that size plays in organization's MCs can be better appreciated as firms grow, making use of more formal controls, standardization, role specialization and increased flows of

information (Bruns and Waterhouse, 1975; Merchant, 1981). Logically, size can be measured based on several different factors, such as employees, assets, sales and profits, although, as noted by Chenhall (2006) the number of employees is the most common between contingency-based studies, but the dimension of the MC under study needs to be considered when choosing the the way of measurement.

The industry in which the organization operates can be also a determinant of the MCS used. From a logical perspective, as industries vary to a great extent, it is expected that the use of MCS will differ from industry to industry. Authors have noted the role of industry in MCS decisions. Hitt and Tyler (1991) found that managers in one industry tend to consider the same criteria when making strategic decisions, which could explain why they tend to choose similar measures. As noted by Abdel-Maksoud, Dugdale, and Luther (2005), manufacturers of different products tend to focus more (less) on some non-financial measures depending on the product they make. Moreover, the results from Ely (1991) show how the relationship between executives' compensation and performance measures are different between industries, as these measures take into account specific characteristics of each industry that are able to effectively reflect executives' performance, and would not do it in a different one.

2.5 The role of accounting and management controls in crises

Accounting and MCS have been broadly used as tools to deal with uncertainty, not only in companies but at a societal level. Although the Covid-19 pandemic cannot be completely compared to a natural disaster, its magnitude and impact on the economy and society are even bigger than the ones from the Global Financial Crisis and the Ebola pandemic (Passetti et al., 2021). The exogenous nature of the pandemic (i.e. not caused by organizations) also needs to be considered, and hence, it cannot be simply treated as a regular crisis in organizations. Therefore, it is important to observe the role of accounting in other complex scenarios. Previous work has studied the role of accounting in recovering from natural disasters and economic crises. Accounting provides the capacity of giving accountability, keeping track of events and giving a sense of direction that could explain why contingency budgets, KPIs (e.g. infected people, ICU occupation, recovery times), and other accounting tools are being used by governments to deal with Covid-19 issues in these pandemic years and why companies could have probably done it in a similar way.

The work by Becker et al. (2016) provides an overview of the use of MC tools by companies (i.e. budgets) to respond to the challenges that arose from the Global Financial Crisis (GFC) of 2008. Their results show how in the turbulent times of GFC, managers increased the use of budgets for planning and allocation of resources purposes, and conversely, the use of budgets for performance evaluation purposes decreased. They also find that there was an increase in, drawing from Simons (1994), the interactive use of budgets as there were higher and more recurrent coordination efforts in the use of budgets, both internally and externally with

stakeholders, to continuously reassess the underlying assumptions in the budgets. Additionally, the use of *musts* and *cans* in regard to resource allocation signals the scarcity of resources present during crises (Khandwalla, 1978). These results are in line with the study of Pavlatos and Kostakis (2015), showing that during the GFC, Greek companies increased the use of strategic accounting tools in order to obtain better and more complete information to improve decision making, while some performance measures, such as ROI decreased its importance during the crisis.

A more interactive use of budgets aligns with the views of Khodarahmi (2009) of the importance of complete information, analysis and communications as key in effective crisis management. In the same line, Janke, Mahlendorf and Weber (2014) analyze the role of uncertainty in shaping MCS choices by managers during the GFC. Their findings show how when management's perception of the impact of the GFC changed, the interactive use of MCS increased, also noting a time-lag between the perceived impact of the GFC and the increased interactive use of MCS. Moreover, they also observe that there is an effect of the interactive use of MCS in the negative perception of the crisis, meaning that, the more MCS are used interactively to respond to the crisis, the merrier the perception of a negative impact from the GFC. This indicates that MCS could influence the environmental perceptions from managers in a reciprocal way (Janke, Mahlendorf & Weber, 2014).

Although the authors observed Icelandic and Danish banks through the lens of Malmi and Brown (2008) framework, the results by Rikhardsson, Rohde, Christensen, and Batt (2021) indicate that there is not an ideal response, but instead, banks coped with the GFC using a mix of mechanistic and organic controls to deal with their specific environmental changes, noting differences between both countries. In Iceland, clan controls and new corporate identity were in place to shape new values and external regulations pushed to increased mechanistic controls. Instead, Danish banks did not change neither the level of formalization nor their organizational values. There were similarities in some actions, such as the increase in use of non-financial measures and the use of control mechanisms to influence the perceptions of external actors.

In regard to the role of accounting in natural disasters, some authors have analyzed different events such as earthquakes (Sargiacomo, Ianni & Everett, 2014) and floods (Lai, Leoni & Stacchezzini, 2014) providing evidence on how accounting can be used in the recovery stages. The study of the Abruzzo region earthquake shows how accounting was initially used as a tool to assist the victims with the provision of public funds to overcome the disaster. The study also note that with time, the purpose of the deployed accounting systems mutated to a more traditional focus on accountability and cost prediction, sometimes becoming a hurdle to the people that was aimed to help, showing the struggle between two ethical demands, from victims and from supervisors (Sargiacomo, 2014; Sargiacomo, Ianni & Everett, 2014). Lai et al. (2014) show how an accounting system was deployed after the flood in the Veneto region in Italy providing

transparency and trust regarding teams' operations, suffered damages, costs and donations. Additionally, they note how the victims became active participants in the accounting process, and how the deployment of accounting practices facilitated cooperation and communication between the different parties.

In relation to this thesis and, although the Covid-19 Pandemic is a recent and still ongoing event, some authors have studied the role of MCS in dealing with Covid-19 in organizations. Passetti et al. (2021) analyze how both organic and mechanistic MCS were deployed in an Italian food cooperative. They observe how internally, MCS were used as a tool to coordinate and organize new operational settings, making employees aware of health and safety objectives. Moreover, management showed a more active financial control, with increasing and recurrent attention to cost and commercial information, while externally, MCS acted as a tool for building trust and dialogue with government authorities and other organizations. With a greater focus on health and safety controls, but still adding to above results, Passetti, Battaglia, Testa, and Heras-Saizarbitoria (2020) highlight the importance of Informal controls in combination with formal ones in organizations to ensure a proper and safe environment for workers.

3. Method

3.1 Research approach

This study aims to investigate the role of MCS in several organizations and how they were used to deal with the challenges related to Covid-19, because of this a quantitative approach is more fitting. This was based on the fact that quantitative research allows researchers to collect information from a greater number of respondents, which in this case, allows the study to take more perspectives into account. While at the same time it allows the authors to collect numerical data that can be used to observe patterns and to perform comparisons by conducting statistical tests. Bryman and Bell (2011) stated that a quantitative approach aims to explore the diversity of a topic within a specific context. In this study, this refers to the challenges Covid-19 brought with it.

While using a qualitative approach would allow for greater depth regarding the role of MCS in a reduced number of organizations, a quantitative approach instead offers insight into how more companies have dealt with Covid-19. While previous literature states that authorities and managers often depend on MCS when facing uncertain situations, it becomes interesting to study to what extent different organizations used their MCS (Becker et al., 2016; Lai, Leoni & Stacchezzini, 2014). Using a quantitative approach also makes the results from the study more generalisable then those from a qualitative study, as it includes the perspective of more subjects.

3.2 Data collection and study sample

3.2.1 Data collection

The data in this study was collected through the use of a survey instrument (i.e. self-completion questionnaire) sent to top managers of listed Swedish companies. The choice of a self-completion questionnaire as the survey instrument instead of interviewer-administered questionnaires was based on time restrictions and greater possibilities of the former to reach more respondents at a lower cost and greater convenience (Easterby-Smith et al., 2015). The collected data from surveys was later summarized together to create descriptive statistics that are presented under the *Survey Design and Implementation* in table 1 and under the *Findings* chapter in table 4. Along with the descriptive statistics, statistical tests were conducted on the collected data, to check for statistical significance, which are presented under the *Findings* chapter.

Considerations regarding the questionnaire are discussed further below under *Survey Design and Implementation.* Moreover, previous relevant literature was collected through the use of search engines and databases (i.e. Google Scholar and LUB Search). For such purposes, articles were found using keywords (e.g. Formal controls, MCS, Covid-19 management, Contingency theory). Additionally, relevant articles were also found using snowballing techniques (i.e. using references lists from relevant articles to find additional ones).

3.2.2 Study Sample

When conducting the study, it was decided to focus on companies within three industries. Those industries, in accordance with the Swedish Standard Industrial Classification (SNI) were the following: *Retail trade, Manufacturing,* and *Professional, scientific and technical activities (*referred in the study as *Professional Service Firms)*. Within *Professional, scientific and technical activities*, law and accounting, management consulting, head offices and advertising firms were used. The choice of such industries partially relies on the fact that they have been previously studied from the perspective of Simons' LOC. Martyn, Sweeney, and Curtis (2016) discuss how both manufacturing and professional service firms have been the focus of previous studies using a Simons' LOC perspective. Simons (1994) also notes that effects in the retail industry can be observed rather quickly. Therefore, as there is already a better understanding of how companies in these industries use different control systems, analyzing the differences when the impact of Covid-19 is considered is a possibility. Along with this Martyn, Sweeney, and Curtis (2016) also mention that geographical areas can have an impact in MCS.

Another interesting reason for the choice of industries is, as these industries are different from each other, different solutions are expected due to the variation of the Covid-19 impact in their operations. Therefore, a bigger depth can be added to the study. This argument can be further strengthened when taking into account that professional service firms can conduct their work remotely to a greater extent, while retail and manufacturing are greatly constrained in doing so. In addition, retail and manufacturing companies are further set apart when considering that retailers have direct interaction with the final customers, while the latter are dependent on managing employees in factories to continue manufacturing operations. Therefore by analyzing these three different industries, a broad set of challenges is expected. Although these challenges faced by the different industries might differ, the LOC perspective focuses on the use of controls rather than the control itself, allowing a comparable analysis among the different sectors.

Once the industries were chosen, and before sending out the survey instrument to companies, selection criteria was set for the companies that were to be included in the study. First, all companies in the sample had to be currently active companies. This was both meant to increase the likelihood of responses along with ensuring that companies have been active during Covid-19 as that is the main focus area of the study.

Second, all companies had to be publicly traded in Sweden (i.e. listed companies). This criteria was set for three reasons. First, the advantage of access to additional information contained in public registers and transparency in regard to top management members. Secondly, listed companies have a defined top management structure in charge of the strategic direction, ensuring that the targeted candidates (i.e. top managers) have the necessary knowledge to respond to the survey. Third and lastly, as Simons' LOC framework addresses the role of formal controls in

organizations, the authors considered listed companies, under public scrutiny, to have an acceptable level of formalization that some non-listed companies might not have.

While an equal number of companies for all industries would have been ideal, the number of companies in the retail industry that fit the criteria for the study was very limited. This meant that the number of retail companies in the sample is lower than those of the other two categories. Bryman and Bell (2011) noted that the larger the sample size is the smaller the sampling error will be. Therefore, a total of 247 surveys were sent out to different companies.

3.3 Survey Design and Implementation

As noted above, the data collection for this study is based on a self-completion questionnaire (see Appendix A) sent to companies' top managers. When designing the questionnaire two types of questions were used. The first type of questions are those already present in the literature, while the second ones are new questions based on existing literature. In both cases, as the used articles were not referring to the Covid-19 pandemic, questions were adapted to this scenario. The questionnaire consists of 45 questions divided into 7 sections that are explained below. The questions have four different response formats, being the majority of them a Likert scale (1-7) (see Appendix D), and the remaining ones, multiple-choice, short-answer and one final open question. The authors did not include any mandatory responses in the questionnaire, this was done to prevent respondents from leaving the questionnaire incomplete in case they miss or do not understand a question, although it was acknowledged that this could affect the results. To reduce the likelihood of respondents not answering all the questions, it was stated that questions regarding identity and the final question were optional, that might lead respondents to think that the rest of them were not.

Before section 1, an introductory text is present. This text contains information regarding the thesis topic, the structure along with an estimated duration of the survey, instructions and information regarding data collection and confidentiality. Although the majority of this information was already in the email sent to possible respondents, it was again included to ensure the clarity of instructions for respondents in line with Bryman and Bell (2011).

Section 1 consists of 11 questions, from which the first five are control questions referring to company name, size (i.e. number of employees), financial performance, parent company location, and global presence. The following questions are referred to Perceived Environmental Uncertainty (PEU), represented by Predictability of changes in six dimensions identified as relevant in the literature (i.e. supply, demand, regulatory environment, company survival, employees, and competition). The used questions are from Bedford and Malmi (2015) and also were revised based on the articles by Agbejule (2005), Miller (1993), and Tapinos (2012).

Section 2 is the first section related to Simons' LOC (1994). It consists of ten questions referring to the Diagnostic and Interactive use of controls during the Covid-19 pandemic in firms. For this section, questions by Bedford (2015) were adapted and used.

Section 3 consists of five questions that refer to the use and effectiveness of Boundary systems in relation to the Covid-19 pandemic in the firms. For this section, questions by Bedford (2015) and Bedford, Malmi, and Sandelin (2016) were adapted and used.

Section 4 consists of five questions that refer to the use and effectiveness of Beliefs systems in relation to the Covid-19 pandemic in the firms. For this section, questions by Bedford (2015) and Bedford, Malmi, and Sandelin (2016) were adapted and used.

Section 5 consists of five questions that refer to the use and effectiveness of Informal controls in relation to the Covid-19 pandemic in the firms. For this section, the questions were developed based on relevant articles by Bedford, Malmi, and Sandelin (2016), Ferreira and Otley (2009), and Laguir, Laguir and Tchemeni (2019).

Section 6 consists of five questions that refer to the effectiveness of MCS in relation to the Covid-19 pandemic in the firms. For this section, the questions were developed based on relevant questions in Bedford, Malmi, and Sandelin (2016) and the article by Laguir, Laguir and Tchemeni (2019).

Lastly, section 7 contains an open and optional question giving the respondents a choice to provide any additional information on the role of MCS during the Covid-19 pandemic. Giving the respondent a chance to answer an open question can provide a fruitful insight into a topic that is not developed in the survey but can still be relevant to the study (Bryman & Bell, 2011).

All the above mentioned sections in the survey, along with the email and introduction text sent out with the survey were designed in English and later translated to Swedish before the survey was sent out in Swedish. The reasoning behind this is that the study is conducted in Sweden, with the aim of the Swedish market. Through sending it out in Swedish, the authors aim to reduce the number of misinterpretations that might occur if the questions were to be in another than the native language of respondents.

The questionnaire was sent to possible respondents by email, with a brief description of the topic, information about data collection and a response deadline. Participants were offered the survey in two formats (i.e. google forms and interactive PDF). This dual option was based on possible company policies against opening internet links (i.e. google forms) that could affect the response rate. Additionally, participants were offered the option to receive a copy of the finished thesis afterwards. Contact information was also provided for possible inquiries. The full Survey

sent out can be found in Appendix A and the English version of the survey can be found in Appendix B.

In table 1 below some descriptive statistics over the responses obtained from the survey can be seen. As seen under the number of respondents it shows that no response was obtained from the *Retail* industry. Along with this a single respondent did not specify which industry they are in, which is shown in the table by *other*. When it comes to the positions of the respondents in table 1, almost all of the respondents are top managers, apart from one (production manager). However, as this respondent was part of a small firm (i.e. 7 employees) it is unlikely that he/she did not have sufficient knowledge to provide valid answers. Table 1 also presents the number of employees along with the number of countries the companies are active in, in a few different brackets. Interestingly a few very large companies both in terms of employees and countries chose to participate in the survey, resulting in a wide range of companies. Lastly, table 1 shows how the respondents financial situation (i.e. return on assets) was before the pandemic began in comparison with competitors (1: Worse, 7: Better). The scale used for this question can be found in Appendix D (figure 2).

Table 1. Descriptive statistics over the obtained responses from the survey.

Number of respondents	**28**	**Employees**	
Manufacturing	17	1-50	8
Professional Service Firms	10	51-100	3
Retail	0	101-500	7
Other	1	501-1000	4
		1001-10000	4
		>10000	2
Job Positions		**Countries**	
CFO	6	1-10	19
CEO/acting CEO	14	11-25	4
Finance*	4	26-50	3
Other**	4	>50	2

**Includes head of finance and Investor relations*

***Head of communication, Chief of staff, Production Manager*

Financial performance							
Score	***1***	***2***	***3***	***4***	***5***	***6***	***7***
n	1	2	1	11	5	5	3

3.4 Reliability, validity and ethical considerations

3.4.1 Reliability

When conducting a study, it is necessary to ensure that its results are both reliable and valid. First, reliability refers to the study being repeatable. A reliable study can be performed under similar circumstances at a later point and it should yield results resembling those of the original study (Bryman & Bell, 2011).

As this study focused on three industries and the companies chosen within those industries are taken from a public register, all information used to choose the companies is available to the public. This should therefore mean that this study has a high reliability. While the reliability overall can be seen as high in the study, the fact that this study focuses on the response from companies to Covid-19, might decrease the replicability of the study. Considering that the Covid-19 pandemic is the most significant one in the last 100 years (Vesci, Feola, Parente & Radjou, 2021), and taking into account that a similar study would need similar circumstances, certain aspects of the study will be hard to replicate.

3.4.2 Validity

The validity in a study refers to whether the findings in the study are related to those of what the authors intend to study. This means that a study that succeeds in measuring what it intended to measure can be considered to have a high validity (Bryman & Bell, 2011; Yin, 2009). When discussing validity in a quantitative study, *measurement validity* is the main focus (Bryman & Bell, 2011). Measurement validity (also known as constructed validity) refers to how well the measures that the study uses reflect what is intended to be measured. As the study attempts to investigate and analyze how different companies have chosen to deal with Covid-19 through the use of management control systems, the survey is based on both previously used and self-developed questions based on existing literature as explained further above. Considering that the articles used for the questions do not address the Covid-19 pandemic, adaptations have been made to provide a Covid-19 perspective. This should result in a high measurement validity in our study, as the questions in the survey will better reflect what they intend to measure (Bryman & Bell, 2011). In addition, all data used in this study was collected from organizations' top management, including, but not limited to, CEO, CFO and directors. The reasoning behind the choice of top managers is that they are assumed to have the necessary knowledge to answer the survey. This is because top managers are directly involved in the strategic direction of organizations, and the Covid-19 pandemic impacted several aspects related to this (e.g. supply, demand, operations, regulations).

In addition to measurement validity, external validity of the study is also of high importance. External validity refers to how the study is designed and to what extent the results of the study

can be generalized on a bigger scale (Bryman & Bell, 2011; Yin, 2009). As previously mentioned, this study originally attempted to look at three different industries, although no responses from retail companies were received. Those industries were chosen as they operate differently from each other, and through that the study should better be able to capture how more companies have adopted their management control to deal with Covid-19. The inclusion of more companies and from different industries should increase the external validity as it reflects multiple different actors operating in different environments and backgrounds. On the other hand it is acknowledged that as this study uses a convenience sample, results cannot be generalized to the same extent that they could be if random samples were used (Easterby-Smith et. al, 2015).

Before the survey was sent out to all companies in the sample, the survey was sent out to a single company for additional feedback. This was done to control that the respondent understood what was being asked, and it gave the authors the opportunity to adjust and change possible questions in the survey that were unclear, before it was sent out to the entire study sample. According to Bryman and Bell (2011) this will increase the validity of the study further as it gives the authors the chance to reformulate potential unclear questions. In addition, it also gives the authors the chance to remove or add questions depending on the feedback. From the received feedback, two questions were reformulated to better reflect what they intended to measure. Additionally, the feedback included interesting suggestions about adding questions referring to emotional management. On the other hand, as concerns about the length of the survey were also raised, and taking into account that emotional management is not related to Simons' LOC, no additional questions were added to the survey.

3.4.3 Ethical considerations

As some of the data can be considered sensible the entire survey was made anonymous to protect the integrity of the organizations (Bryman & Bell, 2011; Easterby-Smith et. al., 2015; Sipes, Mullan & Roberts, 2020). Both the survey and the email that was sent out with the survey specified that the answers the respondent provided were anonymous and that participating in the survey was done at the organization's own will, which is in agreement with Bryman and Bell (2011) description of information consent.

With this in mind, respondents were asked to provide the name of their organization, although such information was only used to keep track of responses. In addition, respondents were also asked to fill in their position in the company to verify that the person responding to the survey had sufficient knowledge. All collected data was also handled with utmost confidentiality and being only accessible to the authors.

3.5 Data Analysis

To analyze the collected data from the survey it is important to consider the type of tests that will be conducted. As the survey mostly contains Likert-scale questions (i.e. ordinal data), non-parametric tests are needed (Easterby-Smith et al., 2015).

Regarding the use and effectiveness of MCS during the Covid-19 pandemic in Swedish companies, simple data analysis techniques are used, using descriptive statistics (i.e. mean, SD, min and max) and correlation tables. Additionally, a paired samples t-test was used to test for statistical differences between the use of different controls. Moreover, to test for differences in the sample, two non-parametric tests are used (i.e. Mann Whitney U and Kruskal Wallis). Although both tests intend to capture differences between groups, Mann Whitney U can only be used to compare two groups, while the Kruskal Wallis test is used with more than two groups. Considering that the comparisons are done based on several factors (i.e. Industry, Size, and PEU) both were necessary.

To conduct the tests, the statistical software SPSS was used. Original data was exported from Google Forms to Excel for data cleansing (e.g. remove irrelevant data and translate responses). Once this process was completed, data was imported to SPSS for conducting statistical tests.

3.5.1 Variables definitions and measurement

As observed under *Survey Design and Implementation,* the questionnaire was divided into 7 sections related to different constructs. To conduct the statistical analysis, those constructs were operationalized into 7 different variables as seen in table 2 and table 11 (see Appendix F). As noted in table 2, some of the used variables are present in previous literature, while other variables were self-developed based on relevant literature. Previously validated measurements were used to the extent that they were available, and when new measurements needed to be created appropriate guidelines were followed (MacKenzie, Podsakoff & Podsakoff, 2011). In line with Abdi & Williams (2010), Principal Component Analysis (PCA) was used to determine the exclusion of items when creating the variables. Additionally, Cronbach Alpha was used to assess reliability of the reflective constructs. As seen on table 11 (see Appendix F), only one item of *Boundary Systems* (i.e. Use of sanctions) was dropped due to a very low PCA weight (i.e. <0.10).

Table 2. Definition and measurement of used variables.

Variable	Definition and measurement
Perceived Environmental Uncertainty	**Ability to predict changes in the organizational environment.** Measured as the average of six items regarding Demand, Supply, Regulatory Environment, Competitors (Malmi & Brown, 2008), Employees, and Company Survival (Self-developed).
Diagnostic Systems	**Formal control systems used by top managers to monitor organizational outcomes and correct deviations from preset standards of performance (Simons, 1994).** Measured as the average of five items regarding the use of PMS and/or budgets in the organization (Bedford, 2015).
Interactive Systems	**Formal control systems used by top managers to regularly and personally involve themselves in the decision activities from subordinates (Simons, 1994).** Measured as the average of five items regarding the use of PMS and/or budgets in the organization (Bedford, 2015).
Boundary Systems	**Formal control systems used by top managers to establish explicit limits and rules which must be respected (Simons, 1994).** Measured as the average of five items regarding the use of codes of conduct, guides and procedures, sanctions, communication of risks and importance to align behavior (Bedford, 2015; Bedford, Malmi & Sandelin, 2016).
Belief Systems	**Formal control systems used by top managers to define, communicate, and reinforce the basic values, purpose, and direction for the organization (Simons, 1994).** Measured as the average of four items regarding the codification of values and purpose before and during Covid-19, communication of values and purpose during Covid-19, and importance to align behavior (Bedford, 2015; Bedford, Malmi & Sandelin, 2016).
Informal Controls	**Controls systems that foster an organizational climate through common values, beliefs and traditions that direct the behavior of group members (Laguir, Laguir & Tchemeni, 2019).** Measured as the average of five items regarding the use of Informal controls during the pandemic (self-developed based on Bedford, Malmi & Sandelin, 2016; Ferreira & Otley, 2009; and Laguir, Laguir & Tchemeni, 2019).
Effectiveness of MCS	**Ability of MCS to facilitate dealing with Covid-related challenges.** Measured as the average of four items regarding the effectiveness of MCS during the pandemic (self-developed based on Bedford, Malmi & Sandelin, 2016, and Laguir, Laguir & Tchemeni, 2019).
Size	**Amount of employees (Chenhall, 2006).** Divided in three categories (Small: 1-49, Medium: 50-249 and Large: +249) according to the Organization for Economic Co-operation and Development (OECD) classification.
Industry	**Classified in accordance with the Swedish Standard Industrial Classification (SNI).** Divided in three industries (Manufacturing; Professional Service Firms; and Other).

3.6 Research method considerations

As mentioned above under *Survey Design and Implementation*, the chosen research strategy is a survey instrument (i.e. self-completion questionnaire), being the most suitable for the purpose of this study. Despite its convenience and suitability, this research approach has not been exempt from criticism, which will be discussed below.

Self-completion questionnaires can present difficulties to respondents if questions are not correctly understood, and without the assistance of an interviewer, this can compromise the obtained results (Bryman & Bell, 2011). To prevent this, once the preliminary questions were ready with assistance from the thesis supervisor, the questionnaire was reviewed by a manager for feedback, and additionally, the questions were also sent to other native Swedish speakers, in order to ensure correct wording and spelling. Lastly, contact information was provided for possible inquiries from respondents.

Another potential concern with the use of internet questionnaires is the difficulty of ensuring that the right person is responding to the questions. In this regard, three preventive measures were taken. First, in the initial screening for contact information, only top management emails were collected in line with Saunders, Lewis, and Thornhill (2007). Additionally, in the email sent to companies, it was asked of the recipients that in case they did not have the necessary knowledge to respond, to forward the email to the right person in the company. Lastly, although optional, respondents were asked about their role in the organization. Considering that the questionnaire was responded by one top manager for each organization, it is possible that they might intend to portray the company in a favorable way (Bryman & Bell, 2011).

Lastly, response rates of this type of instrument are acknowledged for their low responses that can affect the obtained results. The number of questions (i.e. 45) in the survey could potentially also act as a limiting factor, meaning that potential respondents could have chosen not to answer as they found the survey too long to be completed. In line with Bryman and Bell (2011), email reminders were sent out at two different occasions to increase response from companies. From a total of 247 candidates that received the questionnaire, 9 responses were received after the original email. A week after, the first reminder was sent to those candidates who had not responded at the time, receiving 5 additional responses. One final reminder was sent a week after the first remainder, resulting in 14 additional responses. Therefore, a total of 28 responses were received, with a response rate of 11.33%. Although it is acknowledged that the response rate is low, when using convenience sampling a low response rate is less of a concern than in random samples (Bryman & Bell, 2011).

4. Findings

The questionnaire was completed by 28 companies. As mentioned under *Survey Design and Implementation,* there were no mandatory questions for respondents. Because of this, some questions were left unanswered by managers. From the 28 respondents, 24 responded the entire survey, 2 responded all questions except from 2, and lastly, the remaining 2 left 4 questions unanswered in the same section. Considering that there were 45 questions in total, the incomplete questionnaires were included in the results.

4.1 Use of controls

Considering that the main objective of this study is to understand how MCS were used by organizations during the Covid-19 pandemic, it is important to analyze the different controls used by companies. For such purposes, some initial observations regarding correlations are mentioned. Moreover, descriptive statistics of the observed variables introduced under *Data Analysis* are presented in table 4 with some observations, while each variable is individually analyzed and discussed separately under *Analysis and discussion* below.

*Table 3. Spearman's Rho bivariate correlations. * Significant at 5% (2-tailed); ** Significant at 1% (2-tailed).*

Variable		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Diagnostic Use	(1)	1,000														
Interactive Use	(2)	**,786****	1,000													
Belief Systems	(3)	**,525****	**,600****	1,000												
Boundary Systems	(4)	**,465***	**,741****	**,778****	1,000											
Informal Controls	(5)	**,501****	**,468***	**,465***	**,502****	1,000										
Effectiveness MCS	(6)	**,707****	**,501****	,310	,233	**,472***	1,000									
Manufacturing	(7)	-,045	,005	-,254	-,128	,036	,032	1,000								
PSF	(8)	,088	-,042	,153	,046	-,046	-,082	**-,927****	1,000							
Other	(9)	-,107	,095	,275	,216	,024	,122	-,239	-,143	1,000						
Small Firms	(10)	-,304	**-,382***	**-,432***	**-,517****	-,103	-,017	**,509****	**-,471***	-,122	1,000					
Medium Firms	(11)	-,040	,226	**,382***	**,465***	,133	,029	-,007	-,153	,413*	-,295	1,000				
Large Firms	(12)	,306	,173	,098	,112	-,009	-,005	**-,456***	**,544****	-,207	**-,679****	**-,501****	1,000			
LowPred	(13)	,266	,292	,159	,093	-,194	,158	-,042	,086	-,111	,183	-,269	,041	1,000		
MedPred	(14)	-,100	-,199	-,204	-,172	,294	-,045	,073	-,125	,132	-,073	-,078	,126	**-,839****	1,000	
HighPred	(15)	-,267	-,129	,103	,156	-,206	-,257	-,061	,083	-,053	-,175	**,595****	-,298	-,160	-,403*	1,000

First, the correlation matrix (table 3) shows some initial observations that can be made regarding the general use of controls. As observed, all the controls in the study are positively and significantly correlated with each other. This indicates that, although to different extents, companies tend to use all of them rather than choosing one over another, which is also notable in table 4 below.

Table 4. Summary statistics over what extent different controls were used.

Variable	n	Mean	SD	Minimum	Maximum
PEU	28	3.63	0.94	1.67	6.00
Diagnostic Use	28	3.87	1.67	1,00	6.80
Interactive Use	28	4.71	1.71	1.20	7.00
Boundary Systems	28	5.30	1.44	2.25	7.00
Beliefs Systems	28	4.84	1.32	1.75	7.00
Informal Controls	28	4.00	1.85	1.00	7.00
EffectivenessMCS	26	3.03	1.75	1.00	7.00

Some other observations can be drawn from table 4. Regarding Perceived Environmental Uncertainty (PEU), captured by the predictability of changes in the environment (1: not predictable at all, 7: very predictable) (see Appendix D, figure 3), it is seen that uncertainty is present (mean of 3.63) and without high variation among firms (SD of 0.94). When observing the use of controls (1: not used at all; 7: used to an extremely large extent) (see Appendix D, figure 1) it is clear that they were all in fact used, providing an initial answer to the main research question, although there are some visible differences between them. Both Diagnostic and Informal control systems present a moderate use (means of 3.87 and 4.00 respectively) while Interactive controls appear to have a more relevant role in companies during Covid-19, being used close to a large extent (mean of 4.71). In regard to Boundary and Beliefs systems, they present the highest means of use (5.30 and 4.84 respectively) and the lowest SD (1.44 and 1.32 respectively) indicating that from all controls, they appear to have a central role in the deployment of MCS during the pandemic and that there is low variation in their use among all the observed firms. Lastly, it is interesting to note the low mean (3.03) and SD (1.75) observed in Effectiveness of MCS, indicating that most managers did not perceive the usage of MCS as effective in dealing with the pandemic in their organizations.

For further analyzing the use of controls, paired samples t-test were conducted in SPSS. As seen on table 12 (see Appendix G), the use of Boundary systems is significantly higher compared to the rest of controls while Beliefs systems use, although significantly higher than Diagnostic and Informal controls, it does not differ significantly from the use of Interactive Controls (p-value = 0.626). Lastly, no significant differences are found between the use of Diagnostic and Informal controls (p-value = 0.690).

4.2 Effectiveness of MCS

The results indicate a notable low value regarding the overall effectiveness of MCS to handle the pandemic as seen in table 4 (mean of 3.03). This indicates that companies did not find MCS in general to be very useful when facing the challenges brought forward by Covid-19. On the other hand, one question in the survey referring to the development of new performance measures

related to the impact of Covid-19 indicated that companies found those new measures to be highly effective, although only 7 companies out of 28 actually developed any new measures.

In order to better understand the effectiveness of MCS during Covid-19, Spearman's Rho Correlation matrix can be used to further analyze the relations between Effectiveness of MCS and the use of controls along with other relevant variables. As observed in table 3 there is a strong (coefficient of 0.707), positive and statistically significant (1% level) correlation between the effectiveness of MCS and the Diagnostic use of controls. In the same line, there is also a positive and statistically significant at 1% level correlation, although not as strong, between effectiveness of MCS and the interactive use of controls (coefficient of 0.501). The use of Informal controls also presents a positive and statistically significant (5% level) correlation with Effectiveness (coefficient of 0.472), while the rest of control systems (i.e. Boundary and Beliefs) do not present statistically significant correlations with Effectiveness of MCS. In regard to the additional observed variables (Industry, Size and PEU) the observed values do not indicate significant correlations with the Effectiveness of MCS.

These correlations potentially indicate that in those companies where a more intensive use of Diagnostic, Interactive and Informal controls was present, a greater effectiveness of MCS was perceived by managers.

4.3 Differences between organizations

To address the third aspect of the research question in this study (i.e. Was the use of MCS different between organizations regarding industry, size, and perceived environmental uncertainty) three factors are taken into consideration to conduct the analysis of differences in the use of MCS. All these factors have been found relevant in contingency theory literature and applicable to the Covid-19 pandemic as noted under *Literature Review.* First, summary statistics divided by the different groups are presented, and subsequently, the results from the tests are observed. As noted under *Data Analysis,* two types of non-parametric tests are conducted depending on the amount of groups for each factor. For Size and PEU (i.e. 3 groups each factor), Kruskal-Wallis tests are conducted while for Industry (i.e. 2 groups), Mann Whitney U is used.

In regard to Industry, although the initial aim of the study was to analyze three industries, only responses from Manufacturing, Professional Service firms and one unknown industry were received (table 1). Due to the fact that only one company industry was not identified, its inclusion was not considered useful for the analysis, and therefore only Manufacturing and Professional Service firms are analyzed. Initially, the difference of respondents between industries in the sample is evident, with almost twice the amount of responses from Manufacturing firms. From table 5 below, greater Diagnostic use of controls, Boundary and Beliefs systems is observed in Professional Service Firms (means of 4.10, 5.35 and 5.03 respectively). Conversely, the use of Informal controls shows similar means (4.02 and 3.92) on

both groups, while a greater interactive use is observed in Manufacturing firms. In regard to the effectiveness of controls, Manufacturing firms also show increased effectiveness compared to Professional Service ones. Additionally, SD in Manufacturing firms are lower than those from Professional Service, with Informal Controls being the exception.

Table 5. Use and effectiveness of MCS, grouped by Industry (Manufacturing and Professional Service firms).

	Manufacturing					Professional Service Firms				
Variable	**n**	**Mean**	**SD**	**Min**	**Max**	**n**	**Mean**	**SD**	**Min**	**Max**
Diagnostic Use	17	3.80	1.70	1.00	6.80	10	4.10	1.74	2.00	6.60
Interactive Use	17	4.76	1.55	1.80	7.00	10	4.56	2.10	1.20	7.00
Boundary Systems	17	5.18	1.40	2.25	7.00	10	5.35	1.56	2.25	6.75
Beliefs Systems	17	4.62	1.19	2.25	7.00	10	5.03	1.48	1.75	7.00
Informal Control	17	4.02	2.04	1.00	7.00	10	3.92	1.69	1.00	6.40
Effectiveness MCS	16	3.03	1.74	1.00	7.00	9	2.92	1.93	1.00	5.75

From table 6, it is noted that no significant differences were found between Manufacturing and Professional Service Firms, neither regarding the use of MCS nor the Effectiveness of such systems.

Table 6. Mann-Whitney U test for differences between industries (Manufacturing and Professional Service firms).

	Diagnostic Use	**Interactive Use**	**Beliefs Systems**	**Boundary Systems**	**Informal Use**	**Effective Use**
Mann-Whitney U	78.000	81.500	64.500	76.500	80.500	66.500
Wilcoxon W	231.000	136.500	217.500	229.500	115.500	111.500
Z	-0.352	-0.176	-1.032	-0.429	-0.226	-0.316
Asymp. Sig.	0.725	0.860	0.302	0.668	0.821	0.752
Exact Sig.	,749b	,863b	,309b	,675b	,824b	,760b

For the size of companies, the number of employees is used as the determining factor for each category. Regarding the different categories, the most common categorization considering the number of employees, according to the Organization for Economic Co-operation and Development is used as reference (OECD, 2022). Therefore, three categories are created: Small (1-49), Medium (50-249), and Large (+249). With these parameters, as seen in table 7, the sample consists of 8 Small, 5 Medium and 15 Large organizations. From table 7, clear differences are noted between groups.

Regarding the use of controls, Small firms show lower means on every aspect, indicating a general lower use of controls, both formal and Informal, when compared to medium and large firms. While larger firms have the greatest extent of Diagnostic use of controls (mean of 4.36),

medium firms show greater use of all remaining controls, with especial emphasis on the use of Boundary and Beliefs systems (means of 6.60 and 5.75 respectively) and Interactive controls (mean of 5.48). It is also noted, regarding the use of controls, that all groups have relatively low SD (under 2), indicating homogeneity within groups. Despite the above mentioned differences between, Boundary and Beliefs systems means, it indicates that within all groups, they were the most used controls, along with having the lowest SD of all controls.

Despite the extensive use of some controls, it is also evident that top managers did not perceive the use of MCS as an effective tool to deal with Covid-19 related challenges, considering the low values among the three groups. Regarding variation within groups, it is seen that large companies have a greater variation (SD of 2.06), potentially indicating that there is a greater heterogeneity regarding the perception of effectiveness between top managers.

Table 7. Use and effectiveness of MCS, grouped by Size (Small, Medium and Large).

	Small (1-50 employees)					Medium (51-250 employees)					Large (+251 employees)				
Variable	**n**	**Mean**	**SD**	**Min**	**Max**	**n**	**Mean**	**SD**	**Min**	**Max**	**n**	**Mean**	**SD**	**Min**	**Max**
Diagnostic Use	8	3.13	1.47	1.20	5.60	5	3.60	1.93	1.00	5.80	15	4.36	1.63	2.00	6.80
Interactive Use	8	3.83	1.28	1.80	5.80	5	5.48	1.45	3.60	7.00	15	4.93	1.87	1.20	7.00
Boundary Systems	8	4.22	1.16	2.25	6.00	5	6.60	0.38	6.00	7.00	15	5.43	1.40	2.25	7.00
Beliefs Systems	8	4.00	1.29	2.25	5.75	5	5.75	0.73	5.00	6.75	15	4.98	1.36	1.75	7.00
Informal Control	8	3.65	1.90	1.00	5.40	5	4.52	1.95	2.60	7.00	15	4.03	1.89	1.00	7.00
Effectiveness MCS	8	2.85	1.44	1.00	4.50	4	3.13	1.48	1.00	4.25	14	3.10	2.06	1.00	7.00

For the purpose of comparing the different groups, and taking into account that three different groups are present (i.e. Small, Medium and Large firms), a Kruskal-Wallis test was conducted. The results from the test observed in table 8 indicate that in fact, there are statistically significant differences between different groups of companies in regard to the use of Beliefs and Boundary systems. Post-hoc tests were conducted to further analyze these differences. These tests indicated that statistically significant differences were present between Small and Medium firms regarding the use of Beliefs Systems (Test statistic=12.100 and Adj. Sig.=0.029) and Boundary systems (Test statistic=14.563 and Adj. Sig.=0.005) with a greater use of both systems by Medium sized firms. Moreover, the Kruskal-Wallis test did not indicate other statistically significant differences regarding the use of other controls nor the effectiveness of MCS.

Table 8. Kruskal-Wallis H test for differences between firms´size (Small, Medium and Large).

	Diagnostic Use	Interactive Use	Beliefs Systems	Boundary Systems	Informal Controls	Effectiveness MCS
Kruskal-Wallis H	2.994	4.326	6.952	10.113	0.598	0.023
df	2	2	2	2	2	2
Asymp. Sig.	0.224	0.115	0.031	0.006	0.742	0.989

In order to check for differences between organizations regarding Perceived Environmental Uncertainty, a subjective categorization was needed to divide the companies. For this purpose, the variable regarding Perceived Environmental Uncertainty was used. Organizations were divided into three categories, taking into consideration the predictability of environmental changes during Covid-19. The categories are LowPredictability (1-3), MedPredictability (3.01-5), and HighPredictability (5.01-7). With this criteria, seven companies are categorized under LowPredictability, 19 under MedPredictability, and the remaining two companies fell under the category HighPredictability, which was expected to some extent, considering the impact that Covid-19 has had on several aspects of the environment. Both of those companies in HighPredictability did not answer the questions regarding Effectiveness of MCS, being the reason why no values are included in table 9.

From table 9, as an initial observation, a greater use of both Diagnostic and Interactive controls is seen in those companies that perceived changes in the environment to be more unpredictable (means of 4.57 and 5.43 respectively). This group also presents the greatest use of Beliefs Systems with a mean of 5.29 and a low SD of 1.08, although this system has also been used close to a large extent by firms in the other two groups (means of 4.65 and 5.13). On the other hand, it is interesting to note that those companies perceiving changes as very predictable have the greatest use of Boundary systems, although the low number of companies in the group potentially distorts the trustworthiness of the result. Moreover, both Boundary and Beliefs systems were used to a large extent in LowPredictability firms, considering that the minimum observed values are 3.75 and 4.00 respectively. Regarding the use of Informal controls, the greatest use is seen among MedPredictability firms (mean of 4.39), while its use decreases notably in the other two groups. Lastly, the effectiveness of MCS was not perceived to be important by top management, as it showed low values for both groups (Low and Med).

Table 9. Use and effectiveness of MCS, grouped by predictability of the environment (Low, Medium and High).

	LowPredictability					MedPredictability					HighPredictability				
Variable	**n**	**Mean**	**SD**	**Min**	**Max**	**n**	**Mean**	**SD**	**Min**	**Max**	**n**	**Mean**	**SD**	**Min**	**Max**
Diagnostic Use	7	4.57	1.49	2.60	6.60	19	3.80	1.66	1.20	6.80	2	2.10	1.56	1.00	3.20
Interactive Use	7	5.43	1.81	1.80	7.00	19	4.52	1.72	1.20	7.00	2	4.10	0.71	3.60	4.60
Boundary Systems	7	5.57	1.17	3.75	7.00	19	5.09	1.57	2.25	7.00	2	6.25	0.35	6.00	6.50
Beliefs Systems	7	5.29	1.08	4.00	7.00	19	4.65	1.45	1.75	7.00	2	5.13	0.18	5.00	5.25
Informal Control	7	3.37	1.91	1.00	5.40	19	4.39	1.85	1.00	7.00	2	2.60	0.00	2.60	2.60
Effectiveness MCS	7	3.36	1.66	1.00	5.75	18	3.01	1.80	1.00	7.00	0				

For the purpose of comparing the different groups a Kruskal-Wallis H test was conducted. The results from the test observed in table 10 indicate that no statistically significant differences are found between the observed groups, despite the patterns described in the paragraph above.

Table 10. Kruskal-Wallis H test for differences between firms' PEU (LowPredictability, MedPredictability and HighPredictability).

	Diagnostic Use	Interactive Use	Beliefs Systems	Boundary Systems	Informal Controls	Effectiveness MCS
Kruskal-Wallis H	3.299	2.484	1.139	1.036	2.584	2.059
df	2	2	2	2	2	2
Asymp. Sig.	0.192	0.289	0.566	0.596	0.275	0.357

5. Analysis and Discussion

5.1 Use of Controls

5.1.1 Diagnostic Control Systems

Tekavčič, Peljhan, and Šević (2008) argued that Diagnostic control systems are commonly used by top management daily to get a better overview of the organization, while they also note that when implemented, Diagnostic controls alleviate the time-consuming task of managers personally monitoring the organization, only acting in case of deviation of pre-set targets. This managing by exception approach (Simons, 1994) with a greater focus on outcomes can be very useful in certain scenarios where processes are well established and underlying conditions are stable, while under different conditions, they might not be ideal.

In the case of Covid-19, as observed in table 4, uncertainty was indeed present. Therefore managers could not be abstracted from the daily operations of the firm waiting to act when deviations occur, but instead a more active participation was needed, potentially explaining the low use of Diagnostic controls observed in table 4. In this line, as noted by one of the respondents in the open question, a very clear crisis management process was used during the pandemic (see Appendix E, respondent 4), showing a clear differentiation from the ordinary process under normal conditions.

One of the purposes of Diagnostic control systems is to identify critical variables and set targets for such variables. As the pandemic is an evolving and volatile phenomenon, these variables could change at any time, while the targets that seem reasonable today might not be reasonable tomorrow, reinforcing the argument against management by exception that defines Diagnostic control systems. This is in accordance with Becker et al. (2016), as they noted how in an uncertain scenario like the Global Financial Crisis, the use of MCS to assess performance of employees declined significantly due to the decoupling of targets and budgets with reality. In the same line, Passetti et al. (2021) mention that during the pandemic Italian managers struggled with planning due to the uncertainty, needing to constantly redefine budgets.

Moreover, Tessier and Otley (2012) among other literature noted that Boundary systems along with Diagnostic control systems together make up what is defined as the negative part of Simon's LOC. This leads to an interesting observation where Boundary systems is the most used control system by top management while Diagnostic control systems are the least used (mean of 5,22 and 3,92 respectively).

5.1.2 Interactive Control Systems

In comparison with Diagnostic controls systems, Interactive controls systems were used to a higher extent among top management considering the values observed in table 4 (means of 3.87 and 4.71 respectively). These results are in line with the observations by Janke, Mahlendorf and Weber (2014) during the GFC. As noted by Simons (1994), the goal of Interactive controls systems is to address those strategic uncertainties that could invalidate the organizational strategy. During the pandemic, different strategic uncertainties arose, therefore, the use of Interactive controls systems was expected at least to some extent. By analyzing the different purposes for which these controls are used some interesting observations can be made.

One of the purposes of Interactive controls systems is to foster dialogue and communication throughout the organization (Simons, 1994). Coordination is a key aspect in uncertain scenarios, therefore increased flows of dialogue were needed. Interactive control systems provide top managers the opportunity to involve themselves in subordinates' activities and give them a greater understanding of operational knowledge, allowing them to identify opportunities or threats to the firm's strategy (Simons, 1994). In relation to this, as the pandemic development was highly volatile, constantly focusing attention on these uncertainties and the possibility, for both top managers and subordinates, to challenge and debate the company strategy were needed. This can be better reflected by one of the respondents in the last question of the survey, highlighting three key aspects of their pandemic management: importance of constant information, active top management involvement on monitoring of KPIs, and close customer contact to be aware of new business opportunities (see Appendix E, respondent 2).

By fostering dialogue, solutions and debates can arise from different sources within the organization, which is an advantage in a complex and unprecedented situation like the pandemic where strategies might need constant and novel adjustments. Interactive control systems do not only rely on single-loop learning but instead, they foster double-loop, providing the opportunity of critical reflection (Matsuo & Matsuo, 2017).

Conversely to Diagnostic controls, Tessier and Otley (2012) classified Interactive control systems as positive ones, relating them to learning, motivation and guiding. In this regard it is interesting to observe that there is a highly significant and positive correlation between Interactive control systems and both Boundaries (i.e. negative control) and Beliefs systems (i.e. positive control). This can be related to the brakes in the car metaphor used by Tessier and Otley (2012), indicating that although positive controls can enhance learning and motivation, they still require the use of negative ones to ensure that the limits are clearly established.

5.1.3 Boundary Systems

When observing table 4, it shows that Boundary systems are the control systems from Simon`s LOC that were most favored by top management to better handle the challenges brought forward by Covid-19 (mean value of 5,30). On the other hand, it is interesting to mention that the question referred to the use of punishment and sanctions regarding breaches to Covid-19 rules revealed a really low use of such punishment in organizations among all respondents. This can be related to the fact that managers could have been more focused on preventing future risky misbehavior (e.g. that could increase risk of infection) rather than actually sanctioning employees who incurred in such misbehavior, therefore communication of risks rather than actual sanctions and punishment could be more effective. This is especially relevant in an uncertain environment not only for managers but for employees themselves, with the risk of more severe punishment being considered as unfair (Mooijman & Graham, 2018).

One important aspect of Boundary systems is the use to communicate risks. As Covid-19 is a global phenomenon that changed the expectations for the future in multiple areas, it is clear that a lot of companies worked hard on communicating those risks to their employees. One of the respondents noted “Overall, we were more uncertain about the consequences and the future, in the beginning of Covid, around march 2020. After a few months the situation felt somewhat more overseeable.” (see Appendix E, respondent 6), which reflects the importance of communicating risks and awareness.

Considering that Covid-19 is an easily transmitted disease, multiple preventive measures were needed. In line with government responses (i.e. restrictions, recommendations and guidelines), it is not strange that companies have taken similar approaches to deal with Covid-19, which can be reflected in the overall extensive use of Boundary systems observed in table 4. This argument is in line with the findings of Passetti et al. (2021) where an extensive use of action controls was present during Covid-19 to control for the risk of infection and the safety of employees and customers. Moreover, as noted by Tessier and Otley (2012), companies that are already using Boundary systems are more likely to accept new boundaries. This could potentially be a reason why top management chose to approach the challenges brought forward by Covid-19 with the use of Boundary systems to the extent that they did in companies where codes of conduct and rules were already present.

5.1.4 Beliefs Systems

The results provided in table 4 show that Beliefs systems were also used close to a large extent during Covid-19 (mean of 4.84). Beliefs Systems comprise different aspects, namely, formal codification of values and purpose, active communication of values and purpose, and the importance of Beliefs systems to direct employee behavior in line with organizational strategy.

The extended use of Beliefs systems was not surprising to some extent, not only because of its importance in motivating and guiding employees and to drive strategy (Simons, 1994), but also due to all the firms being listed companies. This is related to the role of mission, vision and purposes in brand identity and the purpose of the organizations that potential investors take into account (Ingenhoff & Fuhrer, 2010). Such attributes were noted to be highly present in companies' websites during the collection of contact information.

As noted by Simons (1994), the purpose of Beliefs systems is to provide a common guide for strategic direction. To achieve such a purpose, management does not only need to codify core values and purpose but also actively communicate those throughout the organization in order to foster a shared sense of purpose in the firm. By fostering shared values and purpose, employee motivation and resilience can also be enhanced (Passetti et al., 2021).

In a complex scenario, not only for the organization but for employees themselves, the need of communicating core values and purposes is evident. As Beliefs systems can also be important to align subordinate behavior, this could potentially indicate a reinforcing effect of controls (i.e. Boundary and Beliefs systems) taking into consideration the importance of Boundary systems during the pandemic and the observed strong, positive and highly significant correlation between both systems (0.778). This argument is in line with Passetti et al. (2021), where cultural controls (i.e. values and beliefs) not only were used to guide and motivate employees, but also to facilitate the application of action controls (i.e. Boundary systems) in Italian organizations during the pandemic.

5.1.5 Informal Controls

The inclusion of Informal controls in this study was of high importance due to several criticisms in literature regarding their non-inclusion in Simons' LOC (e.g Collier, 2005; Fagerlin & Lövstål, 2020). From the results of the survey it is clear that all four aspects of formal control along with Informal control were used to some extent by the companies to handle Covid-19. However, Informal controls were among the least used controls by top management in handling the challenges related to Covid-19 as seen on table 4 (mean of 4,00). As Informal control consists of beliefs, values and policies but in *unwritten forms* (Akroyd & Kober, 2020), it would make sense that top management would want to rely more on *written* procedures, like those of formal control, when facing the uncertain future that Covid-19 brought. Laguir, Laguir, and Tchemeni (2019) discussed how Informal controls are harder to design which can also help explain why they were not used to the same extent as formal controls.

Informal controls can either be used to sustain or a way to circumvent the use of formal controls (Laguir, Laguir & Tchemeni, 2019). A low use of Informal controls along with a greater use of formal ones is seen on table 4, in addition to the positive and significant correlations between Informal controls and all the formal ones observed in table 3. This could indicate a more

supportive role of Informal controls in the observed companies. It is however interesting to note that table 4 shows that Informal control has the highest standard deviation of 1,85 of all controls. This implies that while the majority of the companies did not use Informal controls to a great extent there were a handful of companies that did. Kreutzer, Cardinal, Walter, and Lechner (2016) note how previous literature suggested that Informal controls would be used in substitute of formal controls to a greater extent when the organizations faced uncertainty. However, they discussed that there was very little evidence to support those claims being true. This study only helps to support the opposite, meaning that Informal controls appear to be used to a smaller extent by organizations when faced with uncertainty during the pandemic.

5.2 Effectiveness of MCS

The obtained results regarding the effectiveness of MCS deployed during the pandemic are interesting. Table 4 indicates an overall low perceived effectiveness of MCS when facing the pandemic challenges (mean of 3.03). As mentioned above, those companies that developed new performance measures to reflect the impact of Covid-19, perceived those to be very effective, while the overall effectiveness of MCS is notably low.

Considering that there are several articles indicating the facilitating role of MCS, the results were surprising. To shed light on this, the correlation matrix was also observed. Results in table 3 show a positive and statistically significant correlation between effectiveness of MCS and Diagnostic control systems (coefficient of 0.707 at 1%), Interactive control systems (coefficient of 0.501 at 1%), and the use of Informal controls (coefficient of 0.472 at 5%). Without considering the low effectiveness of MCS perceived by managers, the statistically significant correlations are in line with Bedford, Malmi, and Sandelin (2016) where increased effectiveness was associated with an extended use of both Diagnostic and Interactive control systems. Moreover, the correlation between Informal control systems and effectiveness is also seen in Gackstatter, Müller-Stewens and Möller (2019), where they find how the combined use of Informal and formal can enhance the quality of the information provided by MCS, highlighting the previously mentioned supporting role of Informal controls.

The correlation coefficients indicate that neither the use of Boundary nor Beliefs systems were associated with effectiveness of MCS by companies during Covid-19, which contrasts with the obtained results discussed in previous sections as Boundary and Beliefs systems are among the most used levers. In that regard, both Boundary and Beliefs systems are noted, in literature and suggested by the observed results, as being an important tool during the pandemic. Considering this, a possible explanation for the phenomenon is that respondents could have a narrower view on MCS, rather than a holistic perspective where Boundary and Beliefs systems are included. Respondents could be more focused on the financial use of formal controls (i.e. budgets and PMS) in line with Kraus and Lind (2010) and the use of Informal controls to align employees.

Although this was considered beforehand and conceptual definitions for clarification purposes were included in the survey.

One possible reason behind the low effectiveness is the nature of the pandemic. As Covid-19 was an exogenous phenomenon, organizations did not have any other choice than adapt to it. It is possible that for some of the respondents, due to the nature of their operations, their industry or other reasons, this adaptation could have been smoother than for other firms. Some companies might have been able to implement the necessary controls to deal with Covid-19 without disrupting their normal operations to a great extent while others could have not been so fortunate.

As noted by Drazin and Van de Ven (1985), management controls need to match the contingent factors surrounding the organization, and to be internally consistent. Respondent 4 indicated the pre-existence of a crisis management plan (see Appendix E, respondent 4) which was thoroughly followed during the pandemic. As the questionnaire did not contain any question regarding contingency plans, it was not possible to observe if other respondents also had similar procedures. However, two other respondents also indicated pre-existing procedures for remote work which facilitated dealing with the pandemic (see Appendix E, respondents 1 and 5). As these plans were in place before Covid-19, they were most likely very well fitted to their organizations. This is also strengthened with the high perceived effectiveness of newly developed performance measures related to Covid-19, as these measures reflect the specific impact of the pandemic in each organization. On the other hand, considering those companies where no such plans were existent such adaptation could have been more difficult, and therefore less effective if the necessary MCS were not internally consistent, although being consistent with the contingent factors surrounding the firm.

Moreover, considering the examples of the respondents that had existing crisis and remote work plans, it is also possible that, although these plans are actually part of MCS (i.e. planning), they were not perceived as such by managers when answering the survey, as the three respondents perceived the use of MCS to be of low effectiveness.

5.3 Differences between organizations

5.3.1 Industry

When observing table 5, it shows that Manufacturing firms tend to use Interactive controls, Informal controls and perceived the use of controls to be more effective than Professional service firms. Professional service firms instead use Diagnostic controls, Boundary systems and Beliefs systems to a larger extent than Manufacturing firms. However, while there are differences between the industries, these are not major. When observing table 6 (Asymp. Sig.) this is confirmed as there are no statistically significant differences between the industries when it comes to the use of any of the different controls. In the same line, the correlation matrix (see

table 3) does not show any statistically significant correlation between any of the industries and the use or the effectiveness of MCS.

The lack of statistically significant differences can be explained by the fact that although these industries operate differently, they could have handled the pandemic in a similar way. First, due to the nature of the pandemic, rules and guidelines were needed, and to some extent required by governments, which explains the extended use of Boundary systems. These rules and guidelines were probably different between the industries, addressing different concerns adapted to specific scenarios, such as new manufacturing guidelines or digital meetings in Professional Service Firms, although both aiming to reduce the risk of infection. Moreover, Beliefs systems address the values and purpose of the organization (Simons, 1994), and can also act as a complement of Boundary systems. Therefore, it is reasonable that during the pandemic, where not only the organization is affected but also employees themselves, this system was deployed to provide guidance and motivation.

Regarding Interactive and Diagnostic control systems, in this study their concept relates to how budgets and PMS were used during Covid-19, but does not define any type of budget nor PMS. In line with Janke, Mahlendorf and Weber (2014) and Passetti et al. (2021), a greater use of Interactive controls systems and a lower use of Diagnostic control systems in both industries is seen, although the used PMS or budgets were most likely different between industries. In the same line, the use of Informal controls, although different between industries, can be used to support or circumvent the use of formal ones in an organization (Laguir, Laguir & Tchemeni, 2019). As discussed further above, the low use of informal controls and the greater use of formal ones indicate a supportive role of formal controls on both industries.

5.3.2 Size

The results in table 7 shows a general lower use of controls in smaller firms. Smaller firms tend to have smaller less formalized structures that do not extensively rely on established controls (Chenhall, 2006). This observation regarding the low overall use of controls in small firms is reflected in the statement from respondent 3 (see Appendix E) who noted that they do not consider the use of any controls as part of their daily operations. The argument by Chenhall (2006) and statement from respondent 3 is further strengthened by the correlations observed in table 3, with statistically significant negative correlations between small firms and the use of Interactive, Boundary and Beliefs systems. On the other hand, positive and statistically significant correlations are seen between medium firms and the use of Beliefs and Boundary systems that can be associated with more formalized controls as firms grow. With this said, the Kruskal-Wallis test only showed significant differences between the use of Beliefs and Boundary systems between small and medium firms, while the rest of controls and their effectiveness did not show statistical differences between the groups.

Drawing from the literature review further above, the lack of statistical differences between the groups was not expected. One important consideration regarding the use of formal controls in this case, is that all the observed firms are listed companies, and as Kraus and Lind (2010) noted, investors and analysts tend to influence the choice of MCS used by firms. Therefore, it could be expected that investors and analysts push for a more formal and financial approach rather than an informal one in these firms no matter their size, regarding the use of Diagnostic and Interactive control systems. In addition to this, the use of Diagnostic and Interactive control systems in this study depends on how budgets and PMS were used during Covid-19. PMS and budgets can vary immensely between the different organizations as noted in the previous section, therefore it is possible that top managers have used these in a similar way (i.e. diagnostically and/or interactively), although they were different from each other.

It is noted that large firms did not show statistical differences neither with small nor medium firms in the use of Boundary and Beliefs systems. As seen in table 7, despite being the group with the least amount of companies, medium firms have the lowest SD regarding the use of Boundary and Beliefs systems. It is reasonable that as a sample gets larger, SD tends to decrease and not the opposite, therefore the observed values are interesting. Further analysis showed that from the five medium firms, four were manufacturers of complex products (3 of electronics and 1 of pharmaceuticals) and present very homogeneous values on the use of both systems, which is in line with contingency theory (i.e. similar size and industry). With this said, it is possible than the other two groups (i.e. small and large companies), with a greater diversity of firms, varied to a greater extent that makes it difficult to show any significant result.

5.3.3 Perceived Environmental Uncertainty

When analyzing how the companies perceived the environment during Covid-19, it is observed that companies in general felt uncertain about how the future was going to look, which can be seen in table 4 (PEU, mean 3,63). An important aspect to consider is that uncertainties were related to multiple dimensions (i.e. demand, supply, regulators, survival, employees, and competitors). Therefore, it was expected to see uncertainty among managers. One of the respondents noted "The company has been affected partly by regulators and governments, which lead the company to readjust their marketing and investments between different countries based on the current regulations", (see Appendix E, respondent 1). This statement shows how the regulations put on the companies could force the companies to change strategies. This observation is in line with Islam and Hu (2012) who discusses that organizations strategies to a large extent are influenced by how they perceive the environment.

When observing the value regarding PEU, it is clear that uncertainty was present. On the other hand, the value is near to the neutral zone of 4 (i.e., neither predictable nor unpredictable). Two possible arguments for this are drawn from the open responses. First, one respondent noted the existence of a crisis management plan that was thoroughly followed during the pandemic (see

Appendix E, respondent 4), while two other respondents also mentioned the existence of a remote work planning (see Appendix E, respondents 1 and 5). Therefore, the existence of plans beforehand could decrease uncertainty (Becker et al., 2016). This is relevant, especially considering that in this study, environmental uncertainty was measured based on managers perception rather than an objective measure. Moreover, it is also relevant that when measuring uncertainty, managers were asked about the development of the entire pandemic, not a particular moment in time. As one respondent commented, the future was more uncertain at the beginning of the pandemic, but as time went by, uncertainty started to decrease (see Appendix E, respondent 6). It is possible, especially considering that the study has been conducted at the later stages of the pandemic, that initial greater uncertainty decreased with time, therefore different results could be obtained if the questions were to be referred to the beginning of the pandemic in 2020.

While a few differences between how the companies perceived the environment and their use of different controls can be observed from table 9, neither of those observed differences has shown to be statistically significant (table 10). In the same line, no statistical correlation was found between the use or effectiveness of MCS with any of the categories of PEU. Only medium firms were positively and highly statistically correlated with HighPredictability, although considering that only two firms are in this group, this could be a random coincidence.

Although the lack of statistical significance between the observed companies can be unexpected, some analysis can be drawn. First, as noted above it is possible that all companies were forced to use Boundary (e.g. Covid-19 guidelines and procedures) and Beliefs systems (e.g. for motivation and support of Boundary systems) to some extent. Moreover, Janke, Mahlendorf and Weber (2014) mention that by using Interactive control systems, managers become aware of the impact that a crisis has on an organization and all the issues that could arise. In this line, it is not unlikely that this has happened among organizations, especially considering the development of Covid-19 with the different waves, back-and-forward decisions, constant new information and guidelines. Therefore, all managers, although differing in how they perceived the environment, were forced to actively involve themselves to know if, how and where Covid-19 was affecting their firms. As Simons (1994) noted, any diagnostic control can be made interactive with sufficient attention from top management. Therefore in this case, if managers use budgets and PMS in an interactive way during Covid-19, it is reasonable to observe a lower diagnostic use of the same tools in the same period.

6. Conclusion

This thesis aimed to study the role of Management Control Systems during the Covid-19 pandemic in Swedish listed companies. While only a limited number of companies participated in the survey, some valuable conclusions can still be drawn.

In regard to the use of MCS, the initial results indicate that, although to different extents, all the studied controls were used by top management to deal with Covid-19 challenges in organizations. Boundary systems were deployed to the greatest extent in all organizations while Beliefs systems also show extended use. These results are not surprising, not only because they are in line with previous research, but due to the nature of the pandemic where risk of infection was high and rules were needed along with the importance of motivation, resilience and purpose to overcome these uncertain times. It is interesting to note that despite the high use of Boundary systems, sanctions and punishment were barely used among respondents. On the other hand, the use of Diagnostic controls turned out to be amongst the least used controls which is not surprising as Diagnostic controls tend to be used to handle deviations from standards and pre-set targets, which is hard to do when the environment is uncertain and the best procedures are not known by top managers. As a response to this, top management appears to have relied more on Interactive controls systems, as these allow them to be actively involved in subordinates activities and to challenge and debate the company strategy. Due to the non-written nature of Informal controls, these appear to have been used more in a supportive role rather than in a way to avoid the use of formal controls.

Despite the overall use of MCS during the Covid-19 pandemic, the results indicate a rather low perceived effectiveness of controls. As the pandemic was an external crisis, organizations had to rapidly adopt their controls to the uncertain environment instead of what was consistent with their strategy. A few of the respondents noted that they had plans in place, meaning that they already had ways to deal with Covid-19 suited to their firms. Those who had plans did not perceive MCS to be as effective, which can also indicate a misconception of MCS, considering that planning can be considered a part of MCS. The importance of MCS being consistent with the organization was also seen in those firms that developed new performance measures related to the impact of Covid-19, as these new measures were suited to each organization and were perceived to be highly effective.

The initial results from the survey implied that there were differences in the use and effectiveness of MCS between companies according to industry, size and PEU. The performed tests however showed that only statistical differences existed between small and medium companies, where medium companies used Beliefs and Boundary systems to a greater extent than small ones. Moreover, to test for differences, the contingent factors were analyzed individually rather than together. By doing this, the interactions between these factors are not observed and therefore, the possibility of obtaining different results remains. Also, dividing the firms in different groups can

affect the significance of results as smaller samples are associated with low statistical power Button, Ioannidis, Mokrysz, Nosek, Robinson, & Munafò, 2013).

6.1 Contributions

This thesis has contributed to the knowledge of the role of MCS during Covid-19 in Sweden. Although there are some studies regarding the role of MCS during Covid, none of these was conducted in Sweden. As Sweden chose to deal with Covid-19 in a different way when compared with European and other Nordic countries, this can enrich the discussion on the different approaches concerning how MSC were used in the times of a crisis. In addition, some of the results of this study regarding the use of controls strengthen the findings of previous studies. A greater Interactive use of budgets and PMS during uncertain times is in line with Janke, Mahlendorf and Weber (2014) and Becker et al. (2016), while the use of Boundary and Beliefs systems during Covid-19 concords with the findings of Passetti et al. (2021). In this regard, it was also found that during the pandemic, Swedish companies did not apply punitive measures regarding Covid-19 rules, which is not found in the study by Passetti et al. (2021).

6.2 Limitations to the study

Although this study has contributed to the literature concerning the use of MCS during the pandemic, there are certain limitations to it. Limitations regarding the research approach have been previously discussed under *Research methods considerations.* In addition, other aspects need to be mentioned. A limited number of companies in the *Retail* category met the criterias to participate in the study. Unfortunately none of those companies chose to partake in the study, resulting in a more limited analysis between two industries, instead of the intended three.

Moreover, the inclusion of only listed Swedish companies meant that a lot of potential respondents were left out of the study. Although including either companies outside Sweden or including non-listed companies (or both), could increase response rate, there were reasons not to do so. In this regard, choosing listed companies rather than non-listed was based on transparency and expected levels of formalization, considering the use of Simons' LOC framework, while proximity and language was the reason why only firms in Sweden were included. Considering the above, the study could have benefited from having lower restrictions to participate, which altogether could have increased the response rate and broadened the analysis, but availability of time was an important factor to consider.

Lastly, regarding the inclusion of Swedish companies only, how Sweden managed the pandemic has differed from other Nordic and European countries, with an approach based on less restrictions and mostly recommendations (Yan et al., 2020; Yarmol-Matusiak, Cipriano & Stranges, 2021). Therefore, there could have been differences between the use of MCS in other countries that need to be considered by readers when analyzing the results.

6.3 Future research

For future research it would be interesting to investigate how companies in other Nordic countries chose to deal with the Covid-19 pandemic and how their responses differed from those of Swedish companies. This is based on the cultural similarities between Nordic countries and how the Swedish government response to Covid-19 differed from their Nordic neighbors. Cultural aspects have been previously noted as influential in MCS choices (Malmi, Bedford, Brühl, Dergård, Hoozée, Janschek, Willert, Ax, Bednarek & Gosselin, 2020) as well as contingent factors such as the regulatory environment (Chenhall, 2006). Therefore, differences could arise. Conversely, an additional avenue to explore is comparing countries that responded similarly to Sweden, but that differ in cultural aspects.

In addition to the above mentioned approaches to further research it would also be interesting to involve more industries as it would create more generalisable results. This would also include non listed companies as they do not face the same public scrutiny as listed companies which in turn could mean that they reacted differently. Moreover, a qualitative approach would also be interesting as it would create a more in-depth reasoning behind why certain MCS are preferred over others and provide a better understanding of which aspects top management takes into account.

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Appendix A - The Survey

On the following pages the survey sent out to the respondents can be seen.

The Survey was sent out on three separate occasions, first to all companies and then a second and a third time as a reminder to those who hadn't already answered or stated that they didn't want to participate in the survey.

The Survey is divided into seven sections. The first section contains five control questions along with five questions concerning the environment the company operates in. The second to fourth section consists of questions referring to Simons LOC. The fifth section contains questions concerning the effectiveness of informal control. Section six contains questions referring to the effectiveness of MCS in relation to the Covid-19 pandemic in the firms. And finally, the seventh section contains an open question if the company wanted to add something they felt wasn't brought up in the survey.

Section		Question	Answer
General	**1.1a**	Namn på företaget (endast för att hålla koll på vem som svarat, undersökningen är anonym)	Short Answer
	1.1b	Vilken position på företaget har du? (exempelvis, VD, Vice VD, CFO, Ekonomiansvarig)	Short Answer
	1.2	Vilken industri befinner sig företaget huvudsakligen i?	Multiple Choice
	1.3	Hur många anställda är det på företaget?	Short Answer
	1.4a	Hur många länder bedriver företaget verksamhet i?	Short Answer
	1.4b	I vilket land är moderbolaget registrerat?	Short Answer
	1.5	Hur presterade ert företaget jämfört med era konkurrenter, vid Covidpandemins början 2020? (räntabilitet på totalt kapital, 4 motsvarar genomsnittligt för branschen)	Likert scale
PEU	**1.6**	Hur förutsägbara var förändringarna i efterfrågan från kundernas under av Covidpandemin?	Likert scale
	1.7	Hur förutsägbara var förändringarna från leverantörernas sida under Covidpandemin?	Likert scale
	1.8	Hur förutsägbara var förändringarna i konkurrensen inom branschen under Covidpandemin?	Likert scale
	1.9	Hur förutsägbara var företagets möjligheter till överlevnad under Covidpandemin?	Likert scale
	1.10	Hur förutsägbart var det i vilken utsträckning de anställda skulle påverkas under Covidpandemin?	Likert scale
	1.11	Hur förutsägbar var inverkan av Covid på företagsmiljön och dess regler under Covidpandemin? (exempelvis, regler från staten, standarder, regler från huvudkontoret, fackliga riktlinjer)	Likert scale
Diagnostic Use		***I vilken utsträckning använde högsta ledningen sig av prestationsmått (nyckeltal) (både finansiella samt icke-finansiella) och/eller budgetar för följande...***	
	2.1	identifiera viktiga prestationsvariablar som är relaterade till effekten av Covid-19 (t.e.x antalet sjukskrivna, affärer som tvingats stänga pga Covid-19, Covid-19s påverkan på företaget)	Likert scale
	2.2	sätta mål för viktiga Covid-19 relaterade prestationsvariablar	Likert scale
	2.3	ändrat målsättningen för viktiga prestationsmått som påverkats av Covid-19 (exempelvis, hur såg försäljningsprognoserna ut? sänktes målen, ökades de eller behålls de på samma nivå)	Likert scale
	2.4	övervaka utvecklingen av viktiga prestationsmått som påverkats av Covid-19	Likert scale
	2.5	ta fram information för att korrigera avvikelser från tidigare utsatta målsättningar som påverkats av Covid-19	Likert scale
Interactive Use		***I vilken utsträckning använde högsta ledningen sig av prestationsmått (nyckeltal) (både finansiella samt icke-finansiella) och/eller budgetar för följande...***	
	2.6	ta fram en återkommande och frekvent agenda för högsta ledningens arbetsuppgifter som påverkats av Covid-19	Likert scale
	2.7	ta fram en återkommande och frekvent agenda för de underordnades arbetsuppgifter som påverkats av Covid-19	Likert scale
	2.8	möjliggöra kontinuerlig debatt om utmaningar, antagande, strategi och planering för underordnade och ledningen med hänsyn till hur företaget hanterar Covid-19 relaterade problem	Likert scale
	2.9	fokusera på strategiska osäkerheter relaterade till Covid-19 (t.e.x faktorer som kan försvåra: a) företagets affärsstrategi, b) företagets strategi för att hantera Covid-19)	Likert scale
	2.10	uppmuntra och underlätta dialog och informationsutbyte med de underordnade	Likert scale

Boundary Systems		***I vilken utsträckning…***	
	3.1	före Covid-19, fanns det uppförandekoder eller liknande formella dokument eller uttalanden som definierade vad som ansågs som lämpligt beteende?	Likert scale
	3.2	var formella procedurer/riktlinjer explicit framtagna/omarbetade för att hantera Covid-19? (t.e.x riktlinjer angående tillverkning, lunch, möten)	Likert scale
	3.3	har toppchefer och managers aktivt och på formellt sätt kommunicerat aktiviteter som anställda bör undvika relaterat till Covid-19? (exempelvis genom mail, meddelanden eller videos)	Likert scale
	3.4	tillämpades det sanktioner och/eller bestraffningar mot anställda som deltog i riskfyllda aktiviteter som gick emot företagets Covid-19 policy, oavsett utgång av aktiviteten?	Likert scale
	3.5	Hur viktigt har användningen av riktlinjer varit för få de underordnade att följa företagets strategi under Covid-19?	Likert scale
Belief Systems		***I vilken utsträckning…***	
	4.1	före Covid-19, var företagets värderingar och målsättningar nedskrivna i formella dokument?	Likert scale
	4.2	blev företagets värderingar och målsättningar explicit nedskrivna i formella dokument under Covid-19?	Likert scale
	4.3	före Covid-19, arbetade högsta ledningen aktivt och på ett formellt sätt med att kommunicera företagets värderingar och målsättningar till de anställda? (exempelvis genom mail, meddelanden eller videos)	Likert scale
	4.4	arbetade högsta ledningen aktivt och på ett formellt sätt med att kommunicera företagets värderingar och målsättning till de anställda under Covid-19? (exempelvis genom mail, meddelanden eller videos)	Likert scale
	4.5	Hur viktigt har användningen av normer och värderingar varit för få de underordnade att följa företagets strategi under Covid-19?	Likert scale
Informal Controls		***I vilken utsträckning…***	
	5.1	har informella styrsystem hjälpt till att underlätta och hantera utmaningarna som Covid-19 restriktioner medfört?	Likert scale
	5.2	har informella styrsystem använts för att kommunicera och förstärka organisationens strategi för att hantera utmaningarna relaterade till Covid-19?	Likert scale
	5.3	har informella styrsystem använts för att utvärdera och förbättra mått/processer relaterade till hur ni hanterar Covid-19?	Likert scale
	5.4	har informella styrsystem använts av högsta ledningen för att förstärka och förbättra formella kontrollsystem som ämnar att hantera utmaningarna med Covid-19?	Likert scale
	5.5	har informella styrsystem använts av högsta ledningen för att förbättra de anställdas motivation/moral under Covidpandemin?	Likert scale
Effectiveness MCS		***I vilken utsträckning…***	
	6.1a	har företaget tagit fram några nya prestationsmått och/eller tillvägagångssätt för bättre hantera Covid-19? (ifall Nej, skippa 6.1 b)	Yes/No
	6.1b	har de nya framtagna Covid-19 prestationsmått och/eller tillvägagångssätt hjälpt företaget att hantera osäkerheterna som kommit i samband med Covid-19?	Likert scale
	6.2	har användningen av ekonomistyrning underlättat för företaget när det kommer till att förhålla sig till Covid-19 restriktionerna (exempelvis, regeringens riktlinjer, standarder, huvudkontorets regler eller fackliga regler)	Likert scale
	6.3	har användningen av ekonomistyrning underlättat verksamheten förutsättningar när det kommer till att förhålla sig till Covid-19 restriktionerna?	Likert scale
	6.4	har användningen av ekonomistyrning underlättat engagemanget från de anställdas sida i den vardagliga verksamheten under Covid-19, med tanke på de utmaningar som Covid-19 för med sig?	Likert scale
	6.5	Hur viktigt har användningen av ekonomistyrning varit för få de underordnade att följa företagets strategi under Covid-19?	Likert scale
Open question	**7.1**	Här kan ni skriva ifall ni har några slutliga kommentarer om hur olika former av styrning används för att hantera Covid-19 inom ert företag?	Open question

Appendix B - The Survey - English version

On the following pages the survey sent out to the respondents can once again be found. However, this is an English version of the survey, that was used as a draft when constructing the Swedish one, that later was sent out. This means that the English version of the survey was *never* sent out to any companies.

Section		Question	Answer
General	**1.1a**	Name of the firm (only to keep track of respondents, survey will be anonymous)	Short Answer
	1.1b	Whats you position in the company (i.e, CEO, Vice CEO, CFO, Finance manager)	Short Answer
	1.2	In what industry does the firm mainly operate in?	Multiple Choice
	1.3	How many employees work in the firm?	Short Answer
	1.4a	How many countries does the company operate in?	Short Answer
	1.4b	Where is the global HQ office located?	Short Answer
	1.5	How was the financial performance of the firm in comparison to your competitors when the Covid pandemic started in 2020? (Return on assets, 4 equals average in the industry)	Likert scale
PEU	**1.6**	How predictable was the change in demand from the costumers side during the Covidpandemic?	Likert scale
	1.7	How predictable was the change in demand from the suppliers side during the Covidpandemic?	Likert scale
	1.8	How predictable was the change in competition in the industry during the Covidpandemic?	Likert scale
	1.9	How predictable was the chances of survival for the comapny during the Covidpandemic?	Likert scale
	1.10	How predictable was the impact of the Covidpandemic on the firms employees?	Likert scale
	1.11	How predictable was the impact of Covid on your firm's regulatory environment during the Covidpandemic? (i.e regulations from the government, standards, rules from the headquater, union rules)	Likert scale
Diagnostic Use		***To what extent did top management use performance measures (both financial and non-financial) and/or budgets for the following...***	
	2.1	identify critical performance variables related to the impact of Covid-19 (e.g. Infected employees, stores closed due to Covid-19, Covid-19 impact in the business)	Likert scale
	2.2	set targets for Covid-19 critical performance variables	Likert scale
	2.3	change the targets for critical performance variables affected by Covid-19 (e.g. were the sales forecasts changed? I.e. reduced, increased or kept the same)	Likert scale
	2.4	monitor progress toward critical performance targets related to Covid-19	Likert scale
	2.5	provide information to correct deviations from pre-set performance targets related to Covid-19	Likert scale
Interactive Use		***To what extent did top management use performance measures (both financial and non-financial) and/or budgets for the following...***	
	2.6	provide a recurring and frequent agenda for top management activities related to Covid-19 issues	Likert scale
	2.7	provide a recurring and frequent agenda for subordinate activities related to Covid-19 issues	Likert scale
	2.8	enable continual challenge and debate of assumptions, strategy and action plans with subordinates and peers in regard to how the company dealt with Covid-19 related issues	Likert scale
	2.9	focus attention on strategic uncertainties related to Covid-19 (i.e. factors that may invalidate: a) the firm's business strategy, b) the firm's strategy to deal with Covid-19)	Likert scale
	2.10	encourage and facilitate dialog and information sharing with subordinates	Likert scale

Boundary Systems		***To what extent…***	
	3.1	before Covid-19, were codes of conduct or similar formal statements relied upon to define appropriate behavior?	Likert scale
	3.2	were formal procedure guides/rules explicitly developed/adapted to deal with issues derived from Covid-19? (e.g. procedures regarding manufacturing, lunch, meetings)	Likert scale
	3.3	have top management actively and formally communicated risks and activities to be avoided by subordinates in regard to the Covid-19 situation? (e.g. through emails, announcements, videos)	Likert scale
	3.4	were sanctions and/or punishments applied to subordinates who engage in risks and activities that went against the organizational Covid-19 policy and procedures, irrespective of the outcome?	Likert scale
	3.5	How important has the use of boundary systems been to align the subordinates with the company's strategy during Covid-19?	Likert scale
Belief Systems		***To what extent…***	
	4.1	before Covid-19, were the values and purpose of the organization codified in formal documents?	Likert scale
	4.2	were the values and purpose of the organization codified in formal documents during Covid-19?	Likert scale
	4.3	before Covid-19, did top management actively and formally communicate core values and purpose to subordinates? (e.g. through emails, announcements, videos)	Likert scale
	4.4	did top management actively and formally communicate core values and purpose to subordinates during Covid-19? (e.g. through emails, announcements, videos)? (e.g. through emails, announcements, videos)	Likert scale
	4.5	How important has the use of values and normes been to align the subordinates with the company's strategy during Covid-19?	Likert scale
Informal Controls		***To what extent…***	
	5.1	have informal controls affected how you coped with the challanges that the Covid-19 restrictions brought?	Likert scale
	5.2	have informal controls been used to communicate, reinforce and embed the organizational strategy to deal and overcome challanges related to Covid-19?	Likert scale
	5.3	have informal controls been used to evaluate and reinforce measures/proceduers related to how you dealt with Covid-19?	Likert scale
	5.4	have informal controls been used by top managers to support and enhance formal control sysems which aims to deal with the challanges of Covid-19?	Likert scale
	5.5	have informal controls been used by top management to improve the subordinates motivation/moral during the Covidpandemic?	Likert scale
Effectiveness MCS		***To what extent…***	
	6.1a	did you develop any new performance measures and/or procedures to deal with Covid-19? (if not, skip 6.1 b)	Yes/No
	6.1b	have the newly developed Covid-19 performance measures and/or procedures helped the organization to cope with all the uncertainties that emerged with the Covid-19 situation?	Likert scale
	6.2	have the use of Management controls facilitated compliance with Covid-19 related restrictions (e.g. government rules, quality standards, Headquarters rules, union rules)?	Likert scale
	6.3	have the use of Management controls facilitated continuance of operations during Covid-19 considering all the restrictions that Covid-19 brought?	Likert scale
	6.4	have the use of Management controls facilitated commitment from employees in the daily operations during Covid-19 considering all the challenges that Covid-19 brought?	Likert scale
	6.5	have the use of Management controls been effective to align subordinates' behavior to the company strategy during Covid-19?	Likert scale
Open question	**7.1**	Any final comments on how management controls were used to deal with the impact of Covid-19 for your company?	Open question

Appendix C - The mail sent out with the survey

In line with the survey sent out to the companies, the mail that was sent out was also sent out in Swedish. This was done both to be consistent, so both the survey and the mail was in the same language but also to reduce the misinterpretations that could arise. As the mail and survey was sent out two additional times, as remainders to those who had not answered the survey or stated that they didn't want to participate in the survey, some small adjustments were made in the mail stating it was a remainder.

Hej!
Vi är två studenter, som studerar vid Lunds universitet och skriver vår Masteruppsats i Redovisning och Finansiering. Vi studerar hur olika företag har ändrat sin ledning och deras styrsystem för att bättre hantera de dagliga aktiviteterna under Covidpandimin. Vi skulle därför be er fylla i en undersökning om hur ert företag har hanterat Covid-19.
Vi bifogar undersökningen både som en web-version (google forms) och som en interactive PDF (öppnas med Adobe Acrobat Reader), ni väljer själva vilken av dem ni svarar på. Ifall ni väljer PDF versionen, var snälla att fyll i den, spara och skicka tillbak till denna mailadressen. Undersökningen tar mellan 10 till 15 minuter. Svaren ni skickar in kommer vara anonyma, namnet kommer endast vara synligt för oss för att kunna hålla reda på vilka som har svarat, ni kan ändå om så skulle önskas utelämna namnet på företaget.
Ifall ni inte har möjlighet att svara, men vet någon som kan inom företaget var snäll att vidarebefordra mailet till dem. Utifall ni skulle vilja ha den slutliga rapporten när den är klar, meddela gärna detta så skickar vi gladeligen den till er.
Ni kan svara på undersökningen fram till och med den 30de April.
Länk till web-versionen https://forms.gle/79DqBdCicTHS8cUy9

Om ni har några frågor kan ni nå oss på

Emil Augbeck - em3550au-s@student.lu.se
Javier Francisco Molina Herrero - ja4802mo-s@student.lu.se
Handledare Johan Dergård - johan.dergard@fek.lu.se

Vänliga Hälsningar Emil Augbeck och Javier Francisco Molina Herrero

Appendix D - Likert Scale

The Likert scale (figure 1) represents the scale and thus the definition corresponding to the different numbers, in the majority of the survey that was sent out. As some questions in the first section were looking at some more general aspects, figure 2 was used for question 1.5 and figure 3 was used for questions 1.6-1.11. Note, as some questions didn't use a Likert scale, those scales don't apply to the entire survey.

1	2	3	4	5	6	7
Not at all	**Very Small Extent**	**Small Extent**	**Moderate Extent**	**Large Extent**	**Very Large Extent**	**Extremely Large Extent**

Figure 1. Used for the majority of the study after section 1.

1	2	3	4	5	6	7
Worse than competitors	**Somewhat worse**	**Slightly worse**	**Similar to competitors**	**Slightly better**	**Somewhat better**	**Better than competitors**

Figure 2. Used for question 1.5 in the survey.

1	2	3	4	5	6	7
Not at all	**Somewhat unpredictable**	**Slightly unpredictable**	**Neither predictable nor unpredictable**	**Slightly predictable**	**Somewhat predictable**	**Very predictable**

Figure 3. Used for question 1.6-1.11 in the survey.

Appendix E - Responses on section 7 of the survey

Below are the responses given (translated from Swedish) by the six companies that choose to leave an additional comment on section 7 in the survey, that referred to any additional comments the company might have that they wanted to share.

Respondent 1

The company has only been affected by Covid to a very limited amount, this is because we are well adapted to remote work as well as we are not manufacturing any items. This combination has allowed the company to continue working without any difficulties.
The company has been affected partly by regulators and governments, which lead the company to readjust their marketing and investments between different countries based on the current regulations. This is something the company is used to since before, on the other hand the pandemic led to the demands for some quick adjustment (at least during the first half year).

Respondent 2

The most important factors behind the success

1. Clearly developed measurements that indicates the development/growth in the business (order-pipeline, supply stock, consulting occupancy)
2. Active management of the employees safety, health, concern, work environment and need for information
3. Weekly “check-in” with the top management to follow the development of KPIs as well as handling employees

Close customer support and drive the innovation around new business opportunities.

Respondent 3

We are a small company with seven employees. We have had direct communication with everyone through i.e teams-meetings. Our sales were close to zero before the pandemic and we were about to launch a new product. Because the client was a hospital it was almost impossible to conduct any sales during the pandemic-period. We were not even allowed to visit the clinic as they were fully occupied with other things. We didn't need any direct control systems, the important part was that the owners could supply money through a right issue. We had to work with other things than direct sales i.e developing new products. FDA-approved (right to sell in the US) and so on.

Respondent 4

We have a very clear crisis management process, which we followed during the entire Covid-19 pandemic.

Respondent 5

We were not affected that much as we had appropriate places/rooms and a good schedule for both remote work and onsite.

Respondent 6

Overall, we were more uncertain about the consequences and the future, in the beginning of Covid, around march 2020. After a few months the situation felt somewhat more overseeable. It's hard to describe our actions “during Covid-19” because they were different at different occasions.

Appendix F - PCA and Cronbach-Alpha

Table 11. PCA and Cronbach-Alpha of the different constructs used in the study.

Construct	Items	PCA	Cronbach-Alpha
Perceived Environmental Uncertainty	**Predictability of changes in the environment during the pandemic regarding:**		
Bedford & Malmi (2015)	Customer demand	0.813	0.615
Agbejule (2005)	Employees	0.802	
Miller (1993)	Regulatory environment	0.723	
Tapinos (2012)	Competitors	0.721	
	Suppliers	0.236	
	Company survival	0.217	
Diagnostic Use	**Five dimensions related to the diagnostic use of budgets and/or PMS during Covid for:**		
Bedford (2015)	Provide information to correct deviations from pre-set performance targets related to Covid	0.852	0.872
	Set targets for Covid critical performance variables	0.822	
	Monitor progress toward critical performance targets related to Covid	0.808	
	Change targets for other critical performance variables affected by Covid	0.805	
	Identify critical performance variables related to the impact of Covid	0.790	
Interactive Use	**Five dimensions related to the interactive use of budgets and/or PMS during Covid for:**		
Bedford (2015)	Enable continual challenge and debate of assumptions, strategy and action plans with subordinates and peers in regard to how the company dealt with Covid-related issues	0.896	n/a
	Provide a recurring and frequent agenda for top management activities related to Covid issues	0.889	
	Focus attention on strategic uncertainties related to Covid	0.862	
	Encourage and facilitate dialog and information sharing with subordinates	0.859	
	Provide a recurring and frequent agenda for subordinate activities related to Covid issues	0.833	
Boundary Systems	**Five dimensions regarding the use of boundary systems in organizations**		
Bedford (2015)	Importance for aligning subordinates behavior to organizational strategy	0.862	n/a
Bedford et al. (2016)	Use of formal procedures/guides to address Covid issues	0.765	
	Top management active communication of risks and activities to be avoided regarding Covid	0.741	
	Previous existence of codes of conducts or rules to define appropriate behavior	0.703	
	Use of sanctions for breaking Covid policies and rules, irrespective of the outcome*	<0.10	
Belief Systems	**Four dimensions regarding the use of belief systems in organizations**		
Bedford (2015)	Formal and active communication of core values and purpose by top management during Covid to enhance commitment of employees	0.871	n/a
Bedford et al. (2016)	Importance for aligning subordinates behavior to organizational strategy	0.806	
	Codification of values and purpose in formal documents during the pandemic	0.624	
	Previous codification of values and purpose in formal documents	0.539	
Informal Controls	**Five dimensions regarding the use of informal controls in organizations**		
Bedford et al. (2016)	Use of informal controls by managers to support/enhance subordinates' motivation during the pandemic	0.937	n/a
Ferreira & Otley (2009)	General use of informal controls to facilitate overcoming or deal with the challenges from Covid	0.916	
Laguir et al. (2019)	Use of informal controls to support or reinforce formal controls	0.912	
	Use of informal controls to improve measures/procedures related to Covid	0.895	
	Use of informal controls to communicate, reinforce and embed the organizational strategy to deal and overcome Covid challenges	0.844	
Effectiveness of MCS	**Four dimensions regarding the effectiveness of MCS during the pandemic**		
Bedford et al. (2016)	Use of MCS effectiveness to facilitate continuance of operations during Covid	0.970	0.952
Laguir et al. (2019)	Use of MCS effectiveness to facilitate commitment from employees during Covid	0.947	
	Use of MCS effectiveness to facilitate compliance with Covid-related restrictions	0.922	
	Use of MCS effectiveness to align subordinates' behavior to the company strategy	0.908	

Appendix G - Paired sample t-test of controls use

Table 12. Paired samples t-tests between the use of controls.

Pairs	Significance (Two-Sided p)	Paired Differences Mean	t	df
Boundary Systems > Beliefs Systems	**.015**	.45536	2.603	27
Boundary Systems > Interactive Use	**.016**	.58036	2.565	27
Boundary Systems > Diagnostic Use	**<.001**	1.42321	4.516	27
Boundary Systems > Informal Controls	**<.001**	1.28750	4.143	27
Beliefs Systems > Interactive Use	.626	.12500	.493	27
Beliefs Systems > Diagnostic Use	**.002**	.96786	3.503	27
Beliefs Systems > Informal Controls	**.016**	.83214	2.580	27
Interactive Use >Diagnostic Use	**.001**	.84286	3.623	27
Interactive Use > Informal Controls	**.049**	.70714	2.065	27
Informal Controls > Diagnostic Use	.690	.13571	.403	27