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Why an Effective Collaboration Results in Value

A study about the collaboration between CIO and CFO and how this affects the IT Governance maturity, with taking into consideration the complexity of IT investments and the perceived position of the CIO.

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Abstract

Adding value to the Information Technology (IT) governance of an organization is a high priority of interest for chief-level executives. Even though the Top Management Team (TMT) admits that IT could provide a competitive advantage, it remains difficult for chief-level executives to understand how a Chief Information Officer (CIO) adds value to the table. In this thesis, I developed a literature review which gives an nomological network and dives into trying to understand what an effective collaboration includes between the CIO and Chief Financial Officer (CFO) and how this could affect the IT governance maturity of a firm. I further hypothesize that the complexity of IT investments has a negative relation with the IT governance maturity of a firm. The data could come from field research and secondary information. This includes surveys and online databases. The relevance of this thesis comes from the information that arises about the interaction between the CIO and CFO and what the effects will be on the IT governance maturity of a firm. It turns out that this interaction contains more logic if the CIO is working closely with a CFO when the firm has the characteristics of a cost-leadership strategy. Likewise, if the complexity of IT investments is low, then it could have a positive effect on the IT governance of a firm. The further research depends on the empirical testing of this thesis. It could lead to further explore the antecedents of the constructs, or find out more about the relationship between the variables.

Key words: Chief information officer; Information systems; Information Technology; Chief financial officer; Top Management Team; surveys, IT governance.

Table of Contents

Chapter 1

1.1 Problem indication

These days, companies have generally created 'C-suites', which are high-level corporate positions in the top management team where the C stands for 'Chief'. These Chiefs have to deal with persistent challenges of the organization (Schobel & Denford, 2012). The CFO became important in the 1950s when General Electric, as one of the first organizations, moved to a new decentralized structure. This approach created a set of divisions and operating departments of the organizational layers, each with its own general manager. By the late 50s, senior financial executives were responsible for the accounting and control of their companies operating departments. However, it was until the 90s that the interest acknowledged that the 'changing the role of the CFO' could add more value than just being a controller. It seemed that a CFO as business partner created much more value for the firm than just being a controller. Nowadays, the CFO's function has expanded to a financial strategist and business advisor. Likewise, it is expected that a CFO is extraordinarily broad-gauged and acting in close alignment with their Chief Executive Officer (CEO) (Howell, 2006).

The CIO on the other hand rose in importance around the 1980s. Since the advent of Management of Information Systems (MIS), executive support in the 'C-suite' seemed reasonable and necessary (Jarvenpaa & Ives, 1991). In the 1980s, information technology applications began to be viewed as central position inside the business strategy (McFarlan, McKinney & Pyburn, 1983). Moreover, when Information Technology became more broadly accepted because of competitive advantage, it was a particular interest to invest in IT (Harrison, Mykytyn & Riemenschneider, 1997; Barney 1991). Therefore, the CIOs position emerged in response to the use of information technology and the emergence of the information economy. The position became more influential as IT became more important to the overall strategy of a company (Banker, Hu, Pavlou & Luftman, 2011).

The CIOs function is one of the youngest among the C-level executives; therefore, the organizational impact of the CIO position and how it interacts with the CEO has become a key area of research. For that reason, a lot of research has been done on the relationship between the CIO and the CEO and in general with the Top Management Teams (Karahanna & Watson, 2006).

However, there has not been done a lot of research between the CIO and CFO, but no other executive, other than a CEO, can affect a CIO's plans as much as the CFO can. The primary

reason, therefore, is the degree of discretionary spending on IT operations and future investments (Earl & Feeny, 1994). Because of the high investments required for IT strategies, the Information Technology governance focus on how the CIO can return business value to the organization instead of "stealing" capital (De Haes & Van Grembergen, 2004). Both the return on business value and the investment opportunities are decisions that have financial implications and therefore are part of the CFO's purview (Schobel & Denford, 2012). However, a CFO does not always know what kind of data exists and how to gain an advantage from that data and the CIO does not always know which financial metrics are important within projects (Weismantel, 2007). It is also proposed that the perceived position of the CIO, within the organizational structure, could be a rational result of the overall business strategy of a firm (Banker et al., 2011).

The purpose of this thesis is to gain more insight in the effective collaboration between the CFO and CIO and the influence that an effective collaboration has on the Information Technology governance maturity of an organization. Thus, this thesis is aiming to add one comprehensive review to the already existing, but scarce knowledge about this topic. Additionally, it takes into account that complexity of investments can have an effect on the IT governance maturity and that the perceived position of the CIO within the organizational structure should follow from the overall business strategy. In the existing literature of collaborations between C-level executives everything is linked to the CEO. However, this thesis will focus on the link between CIO and CFO. First, the effectiveness of the collaboration is studied as a property of the organization and individually between CIO and CFO. Secondly, the complexity of the investments is also based on the property of an organization but as a single investment choice. Third, the position of the CIO is an individual and organizational property. Finally, the IT Governance maturity is a property of an organization.

1.2 Problem statement

From the above-mentioned problem indication, results in the following problem statement:

> *'To what extent does an effective CIO – CFO collaboration influence the IT Governance maturity of the organization; what is the influence of the perceived position of the CIO on this collaboration and what is the role of complexity of IT investment?'*

1.2.1 Research model

From the previous problem statement follows the following research model, which graphically explains the relationships of the constructs in a nomologial model.
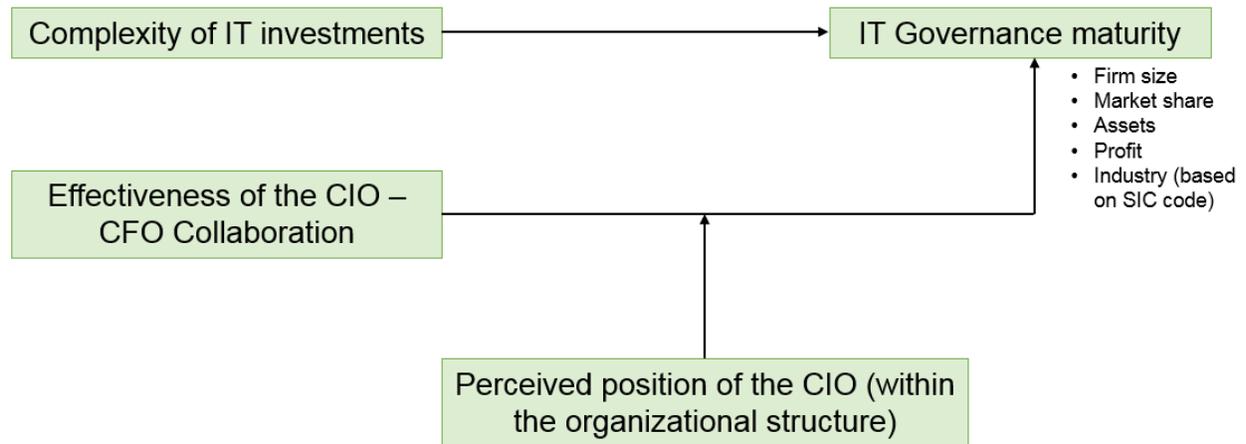
Figure 1. Research model

The 'Degree of effectiveness of a CIO and CFO collaboration' and 'complexity of IT investments' as independent variables (IV), 'IT governance maturity' as the dependent variable (DV) and 'perceived position of CIO (within the organizational structure)' as moderator. This moderator indicates what will be the influence of the perceived position of the CIO on the collaboration between CIO and CFO because research indicates that the direct reporting structure has an effect on the influence of a CIO on other peers. It will also give a better understanding of what an effective collaboration affects and how it contributes to the IT governance maturity.

1.3 Research questions

To tackle the problem statement properly, it is necessary to split it up into a number of sub-research questions. In the research question, the problem is more specified in multiple related questions.

1. What is an effective CIO – CFO collaboration?
2. What is IT governance maturity?
3. What is meant by the perceived position of the CIO?
4. What is the effect of the complexity of IT investments on the IT governance maturity?
5. How does the perceived position of the CIO influence the relationship between the collaboration of the CIO and CFO and the IT governance maturity?

6. To what extent does the effectiveness (of a CIO – CFO collaboration) influence the IT governance maturity?

1.4 Research design

The research methods applied are a literature review at first, which will be provided in this theses. Secondly, I will advise to investigate the topic of CFO and CIO interaction more in depth by surveying companies which are publicly traded, and complementing the data with secondary data from financial databases (like Orbis and D&B Million Dollar database). Therefore, this thesis is based on existing theories and new information from primary research.

For the data collection, the literature is collected by using online library databases. With these online databases, high-quality journals based upon Management Information Systems, Information technology and Information Management have been consulted. Relevant, accurate and valid information on the concepts, factors and variables all related to the influence of the relationship between CFO and CIO and the effect on IT governance maturity are included. Moreover, the importance of the complexity of IT investments is taken into account. As well, the position of the CIO. The final goal of this study is to describe a research to empirically test the theory provided in this thesis. Some keywords used are C-level executive relationships, Information Technology Governance, a collaboration between executives, IT governance maturity, IT investments and position of CIO.

Attention must be paid to the validity and reliability of the sources. Therefore, in this thesis, there is the main focus on academic journals and papers that are peer-reviewed.

1.5 Structure of the thesis

First, the structure of this thesis will be based upon the structure of high academic papers. It will start with the constructs, relations and hypotheses. Secondly, the suggested methodology will be discussed. Afterwards, the recommendations implications and limitations will be argued. The Appendixes will include figures for further explanation of a subject and the grand tables with the constructs and relationships.

1.6 Relevance

1.6.1 Academic relevance

As mentioned earlier, there is not that much known about the collaboration between CIO and CFO. Still, the CFO has a significant influence on the plans of the CIO. Some research has focused on the relationship between the CIO and CEO and how to gain competitive advantage,

but the CFO is excluded from these conversations. And vice versa between CEO and CFO, the CIO is excluded from these conversations. This thesis should attempt to fill up the literature gap and therefore try to be of academic relevance.

1.6.2 Management relevance

Today's TMTs face the pressure of gaining a competitive advantage from their IT. This pressure arises from a fast-changing environment and the knowledge that IT gives an organization the opportunity to survive (Mata, Fuerst & Barney, 1995). Furthermore, research showed that aligning IT and the business strategy gives organizations the opportunity to stay ahead of the competition and develop a competitive advantage (Barney 1986; Henderson & Venkatraman, 1993). If the TMT precisely know how to influence the IT governance, it would benefit the firm substantially. Therefore, this thesis aims to be of managerial relevance as well.

Chapter 2

Figure 1 represents the research model of this study. The research places complexity of IT investments and the effective collaboration between CIO and CFO in a nomological network of relationships that will result into the aspired IT governance maturity level of a firm. The explanation for the model is that the antecedents of the effective collaboration simplify the process of an effective collaboration between the chief-level executives and thus develop a more efficient approach for the IT governance of a firm. Likewise, if the firm is able to manage the complexity of IT investments, it will probably have positive influence on the efficiency of IT governance as well. Furthermore, the perceived position of the CIO could have an influence on the relationship between the effective collaboration and IT governance maturity of a firm since the logic behind the position of the CIO could provide better opportunities for collaboration.

2.1 Theoretical development

2.1.1 Effective collaboration

According to Schobel and Denford (2012), it seems that the effective collaboration between CIO a CFO is based upon several factors. They argue that trust should be a predictor of effectiveness. Simon and Peterson (2000) support this because they have acknowledged that trust reduces the likelihood of misunderstanding and task conflicts. Furthermore, they claim that task conflicts lead to relationship conflicts. Those conflicts lead to a negative engagement with the TMT's. However, CIO's have a significant contribution when they experience positive engagements with the TMT (Smaltz, Sambamurthy & Agarwal, 2006). A CIO is often required to attempt to influence other peers for the implementation of IS projects. Therefore, the CIO uses rational persuasion, a technique that is only useful in an effective collaboration (Enns, Huff & Golden, 2003; Schobel & Denford, 2012). Finally, Feeny, Edwards and Simpson (1992) acknowledged that shared understanding enables a successful exploitation of IT. That research suggests that chief-level executives with a background in general management could be helpful in enjoying a successful collaboration. Specifically from a CIOs perspective, the ones with a solid background in IT enjoyed an excellent relationship with their peers. However, CIOs are often visualized as 'individuals in their own world' but for an effective collaboration, they need skills like honesty and openness. Besides that, they need to have a business perspective as well (Feeny et al., 1992).

Therefore, an effective collaboration is built upon the influence of the CIO, trust and a shared understanding. Moreover, trust is a result of a reasonable shared understanding between the two chief-level executives. Since IT became strategically important for organizations, IT management,

skills and knowledge must be merged with executives knowledge, perspectives and skills in order to stay ahead of the competition for the firm as a whole (Gupta, 1991). Today, the CFO is seen as an important strategist and business advisor to the CEO. It is expected that the CFO has a wide range of skills and knowledge about the organization (Howell, 2006). On the other hand, CIOs need to have a solid knowledge about the organization in order to successful implement the IT systems. The main task is to translate the importance of the IT systems into a strategic perspective, which will benefit the organization as a whole (Enns et al., 2003).

This study contributes to the effective collaboration literature by elaborating on the antecedents of 'the degree of effectiveness for a collaboration'. When it is clear what will influence an effective collaboration between chief-level executives, it will contribute to a more straightforward approach of working together. In that way, the collaboration could positively contribute to the IT governance of a firm because of the more structural and smooth way of working together. Because the focus is on the 'degree of effectiveness of a collaboration between CIO and CFO', I define this as 'the degree to which a collaboration between chief-level executives includes trust, positive influence and shared understanding with reasonable arguments' (Schobel & Denford, 2012; Smaltz et al., 2006; Feeny et al., 1992; Boynton, Zmud & Jacobs, 1994).

Since the above definition of an effective collaboration maintains terms as 'trust', 'positive influence' and 'shared understanding' it is hard to translate this into numbers for a quantitative study. However, several studies argue that a survey can be held to gain more insight into the 'effective collaboration' (Feeny et al., 1992; Boynton, Zmud & Jacobs, 1994). Thus the dimensions of this effective collaboration are *trust, positive influence* and *shared understanding.* In order to measure the 'degree of effectiveness', a survey could be send out to a certain number of CIOs and CFOs (or other members of the TMT who have the same sort of role) and find out their opinion about the collaboration with each other (Sekaran & Bougie, 2016). A theory can be developed based on this inside information gained from the survey. So this method is deemed most appropriate to measure the effective collaboration and gain more insight in how effective collaboration leads to IT governance maturity and about the underlying quantitative factors. Besides that, it is given that previous research examined this construct in a similar way (Schobel & Denford, 2012; Feeny et al., 1992; Enns et al., 2002).

2.1.2 IT Governance

To explain the term IT governance, an important distinction has to be made between IT governance and IT management. Those two terms are often used as synonyms but they are not. IT management focusses on the internal useful supply of the IT services and products. Besides

that, the IT management is looking at present IT activities. On the other hand, IT governance is much broader. The IT governance has a focus on the performance and the transformation of IT with the goal to meet the present and future demands for the business and the customers (Van Grembergen, 2004).

De Haes and Van Grembergen (2004) indicate that "*IT governance is defined as the leadership and organizational structures, processes and relational mechanisms that ensure that an organization's IT sustains and extends its strategy and objectives*".

Despite the fact that IT is a responsibility of the TMT (or employees with the same sort of tasks) (De Haes and Van Grembergen, 2004), it is determined to fail when there is no alignment with the governance of IT and the business itself. Without the alignment, there will be the inability to realize value from the IT (investments) (Henderson & Venkatraman, 1993). This refers back to the problem indication where is explained that a CFO, but also the other departments, are not able to see the value that IT brings to a company. This is supported by the research of Kearns and Sabherwal (2007) where they concluded that business value can be generated by an effective IT governance. Although prior research suggests that IT governance is the responsibility of the TMT, more current research suggests that it depends on holding participants responsible in this formalized system (Simonsson et al., 2010). Thus this research suggests that IT governance is the policy of the firm to hold the responsibility within the TMT but also keep participants accountable.

IT governance Maturity

IT governance maturity is the internal IT organization efficiency. Every organization that uses IT has IT governance. It depends on several issues such as rights and responsibilities that determine if formalized processes are needed. Fortunately, for IT management, an organization that has a high IT governance maturity also benefits from high IT performances. However, an important side note must be that the IT performance depends also on the size of the organization. One of the popular models to measure IT governance is the 'Control Objectives for Information and related Technology' (COBIT). COBIT is a model that follows several principles and provides a definition of IT governance as consisting of four domains and 34 processes (Simonsson et al., 2010; Simonsson, Johnson and Wijkström, 2007). The domains that the COBIT uses include indicators such as activities, documents, metrics and support for role and responsibility. Appendix A will provide a detailed overview of the questions and dimensions of the COBIT model. Next, the domains will be described shortly (Simonsson et al., 2010).

Plan and Organization (PO) is a domain that covers IT processes, strategies and tactics. It also identifies the way IT can contribute to achieve the business goals and communicate this with the management of it.

Acquire and Implement (AI) identifies the solutions that need to be developed or acquired in order to meet the IT strategy and integrate it into the business process.

Deliver and Support (DS) is a domain that looks out for the actual delivery of service. This can be the management of security but also service support.

Monitor and Evaluate (ME) is a domain that maintains a certain quality of IT governance because the processes need to be developed over a certain time to control the requirements.

Research recognized that an effective collaboration between chief-level executives allows them to evolve a shared understanding about an IT topic. This allows the CIO to influence the CFO in such way that the CFO understands the value that the firm generates from the IT decision (Schobel & Denford, 2012; Kearns & Sabherwal, 2007; Feeny et al., 1992; Enns et al., 2002). Furthermore, research argues that managerial IT knowledge is crucial for efficient IT use. This knowledge does facilitate information exchange among IT which enables an organization to reach a higher level of value from IT for the organization (Boynton et al., 1994). Thus, the hypothesize follows:

Hypothesis 1: A high degree of effectiveness for the collaboration between CFO and CIO will positively influence the IT governance maturity for the organization.

2.1.3 Complexity of IT investments

Weill and Ross (2004) argued that an effective IT governance is an important predictor of the value that an organization generates from IT. This kind of research is a great contribution to the understanding of IT governance since it can be unclear for an organization how they generate value from IT. However, understanding the IT investments and the decision making for these investments is an important area to take into consideration when a firm wants to discuss the IT governance maturity. The IT investments decisions can be described as complex, multistage and involving several actors from different levels of the firm (Bower, 1970). Besides the complex structure of IT decisions, all the major participants should be held accountable for the outcome of IT investments. Research argues that IT governance should be designed in such way that every stage of the pre-implementation process is properly managed. IT governance should include the

pre-decision stage because even though an IT department is required they may not have that much leverage to play a key role in the investment decision (Xue, Liang & Boulton, 2008).

The definition that will be used for describing the 'complexity of IT investments' will be the complex and multistage systems, which takes every stage of the pre-implementation process into account and hold their major participants accountable for the outcomes. This research could use a survey in order to measure the complexity of IT investments for a firm. This is caused by, the several approaches to determine the IT decision-making process. Due to a survey it could be possible to gain more insight into the underlying variables that determine this complexity (Yin, 2003). Once there is more insight into the involvement of the departments in the decision-making process, the research can continue by calculating the actual return on the investment. In that way, it is possible to hold participants accountable for the decision that is made (Penman, 1991; Dehning & Richardson, 2002). Assuming that it is a linear relationship between the accountability awareness and the return on the investments. This is due to the involvement of the departments, in the decision-making, are aware that they are accountable for the results, they often tend to invest more time and resources in making the right decision (Penman, 1991). Therefore, this method is deemed most appropriate to measure the complexity of IT investments and gain more insight in how this complexity determines the decision-making process and therefore could influence the IT governance maturity of a firm (Bower, 1970; Xue, Liang & Boulton, 2008; Sekaran & Bougie, 2016). Nevertheless, Xue et al. (2008) argue that IT investments are significant influenced by both internal and external factors. Therefore, if a company wants to manage the complexity of the decision-making process they have to develop a high IT function power (which is the power of the IT department to influence other units of the organization that are involved). On top of that, if a firm is able to keep the complexity of the decision making low, an opportunity will arise to keep the IT governance efficient and not more complex than needed (Xue et al., 2008; De Haes & Van Grembergen, 2004). Thus, the hypothesis that follows is:

Hypothesis 2: The complexity of the IT investments has a negative relationship with the IT governance maturity of an organization.

2.1.4 Perceived position of the CIO (in the organizational structure)

The CIO position emerged almost 30 years ago because of the increase in Management of Information Systems. The position of the CIO became more influential as IT began to play a role in the overall strategy of the organization (Applegate & Elam, 1992; Jarvenpaa & Ives, 1991; Raghunathan & Raghunathan, 1989). However, after all these years it is still not clear whether a

CIO should report to a CEO (since IT has an influence on the strategy) or the CFO (since it is about risks and costs). Research acknowledged that when an organization focusses on a differentiation business strategy a CIO is tempted to report to the CEO (Jarvenpaa & Ives, 1991). If the organization focusses on cost leadership then a CIO is tempted to report to a CFO. Thus, the strategic alignment of IT and business depends on the business strategy. However, an important side note of this is that alignment between an organizations position in the market and the CIO reporting structure to his peer(s) is necessary to achieve effectiveness (Banker et al., 2011). Nonetheless, research indicates that a CIO has a significant influence on the IT deployment when he has a certain knowledge about business. In addition, the degree to which the CIO is a participant of the TMT increases the IT successes of the firm (Armstrong & Sambamurthy, 1996). Thus the overall definition of the perceived position of the CIO is 'the degree to which a CIO has knowledge of general business and is reporting to a CFO'. Examining this aspect is a contribution to research because this position can influence the effect of the collaboration between CIO and CFO on the IT governance maturity. The reason therefore is, that the influence of the CIO increases when their knowledge about IT and business increases (Banker et al., 2011). This will likely influence the way other TMT members see the CIO as one of them and therefore the CIO has a better influence on the success of the IT governance (Banker et al., 2011; Armstrong & Sambamurthy, 1996). Consequently, this leads to a sustained competitive advantage (Armstrong & Sambamurthy, 1999) for an organization. It also turned out that, if a firm is focusing on cost-leadership then it is more logical that the CIO is reporting and collaborating with the CFO (Banker et al., 2011).

It is important to determine the involvement of a CIO in the decision-making process of the IT governance in order to measure the perceived position of the CIO. Likewise, it is important to look at the logic of the collaboration. Accordingly, this research has to examine the characteristics of a cost-leadership and determine on what scale a firm is applying these in their overall strategy. The characteristics of a cost-leadership is to aim for the lowest average costs throughout several factors (such as economies of scale and operational excellence). A real cost leader is gaining a strategic advantage by reducing costs but achieving the same level of customer satisfaction as his competitors (Porter, 1996; Hambrick & Mason, 1984; Banker et al., 2011). If an organization has these characteristics, a next step would be to take a look at the collaboration of the CIO and other chief-level executives. A way to do this is through a questionnaire (Banker et al., 2011).

Thus the perceived position of the CIO within a firm has an influence on the relationship of the effective collaboration on the IT governance maturity of a firm. If the overall strategy of the firm

would be cost leadership, then the collaboration between CIO and CFO would be more effective when the CIO is positioned under the CFO. Additionally, the CIO could influence the IT governance more when obtaining the required business knowledge (Hambrick & Mason, 1984; Banker et al., 2011). Therefore we can draw the third hypothesis:

Hypothesis 3: The effective collaboration between CIO and CFO has a positive influence on the IT governance maturity of a firm if the CIO is positioned underneath the CFO when the firm is following a cost-leadership strategy.

2.3 Grand table

All the information above is summarized in the grand tables in Appendix B. These tables give an overview of the constructs that are used in the research model, the property of the constructs, definition of the construct for this thesis, how it will be measured and the supporting literature.

Chapter 3

Chapter 3 will provide an overview of the methodology that could be used in executing this research. A quantitative study will be performed to test the interaction between the CIO and the CFO and the effect on the IT governance maturity of a firm. Several measures will be taken to enhance reliability, internal validity and generalizability. This method will follow the method from Preston and Karahanna (2009) since they have researched the relationship between CIO and TMT and focused on the alignment of IT. Therefore, their method is in line with this research since it is focusing on the scarce researched interaction between CIO and CFO and the effect on IT governance.

3.1 Methodology

3.1.1 Population

This research is focusing on the population of publicly traded firm in the United States (US). These firms have to have a minimum size of one billion in revenue/ assets. The reason therefore is that these companies have the same legislations because they have to follow several of the same laws and regulations. Corporate cultures are often the same because the corporate structures are built upon strategies that are often used with firms with revenues of one billion dollars. The same currencies and structure make it more efficient to analyze the results. Additionally, the results from the research need to be generalizable and reliable. The research should have external validity in order to achieve a certain level of generalizability. This study can draw conclusions for the publicly traded companies in the US. Due to the generalizability, it could also be possible to formulate assumptions for other countries who have some sort of the same characteristics.

The sample will come from two large stock exchange markets within the US. Firstly, this research will use NASDAQ. NASDAQ has a number of listings of 3058 companies. Secondly, this research will use the New York Stock Exchange (NYSE) with a number of listings of 2400 companies. This research will take a probability sample since the change of being chosen for the sample is known. The simple random sampling method will give this research a high representative and therefore this method will be executed. The survey will be send to the total population because of the efficiency.

3.1.2 Data collection method

The data will be collected via a survey which will be send to CIO's and CFO's or TMT members who have the same sort of tasks. Additionally, some data will come via secondary data from the company itself and the online database such as Orbis, Dun & Bradstreed Million Dollar Database (D&B Million Dollar) (for the contact information). The survey must be validated in three steps

(Preston & Karahanna, 2009). Firstly, structured interviews need to be held with a sample six of CIOs and CFOs in order to determine the content validity of the constructs and gain further insight into the phenomenon and test whether the survey works. This could be seen as a small pilot. Secondly, an item-sorting action should be taken to qualitatively evaluate the discriminant validity of the constructs. Lastly, the properties of the scales must be statistically determined (Moore & Benbasat, 1991). Further, a web-based survey need to be developed. Table 1 will provide a summary of the constructs and their key informants. Appendix B provides a table with the constructs and corresponding survey questions (in the third column).

CONSTRUCTS	KEY INFORMANTS
EFFECTIVE COLLABORATION	CIO and CFO and secondary data sources
COMPLEXITY OF IT INVESTMENTS	Departments involved in IT investments decision-making processes; accounting data
IT GOVERNANCE MATURITY	Secondary data from the organization
PERCEIVED POSITION OF THE CIO	Secondary data from the organization; accounting data; CIO

Table 1. Constructs and key informants

In the first stage of the research, the contact information of CIOs and CFOs must be obtained. One database to obtain this from could be the D&B Million Dollar database. This is also in line with Armstrong and Sambamurthy (1999) and Smaltz et al. (2006). In the second stage, the survey must be send out to the total sample. The TMT membership could be confirmed by asking the TMT respondents about the membership and the reporting structure in the firm. In addition, the survey can ask to confirm the name of the organization's CIO (Preston & Karahanna, 2009).

Preston and Karahanna (2009) proved that the response rate is often low but they argue that this is typically for studies that involve CIOs and CFOs (Armstrong Sambamurthy, 1999; Chan, Huff, Barclay and Copeland, 1997). In order to give the respondents an incentive to reply, this study will use the tailored design method. This method will give the participants a pre-notification, the questionnaire and afterwards the appreciation of participation (Sekaran & Bougie, 2016). In order to measure the IT governance maturity, the COBIT model will be used together with the publicly available information from the Orbis database. Reasonably, because this research will complement the primary data with the secondary data. This, again, to ensure that the results are generalizable for the total population. However, it stays important to test for nonresponse bias.

One way to address this is assessing the bias by comparing the average total sales and average total number of employees of the responding organizations (Preston & Karahanna, 2009). This all to ensure the reliability of the research, the validity of the constructs and the generalizability of the conclusions.

This research will use the same analysis method as Preston and Karahanna (2009) namely, the off-the-shelf five-point Likert scale. The reason therefore is that this scale will have a significant contribution to the validity (Sekaran & Bougie, 2016).

3.1.2 Data analysis

This research will use a five-point Likert scale. Even though the results of a Likert scale are ordinal, it can be analyzed as an interval measurement scale. The items are created from five types of Likert-type items, therefore, the composite score should be analyzed at the interval measurement scale. Consequently, descriptive statistics recommend that interval scales should include a mean for a central tendency and standard deviations for variability. Additionally, appropriate measures for the interval scale should be Pearson's r, T-test, ANOVA and regression (Sekaran & Bougie, 2016; Niewenhuis, 2009; Allen & Seaman, 2007). Another reason to use the ANOVA test is to assess the nonresponse bias (Preston & Karahanna, 2009). These tests determine a significance level. In this research the results are significant if $P < 0.05$.

3.1.3 Validity and Generalizability

In order to maintain the validity of the research, the instruments need to measure what they are intending to measure. Therefore, as mentioned earlier, structured interviews will be held in order to gain richer insight into the phenomenon and record the validity of the variables for the survey. Furthermore, an off the shelf scale will be used (Sekaran & Bougie, 2016). All these factors will contribute to the internal validity of the research. To maintain the external validity, this research has to be generalizable for a large group of the population. This research uses the 'organization' unit of analysis. However, if executed well the results can be used for the 'user' only as well. Then, this research will be useful within organizations. The construct validity is ensured since these constructs come from several top journals and research. To maintain the reliability of the survey, a Cronbach's alpha will be used. A value above 0.7 will be accepted.

3.1.4 Control variables

Several control variables occur based on the literature that has been examined. One that returns often is the firm size as measured by using the number of employees in the firm. Firm size could influence the process of decision-making and performance of the IT governance maturity of a firm, but also the collaboration between two chief-level executives can become more complex.

(Subramani, 2004; Ray, Muhanna & Barney, 2005; Schobel & Denford, 2012). Another firm-level control is the market share of an organization. Following other empirical research, a firm with a higher market share could have a greater reserve of resources and therefore, logically, could take more risks concerning IT investments in order to improve the efficiency of the IT governance (Bharadwaj, Bharadwaj & Konsynski, 1999). Other control variables that will be included are the sales, assets, profit and industry. The controlling for the industry will be based upon the SIC code (Preston & Karahanna, 2009). These variables can be included in order to assess the effect of the independent variable on the dependent variables. However, they are not further discussed in this literature review since it is already discussed in previous research.

Chapter 4

4.1 Contribution to research

There are several theoretical implications that derive from this study if it would be executed. Firstly, this study is focusing on the relationship between CIO and CFO instead of the whole TMT. It could give a better insight into what an effective collaboration includes and how it affects the IT governance maturity of an organization. This research thus contributes to the IT governance literature by gaining insight into what the effect of collaboration between CIO and CFO is on the IT governance maturity. Secondly, this research tries to find out what the effect of a complex IT investment is on the IT governance maturity. The study suggests that if a firm is able to manage the complexity, they will have a better IT governance performance. Furthermore, this study could contribute to the knowledge about the effects of the position of the CIO on the relationship of collaboration on the IT governance maturity. The position of the CIO should be determined by the characteristics of the overall business strategy. Therefore, this moderator could give more insight in when the collaboration could be effective and thus has a positive influence on the IT governance maturity. Another important factor to point out is that this is one of the few studies that empirically studies the cognitive elements of the CIO and CFO which lead to the IT governance maturity.

4.2 Manegerial implications

In terms of practical implications, this research depends on the significant level. If this study is executed well and the significance exists, then it could provide the practical use for the CIO and CFO. Nevertheless, it could also add value to the other departments involved in important IT decisions. Most important, this research develops an approach for an organization to establish a sustained competitive advantage. Although, this depends on the industry averages since a firm needs to perform above that in order to establish a competitive advantage. This research could provide the managerial knowledge in a few ways. Firstly, it could foster the collaboration between CIO and CFO. If they are able to develop shared understanding and trust, then a CIO could develop a positive influence on the IT decisions. The collaboration of the CIO and CFO has to focus on the use of common knowledge in order to the ability to adapt to another point of view if necessary for one (or two) of them. Secondly, if a firm is able to establish a great IT power it could lower the complexity of IT investments and contribute to a better IT governance maturity. Additionally, CIOs could rethink their position among the chief-level executives and determine if they are in the right place, taking into consideration the characteristics of the overall business strategy and their influence on the IT governance.

4.3 Conclusive remarks

This study is creating the base for an empirical study. Therefore it is not possible to answer the problem statement with explicit certainty because this study, assuming it would be completed, is based on secondary data and primary data which is available yet. However, if we assume that this research is carried out we could conclude some things. Firstly, the first three research questions are answered since they are described in the theoretical development. This chapter is based upon the constructs that will be used in this research and these constructs are explained by a definition. The next three questions can be answered based on the hypotheses. If the hypotheses turn out to be correct, then this research could conclude that an effective collaboration has a positive influence on the IT governance and that the perceived position of the CIO could influence this relationship. However, this is also depending on the overall business strategy of an organization. Furthermore, if the complexity of IT investments is low then positive opportunities for the IT governance occur since a firm has more resources, like employees and time, left for examining the opportunities more deeply. Those opportunities could be exploited more when a firm could maintain low complexity and therefore minimizing the risks. A reason therefore is that if the involved participants are aware of the accountability for the investments, they decide to put more effort and resources into making the right decision. Thus, the problem could be answered within the boundaries that this research assumes it will be executed and the hypotheses are correct. Therefore, the answer to the problem statement could be that an effective relationship between CIO and CFO influence the IT governance positively. It is logical to assume that this tends to occur when the overall business strategy of a firm is to be a cost-leadership strategy and the CIO is closely working together with the CFO. It is also logical to assume that a low complexity of the decision-making process could have positive influence on the IT governance maturity of a firm.

4.4 Limitations and further research

Also, the limitations of the study must be acknowledged. Firstly, the response rate could become a topic of issue since this research works with surveys. However, this is comparable with other studies from chief-level executives (Armstrong & Sambamurthy, 1999; Preston & Karahanna, 2009). This raises the concern about nonresponse bias. Therefore it is important to take a look at any significant differences between the responding and nonresponding organizations. Also, other organizational differences can occur. Furthermore, since the probability of the sampling is known it leads to a high representativeness but it could also result in high costs. Another important issue could be that this research depends on secondary data from the organizations in order to use the

accounting measures. However, not every organization is willing to provide this information. Consequently, this study has to focus on public organizations who are obligated to provide certain accounting information (e.g. annual reports), which affects the generalizability of the research. Also, it is important to keep in mind that the database Orbis is not the easiest tool to make exports with and that an account needs to be bought for the D&B Million Dollar database.

Future research

If it appeared to be the case that the hypotheses are true, then the results can support the importance of an effective relationship between CIO and CFO on the IT governance of an organization. It takes into consideration the complexity of IT decisions and the position of the CIO, which both could have an effect on the IT governance maturity. This could point to directions for further research. First, from an academic point of view, it is important to further explore the antecedents of an effective collaboration. The current study frames several factors which are important and what their effect is on IT governance maturity of an organization. An additional dimension of complexity could enrich the scarce theory about the relationship between the decision-making process and IT governance maturity. Especially, since this study expects that this is a negative relationship. It could also gain more insight if further research would study characteristics of the CFO and how these would influence a CIO. Second, this study indicates that more knowledge if encouraging for academic objectives. Not much is known about the antecedents and the relationship between them, which could be concerns of the CFO and CIO. Johnson and Lederer (2005) suggest that there are more influences on the effectiveness of the collaboration. Those may be an important consideration for further research. Even though this study is focusing on generating a theory, the disadvantage could be that the data could be scarce and the external validity could be jeopardized. Additional research in the unknown influences and relationship characteristics between CIO and CFO could add value to the overall academic literature. On the other hand, an organization could include the statistical prove for an effective collaboration and the effect on IT governance in their annual reports. In that way, other stakeholders can actually see the results of the high IT investments and a strong IT department. As a result, stakeholders but also employees from other departments are probably changing their opinions about the IT department. In the best case scenario then, stakeholders will see IT as an important resource of the competitive advantage and value it as an actual key role into the survival of the firm. Overall, further research could add value to the existing scarce knowledge about this topic if it could dive deeper into the different dimensions of the complexity of IT; how to effectively communicate this with other peers of the CIO and the influence on the IT governance of a firm.

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Appendix

Appendix A – COBIT

TABLE 1
Plan and organize IT processes (ITGI, 2007a)

	Process name	Description
PO1	Define a strategic IT plan	Incorporation of IT and business management in the translation of business requirements into service offerings. Development of strategies to deliver these services in a transparent and effective manner.
PO2	Define the information architecture	The establishment of an enterprise data model that incorporates a data classification scheme to ensure the integrity and consistency of all data.
PO3	Determine technological direction	Defining and implementing a technology infrastructure plan, architecture and standards that recognize and leverage technology opportunities.
PO4	Define the IT processes, organization and relationships	Establishing transparent, flexible and responsive IT organizational structures and defining and implementing IT processes with owners, roles and responsibilities integrated into business and decision processes.
PO5	Manage the IT investment	Effective and efficient IT investment and portfolio decisions, and by setting and tracking IT budgets in line with IT strategy and investment decisions.
PO6	Communicate management aims and direction	Providing accurate, understandable and approved policies, procedures, guidelines and other documentation to stakeholders, embedded in an IT control framework.
PO7	Manage IT human resources	Hiring and training personnel, motivating through clear career paths, assigning roles that correspond with skills, establishing a defined review process, creating position descriptions and ensuring awareness of dependency on individuals.
PO8	Manage quality	The definition of a QMS, ongoing performance monitoring against predefined objectives and implementation of a program for continuous improvement of IT services.
PO9	Assess and manage IT risks	Development of a risk management framework that is integrated in business and operational risk management frameworks, risk assessment, risk mitigation and communication of residual risk.
PO10	Manage projects	A defined program and project management approach that is applied to IT projects and enables stakeholder participation in and monitoring of project risks and progress.

TABLE 2
Acquire and implement IT processes (ITGI, 2007a)

	Process name	Description
AI1	Identify automated solutions	Identifying technically feasible and cost-effective solutions.
AI2	Acquire and maintain application software	Ensuring that there is a timely and cost-effective development process.
AI3	Acquire and maintain technology infrastructure	Providing appropriate platforms for the business applications in line with the defined IT architecture and technology standards.
AI4	Enable operation and use	Providing effective user and operational manuals and training materials to transfer the knowledge necessary for successful system operation and use.
AI5	Procure IT resources	Acquiring and maintaining IT skills that respond to the delivery strategy, an integrated and standardized IT infrastructure, and reducing IT procurement risk.
AI6	Manage changes	Controlling impact assessment, authorization and implementation of all changes to the IT infrastructure, applications and technical solutions; minimizing errors due to incomplete request specifications; and halting implementation of unauthorized changes.
AI7	Install and accredit solutions and changes	Testing that applications and infrastructure solutions are fit for the intended purpose and free from errors, and planning releases to production

TABLE 3
Deliver and support IT processes (ITGI, 2007a)

	Process name	Description
DS1	Define and manage service levels	Identifying service requirements, agreeing on service levels and monitoring the achievement of service levels.
DS2	Manage third-party services	Establishing relationships and bilateral responsibilities with qualified third-party service providers and monitoring the service delivery to verify and ensure adherence to agreements.
DS3	Manage performance and capacity	Meeting response time requirements of SLAs, minimizing downtime, and making continuous IT performance and capacity improvements through monitoring and measurement.
DS4	Ensure continuous service	Building resilience into automated solutions and developing, maintaining and testing IT continuity plans.
DS5	Ensure systems security	Defining IT security policies, plans and procedures, and monitoring, detecting, reporting and resolving security vulnerabilities and incidents.
DS6	Identify and allocate costs	Complete and accurate capture of IT costs, a fair system of allocation agreed upon by business users, and a system for timely reporting of IT use and costs allocated.
DS7	Educate and train users	A clear understanding of IT user training needs, execution of an effective training strategy and measurement of the results.
DS8	Manage service desk and incidents	A professional service desk function with quick response, clear escalation procedures, and resolution and trend analysis.
DS9	Manage the configuration	Establishing and maintaining an accurate and complete repository of asset configuration attributes and baselines, and comparing them against actual asset configuration.
DS10	Manage problems	Recording, tracking and resolving operational problems; investigating the root cause of all significant problems; and defining solutions for identified operations problems.
DS11	Manage data	Maintaining the completeness, accuracy, availability and protection of data.
DS12	Manage the physical environment	Providing and maintaining a suitable physical environment to protect IT assets from access, damage or theft.
DS13	Manage operations	Meeting operational service levels for scheduled data processing, protecting sensitive output, and monitoring and maintaining infrastructure.

TABLE 4
Monitor and evaluate IT processes (ITGI, 2007a)

	Process name	Description
ME1	Monitor and evaluate IT performance	Monitoring and reporting process metrics and identifying and implementing performance improvement actions.
ME2	Monitor and evaluate internal control	Monitoring the internal control processes for IT-related activities and identifying improvement actions.
ME3	Ensure regulatory compliance	Identifying all applicable laws, regulations and contracts and the corresponding level of IT compliance and optimizing IT processes to reduce the risk of non-compliance.
ME4	Provide IT governance	Preparing board reports on IT strategy, performance and risks, and responding to governance requirements in line with board directions.

Figure 2. COBIT model reprinted from Simonsson and Johnson (2010)

Appendix B – Grand tables

The content of chapter 2 is summarized in the grand tables of constructs and relationship on the next two pages. These tables will give an overview of the definitions of the constructs and how they will be measured. Furthermore, the supporting literature is mentioned in the last column. Table 2 is the table about the constructs and table 3 about the relationships between the constructs.

CONSTRUCT	A PROPERTY OF …	DEFINITION	ITEMS FOR MEASUREMENT	SUPPORTING LITERATURE
EFFECTIVE COLLABORATION	Organization (CIO and CFO)	the degree to which a collaboration between chief-level executives includes trust, positive influence and shared understanding with reasonable arguments	*Scale:* Five point scale ranging from 'strongly agree' (5) to 'strongly disagree' (1). As a CIO and CFO: (1) We have a shared understanding of the importance of IT governance for the firm. (2) We use common business terminology in order to explain our reasoning. (3) We understand the importance of IS for the organization and therefore are willing to work closely together. (4) Common view about the goals of IS.	• Schobel and Denford (2012) • Smaltz, Sambamurthy and Agarwal (2006) • Feeny, Edwards and Simpson (1992) • Boynton, Zmud and Jacobs (1994) • Preston and Karahanna (2009)
COMPLEXITY OF IT INVESTMENTS	Organization (single investment decision)	The complex and multistage systems, which takes every stage of the pre-implementation process into account and hold their major participants accountable for the outcomes	*Scale:* Five point scale ranging from 'strongly agree' (5) to 'strongly disagree' (1). As CIO and CFO: (1) We have a common view about the prioritization of IT investments. (2) We experience that every department involved feels responsibility for the actual decision-making. (3) It is easy to hold participants accountable. *Scale:* accounting measure: ROI	• Xue, Lian and Boulton (2008) • Penman (1991) • Preston and Karahanna (2009)
IT GOVERNANCE MATURITY	Organization	The internal efficiency of the IT organization.	*Scale:* Control Objectives for Information and related Technology (COBIT) model. As a CIO define: (1) A strategic IT plan. (2) The information architecture. (3) The IT processes, organization and relationships. (4) The automated solutions which are cost effective. (5) The service levels. (6) The allocated costs of IT. (7) Evaluation of IT performances. (8) The internal control of processes that are IT related.	• De Haes and Van Grembergen (2004) • Simonsson, Johnson and Ekstedt (2010)

PERCEIVED POSITION OF THE CIO	Organization (CIO)	The degree to which a CIO has knowledge of general business and is reporting to a CFO	*Scale:* (1) is yes and (2) is no. As a CIO: (1) Directly reporting to the CFO of the firm. (2) I am collaborating with my CFO about IT decisions. *Scale:* accounting measure: average costs per unit	• Banker, Hu, Pavlou and Luftman (2011) • Hambrick and Mason (1984) • Porter (1996)
• FIRM SIZE • MARKET SHARE • SALES • ASSETS • INDUSTRY (BASED ON SIC CODE) • PROFIT		Control variables		• Subramani, M. (2004) • Ray, G., Muhanna, W. A., & Barney, J. B. (2005) • Bharadwaj, A. S., Bharadwaj, S. G., & Konsynski, B. R. (1999)

Table 2. Grand table of constructs

RELATIONSHIP	REASON (WHY)	SUPPORTING LITERATURE (OR INTERVIEW)
COMPLEXITY OF IT INVESTMENTS → IT GOVERNANCE MATURITY	As a result of a low complexity for the IT decision-making process, the IT opportunity for a more efficient IT governance could occur.	• Xue, Lian and Boulton (2008) • De Haes and Van Grembergen (2004)
DEGREE OF EFFECTIVENESS OF A CIO – CFO COLLABORATION → IT GOVERNANCE MATURITY	The dimensions of an effective collaboration are 'trust', 'positive influence' and 'shared understanding'. In order to combine the two different fields of working of a CIO and CFO, they have to use common business terminology. This indicates that a certain managerial IT knowledge is crucial for the efficient IT use.	• Schobel and Denford (2012) • Boynton, Zmud and Jacobs (1994) • Howell (2006)
PERCEIVED POSITION OF THE CIO → RELATIONSHIP BETWEEN EFFECT OF COLLABORATION ON THE IT GOVERNANCE MATURITY	In most cases a CIO reports to the CEO in order to have an influence on the strategy of the firm. If a firm is aiming for a cost-leadership strategy, then it would be more consistent if the CIO is positioned underneath the CFO and collaborates with closely in order to facilitate an effective collaboration.	• Banker, Hu, Pavlou and Luftman (2011) • Hambrick and Mason (1984)

Table 3. Grand table of relationships