

The different Roles of the Chief Information Officer (CIO) – A systematic Literature Review

Seminar paper

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Abstract

The role of the Chief Information Officer (CIO) has changed over the years. The CIO used to be the head of the IT sector and was responsible for all supporting information technologies (IT). His responsibilities were limited and the main task was to provide the supporting IT to the CEO and other management members. In the past few decades technology has become more prevalent and sophisticated within organisations. The meaning of technology has changed from a supporting function to one of the crucial elements of organisation's services. This led to a change of the supporting CIO role to one of the leading functions within an organisation. The present paper reviews 28 papers regarding to the different roles of the CIO and shows the development over time. The roles are clustered and inserted in a schema to identify what roles are described in the literature. The paper points out the importance of the CIO, the multiplicity of his roles within an organisation and how these roles developed.

Keywords: Chief Information Officer, CIO roles, CIO new roles

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1 Introduction

In the last few decades the role of the Chief Information officer has received growing attention of researchers. Although much has been written about the CIO position, it seems to be still a topic of discussion. The original role of the Chief Information Officer is defined as functional line manager and technical expert (Applegate & Elam, 1992). The CIO served the organisation as technology provider in a supporting function (Peppard et al., 2011). The development of IT led to a change in the relevance and position of the Chief Information Officer. As IT became a crucial factor for competitive advantage, the CIO role gained in importance for organizations strategies and the evolution of the CIO role started. Cohen & Dennis (2010) describe the evolution of the CIO role as a movement from backroom to boardroom where the CIO position equals other C-level positions. The ongoing development of IT forces organizations in a phase of digital transformation. Due to this change of IT relevance the CIO gained more responsibilities and shifted from being in a supporting role to a driver of strategic change and innovation. (Peppard et al., 2011). This development led to the ambiguity of the CIO role.

1.1 Relevance and aim of the paper

The ambiguity of the CIO role caused confusion about the responsibilities and position of the Chief Information Officer. Spitze & Lee (2012) point out this confusion by debating the meaning of the “I” in the CIO title whether it stands for Information, Infrastructure, Integration, Intelligence, Innovation or a combination of all of these.

It is the aim of this paper to clarify and cluster the different roles of the CIO that are described in the literature. Furthermore, it is part of this paper to show the CIO role development that is described in the literature over time. In addition to the different roles the CIO position gained, it has also gained new areas of responsibilities. Elaborating the growing areas of responsibilities is a further result of this paper.

The results of this paper give an overview how the CIO roles have developed in the past and what areas of responsibility is focused in the future. The analysed role development explains why the position of the CIO has changed drastically within a few decades and why it is still an issue for research. These collected results show the development direction of the CIO role. The findings to the growing areas of responsibility point out a trend of the CIO position and help to understand the complexity of the different roles. The trend that is analysed out of the literature might give an idea how the CIO role will look like in the future and what roles will be no longer a crucial point of the CIO position.

To achieve the required results this paper will focus on the most relevant literature to this topic and give a systematic review of the different CIO roles.

1.2 Research question and structure of the paper

As this paper is intended to give a systematic overview of the different roles the Chief Information Officer can take in an organisation and show the development over time. It should clarify what roles the CIO gained and how the areas of responsibility have changed. This is why the research question of this paper is: What different CIO roles are defined in the literature and how have they developed? To answer this question this paper is structured as followed.

First, I will describe the process of research and present my identified literature as the result. I will structure the literature according to the year of its publication to identify the development of the CIO roles over time. Second, I will conceptualize the different CIO roles I identified out of the literature and give a short explanation of the role categories I developed and how I understand them. In this part I will also analyse the development of the role descriptions in the literature and outline the growing areas of responsibility.

Third, I will point out the commonalties and differences I have found in the literature as well as the limitations of this paper. Finally I will sum up the results to give a short conclusion.

2 Literature Review

In this chapter I will describe the process of research and give a short overview of the research results. I will explain the different research steps to give an exact impression how I came to my research results and what methods I used to identify the relevant literature. Finally I will give a short tabular display of the findings to highlight the most relevant databases and give an overview of the most used literature type.

2.1 The process of research

To start the research process and get a first impression of the literature I went to the library - ZBW-Leibniz Information Centre for Economics. Here I tried out the first keywords and search terms. Unfortunately, I couldn't get access to most of the literature I found in this early phase of research. After this kick-off research I continued the further research in four steps. As first step, I chose different databases I wanted to use. The databases I used for my research are chosen by the criteria of relevance and the possibility of getting access to the required literature. Due to this criteria I decided to use EBSCO, EconBiz, Proquest Ebook Central, ResearchGate, Google scholar and Springer professional as databases for my further research.

The matter of the second step was to identify the right search terms and keywords to get the best results. I started off with the general search term "Chief Information Officer". Depending on the used database there have been many results but after reading through the first papers I realized that I have to use a more specific search term to limit the results and find more relevant literature. To find a better search term I tried to fit the term more to the topic of the paper and went on with "different roles of the CIO". With this search term the results were more specific and limited in the amount. In addition to my prior search terms I used "CIO roles", "CIO new roles" and "CIO responsibilities" as further search terms.

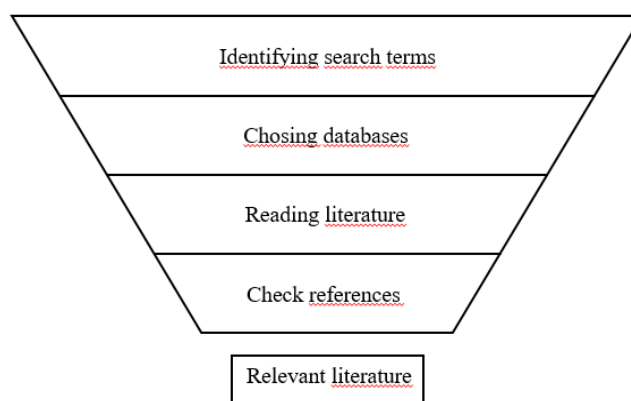


Figure 1: Research funnel

As third step I read the selected literature and identified the relevant papers for my research. While reading the papers in detail I analysed what different CIO roles are mainly described and grouped them in six major CIO roles.

As fourth and final step I checked the references of the identified literature and searched for further relevant papers. This step was an evolving process. I included the relevant papers I was able to get access to. I stopped this process at the point where the different papers and authors were citing each other and referring to the same literature.

2.2 Identified Literature

During the research process I was able to identify 37 papers in total which were in most cases articles. After reading the papers in detail I excluded some more publications due to the fact that the relevant part for my research was often strongly cited. The following table shows in which databases I found the remaining 28 papers.

Database \ Search term	EBSCO	EconBiz	Google scholar	Proquest EBooL Central	Re-searchGate	Springer professional
Chief Information Officer	1	1	2	0	5	2
Different roles of the CIO	0	0	0	0	2	1
CIO roles	2	1	2	1	3	2
CIO new roles	0	0	0	0	1	
CIO responsibilities	0	0	0	0	1	1
Total (28)	3	2	4	1	12	6

Table 1: indetified literature in different databases

The conceptualization of the CIO roles is based on these 28 publications which are included in the schema of the next chapter. Part of the next chapter is also to show the development of the CIO roles over time. This is why the publication date is important for this paper. The figure below shows the papers grouped by their publication year.

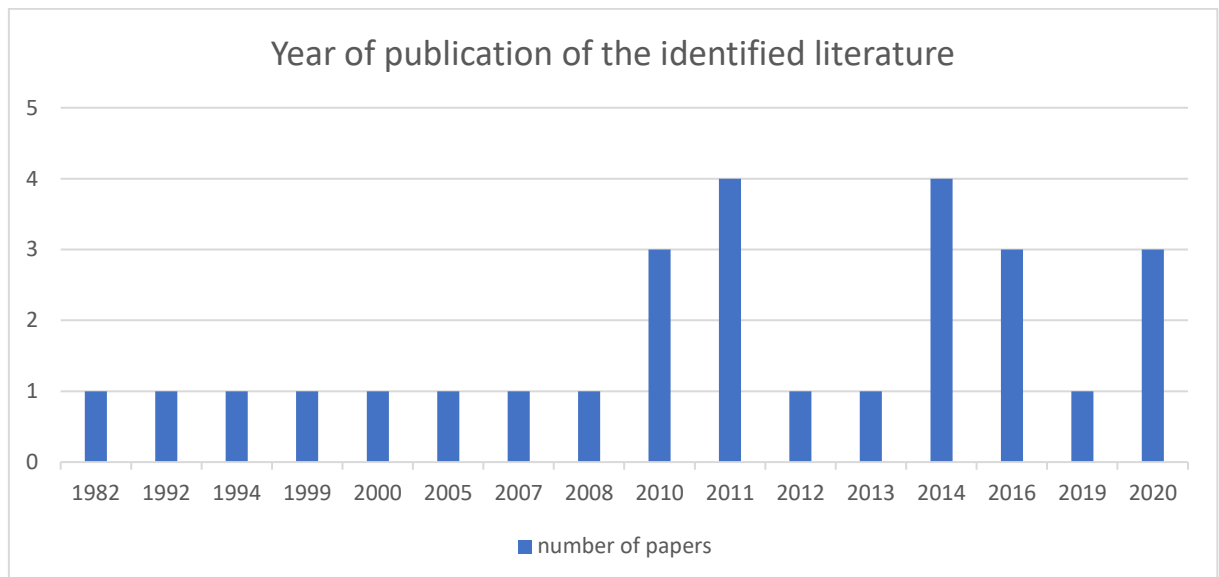


Figure 2 publication year of the identified literature

The figure shows that the CIO position has been a topic for discussion over a long time. Although the CIO position is nothing new and is existing for decades now, literature is still dealing with this topic. Especially in the last ten years the changing role of the CIO position has become a more relevant topic again. Which roles the CIO position includes and how they are described in the literature is content of the next chapter.

3 Findings

In this chapter I will present my research results in three steps. At first, I conceptualized the different CIO roles described in the literature. Second, I will show how the CIO role has developed in the literature and in what roles the CIO is required to interact. Third, I will sum up the findings to clarify the growing areas of responsibility for the CIO.

3.1 Conceptualization of CIO roles

To build the table below I identified six major CIO roles which are described in the literature. The roles are Technology provider, Strategic partner, Business manager, Innovation driver, Integrator & Architect and Relationship builder. The exact meaning of these roles is explained in the following. The schema shows which authors focus on which CIO roles and the role description reflects what main functions of the CIO is described in the specific paper.

Literature		CIO roles					
Author	Role description	Technol- ogy pro- vider	Strategic partner	Business manager	Innova- tion driver	Integra- tor & Ar- chitect	Relation- ship builder
Rockart, Ball & Bullen (1982)	Strategic plan- ner, General man- ager, Sensitive revo- lutionizer, Technology ex- perts communi- cator		X	X		X	X
Applegate & Elam (1992)	Technical ex- pert, Business leader	X		X			
Earl & Feeny (1994)	Relationship Builder	X	X				
Ross & Feeny (1999)	Strategic partner	X	X				X
Gottschlak, & Taylor (2000)	Strategist, Decider, Developer, Architect, Contactor	X	X	X			X

Beatty, Arnett & Liu (2005)	IS technologist, Business manager	X		X			
Bioko (2007)	Technologist, Administrator	X		X			
Motta & Roveri (2008)	Innovation Champion				X		
Cohen & Dennis (2010)	Functional line manager, Strategic business person	X	X				
Hunter (2010)	New direction leader, Corporate culture developer		X			X	
Peppard (2010)	Deliverer, Strategic Thinker, Business leader, Innovation driver, Facilitator CIO, Relationship builder (Diplomat)	X	X	X	X	X	X
Banker, Hu, Pavlou & Luftman (2011)	Strategy shaper		X				
Carter, Grover & Thatcher (2011)	Spokesperson and Monitor, Entrepreneur & resources allocator, Leader and Liaison	X	X	X			X
Gefen, Ragowsky, Licker & Stern (2011)	IT service provider, Strategic driver, Business Integrator, Business Liaisons			X		X	

Peppard, Edwards & Lambert (2011)	Utility IT Director, Evangelist CIO, Innovator CIO, Facilitator CIO, Agility IT Director/CIO	X		X	X	X	X
Spitze & Lee (2012)	Business leader			X			
Dlamini (2013)	Technology all-rounder	X	X			X	
Al-Taie, Lane & Cater-Steel (2014)	Utility provider, Strategist, Integrator, Relationship architect	X	X			X	X
Gonzalez (2014)	IT professional	X					
Hamidifarda & Aminilarib (2014)	Executive-level manager, technical manager (cost concentrated)		X	X			
Hu, Yayla & Lei (2014)	Innovator, Corporate governance integrator				X	X	
Haffke, Kalgovas & Benlian (2016)	Functional head, Strategic partner, Business Visionary, Chief Innovation officer, CDO/Agility IT director	X	X	X	X	X	
Horlacher (2016)	Realizer	X			X	X	
Horlacher & Hess (2016)	Digital Innovation deliverer				X		

Locoro & Ravarini (2019)	Technological leader, Spokesperson, Resource allocator, Project coordinator, Liaisons	X	X	X		X	X
Bub, Striemer & Gruhn (2020)	CIO/CDO teamwork				X	X	
Gerth & Peppard (2020) ¹	Technologist, Key strategic role, Business driver, Source of innovation/ catalyst, Facilitator,	X	X	X	X	X	
Gerth & Peppard (2020) ²	Transition type				X		

Table 2: Concept of different CIO roles

The role of the *Technology provider* is understood as the classical and traditional role of the Chief Information Officer. Applegate et al. (1992) describes the role of the CIO as functional line manager and technical expert. In this role the CIO needs to have excellent technical skills and is responsible for providing the right technology and supporting the organization with IT-solutions (Gerth et al., 2020). This role has just a supporting function and is not included in the top management team. It describes the CIO position as an IT professional position and not as a part of the C-level top management team (Gonzalez, 2014). Ross & Feeny (1999) mention that the focus of the CIO role as an IT-provider lies on the user satisfaction of the organization’s members. The role of the Technology provider stands for an early phase of the CIO role evolution (Haffke et al., 2016).

The CIO as a *Strategic partner* is supposed to influence organizations strategies by developing IT strategic plans (Dlamini, 2013). This CIO role is orientated on the development of IS strategies (Rockart, 1982) so that the strategic role of the CIO gained in importance when IT became a feature for competitive advantage. The strategic partner is responsible for strategic changes based on the technology as a competitive advantage (Peppard et al., 2011). The CIO needs to orientate the technological decisions on the organizations strategy and implies strategy redesigns if the development of technology offers new value creating business segments (Banker et al., 2011). The CIO in the role of a strategic partner has not just a supporting function, but a meaningful influence on organizations strategy. The responsibility of

¹ See “The Ambiguity of the CIO Role” T. Gerth & J. Peppard, (2020)

²See “Setting the Stage for CIO Transitions” T. Gerth, J. Peppard, (2020)

changing and redesigning the strategy of an organization brings the CIO in a proactive role. The decisional power of the CIO in this role makes the CIO to a top management member.

The CIO role of a *Business manager* includes all managerial functions that the CIO is responsible for. As a business manager the CIO is focused on value creation and process optimizing in relation to technology. The role requires leadership skills and the ability of business thinking. The CIO as a business manager is responsible for leading the business with a special focus on IT (Peppard, 2010). The CIO is acting like an entrepreneur and resource allocator to drive the business to the most efficient level (Carter, et al. 2011) and is communicating a business vision. The CIO as business visionary must have a comprehensive understanding of all business actions and technology knowledge to lead the organization to higher success by recognizing the value of emerging IT capabilities and new applications of IT for the business (Haffke et al., 2016).

In the role of the *Innovation driver* the CIO is responsible for using new technology for business change and revolutionizing the organization (Rockart et al., 1982). The CIO is functioning as an innovation champion with less concern on efficiency. For achieving real innovation the mind must be freed from efficiency concerns, because many innovative ideas do not lead to economic success (Motta & Roveri, 2008). The CIO as Innovation driver is mainly responsible identifying new technological solutions and developing opportunities to deploy new IT-enabled process and products/services that give the organization a magnificent competitive advantage over its rivals (Gerth & Peppard, 2020).

The CIO as an *Integrator and Architect* is responsible for integrating new, value-creating technology in the business organization model. In this position the CIO is the leader of projects which have the purpose to implement technology solutions organization-wide. The CIO is also functioning as facilitator and trainer to realize technology implementations and to build a technological architecture within an organization. The IT architecture that the CIO designs needs to be efficient and suitable for all business areas (Gerth & Peppard, 2020). Due to the growing importance of IT the CIO became an essential part of corporate governance. Under this aspect the CIO is responsible for delivering technical requirements of IT and shaping them in a suitable form for the organization to achieve sustainable competitive advantage (Hu et al., 2014).

As a *Relationship builder* the CIO establishes a network of external relationships. In general this role is underrated in its efficiency. Building a network to people outside of the IS function is a central criterion for getting access to information of technology requirements and exiting dysfunctions. This information helps solving the right problems and offering the most efficient contribution to shape the organization's successful strategy. This role is a supporting role of the roles that were described before.

3.2 Development of the CIO roles in the literature

The literature that has been reviewed for this paper, was published in the space of time from 1982 to 2020. The content of this paragraph is to emphasize the development of the different CIO roles in the literature. To give a short overview I will reflect the role development in four different periods. The first period to be examined is between 1980 and 1999, the second between 2000 and 2010, the third between 2011 and 2016 and the fourth and final period is between 2017 and 2020.

In the period between 1980 and 1999 there has been a general uncertainty about the value of IS and the contribution of the CIO. As computer based systems have been involved in almost all day-to-day operations and Information functions have expanded, the role of the CIO changed. The rapidly changing technology and new possibilities to store and use information has led to a growing importance of the CIO role. This is why Rockart et al. (1982) came to the conclusion that the CIO must be a member of the top management team in the future. To that time this view of the CIO role was not fully accepted.

There still have been many sceptic doubters who argued about the importance of the CIO and they took the view that the relevance of the CIO was a relative minor one of data administration. These doubter also have been of the opinion that IS function might disappear and will have no sustainable effect on economics (Rockart et al., 1982). In the beginning of the 1990' there has been still a lot of confusion about the relevance of IT and the CIO's importance. Business leaders were not aware of the CIO's contribution and many CIOs got fired. IT was often seen as liability with outsourcing as its consequence. As IT was still seen as supporting function that did not apply to every industry, outsourcing seemed to be the right method to reduce costs. Over time it has been realized that technology and the position of the CIO can create value and drive business change. The CIO was accepted little by little in the business team and started to take over the role as strategic driver. The IT environment created by a value adding CIO was the foundation and driver of transforming business. This creation of IT environment was only possible if the CEO did not inhibit the IT achievements (Earl & Feeny, 1994). Until the end of the 1990' computing developed from backroom utility to strategic organisational role. The CIO started off as functional head with the responsibility to deliver on promises such as developing new systems to time and budget. The knowledge that is required here is a prerequisite for the next step as strategic partner. The CIO managed to establish its position at this point. There have been speculations about the further development to a business visionary role and main strategic driver, but this was not realized at this point of time (Ross & Feeny, 1999).

In the early 2000' the CIO position includes several roles. The CIO is acting as provider of technological services to user departments, works in publicity, promotes new technology and builds internal relations with the user management. At this point the CIO is concerned with a wider group of issues than most managers. The CIO is operating in strategic planning of information resources and is closing the gap between organizational and IT strategies (Gottschalk & Taylor, 2000). As the importance of the CIO position is still growing at that time the CIO elevated quickly to a top management member. One of the main challenges of the CIO role is the balancing process that must take place between technologic and manager job roles (Beatty et al., 2005). In the last years of this decade the understanding of the CIO role gained additional attributes. The CIO gets encouraged to handle all concerns proactively and support business innovation. The further role of innovation driver was created (Motta & Roveri, 2008). Moreover, the CIO promotes technology that is strongly business orientated with the purpose to enhance effectivity and efficiency of the business governance and processes (Motta & Roveri, 2008). The CIO achieves the role of a business manager as general manager with IT specification (Peppard, 2010). Managers with an understanding of business leadership and excellent knowledge of IT processes became catalysts for the innovation application of technology to support business goals (Hunter, 2010). In this decade the variety of the CIO roles almost achieved its highest potential. The information needed to be managed on different levels of organisation so that role of technology provider was displaced by other functions. The changing responsibilities and the increase of functions of the CIO led to the conclusion that this might be too much to handle for one individual. To solve this problem, sometimes the traditional role of the CIO was recasted as Chief Technology Officer (CTO) (Beatty et al., 2005).

In the beginning of the next period the CIO's responsibilities included still the position as business manager who is combining and connecting operational business aspects of IT. At that time many outsourced IT departments were brought back in the house to support the organizations processes on the spot of business. The CIO strengthened the position as business partner and usual IT projects changed to business transformation projects (Gefen et al., 2011). This change of projects substantiated the CIO role as an innovator. In the role of the innovator the CIO is responsible for identifying and developing new opportunities to deploy new IT-enabled processes and products as well as services that give the organization the possibility to achieve competitive differentiation over its rivals. The CIO acting proactive to enhance strategic growth and innovation (Peppard et al., 2011). Later in this period of time a new topic of discussion appeared. Digital transformation became the strategic goal of many organizations. Typically, this challenge would fall within the CIO's area of responsibility, but the CIO position has reached a level of complexity that makes it unreasonable to face all responsibilities as an individual. As

a result, the C-suite of organisations gained a further member, the Chief Digital Officer. The CIO and CDO role have overlapping areas of responsibilities that need to be demarcated. The introduction of the CDO might mark an inflection point of the CIO position.

In the last period between 2017 and 2020 the CIO is finally fully accepted as a member of the top management team. But the ambiguity of the roles within the position is still an obstacle. According to Gerth & Peppard (2020) variety of the CIO roles is a key reason why organizations struggle with Digital Transformation. An implication of the ambiguity is the possibility that operational and strategic opportunities from IT can be missed and any investments that are made in technology underperform. Furthermore frustration of the CIO can be a consequence of different expectations. Due to the fact that the CIO position is still not defined and clarified, expectations from colleagues can differ from the own expectations of the CIO. In addition to all responsibilities the CIO position already includes, the CIO takes over responsibility for not just technology but operations and particularly digital products when there is no CDO position defined as responsible for this areas of business (Gerth & Peppard, 2020). While the CIO is actually supposed to focus on business strategy in relation to technology, the CDO is concentrating on the digital strategy. The CDO also takes the responsibility for coordinating the digital harmonization of activities, exploiting the opportunities of digital business offered by markets and driving the organization through Digital Transformation. The CDO functions as outbound counterpart of the CIO (Locoro & Ravarni, 2019). Under this aspect it is conceivable that CIO and CDO work together in a team. Interaction between CIO and CDO can provide additional value to the organization and drives product innovation what needs to be realized regarding the criteria of innovative vision and efficiency. (Bub et al., 2020).

3.3 Growing areas of responsibility

The literature shows that the CIO roles developed significantly over time and that the role of the CIO is an ambiguity one. The responsibility of the CIO has changed from functional line manager to an overall business leader and innovation driver. The responsibilities that have been assigned to the role of the CIO in an early phase of development, such as technology provider and functional line manager, do not seem to be very relevant anymore. Although these understandings of the CIO roles still exists (Locoro & Ravarni, 2019), other functions became more central and relevant regarding to the Digital Age. Today organizations face Digital Transformation and it is the CIO's responsibility to support this process. The newly introduced CDO takes over the responsibility of delivering an innovation strategy and driving the organization through Digital Transformation. As the responsibilities of the CIO and CDO are particularly overlapping, the responsibilities of either position must be clarified. This could lead to a cutback of some of the plenty responsibilities of the CIO. It is possible that the efficiency of the CIO increases when the CIO and CDO work in a team. In relation to Digital Transformation the CIO's focus lies on leading the organisation's innovation on the right path between vision and efficiency (Gerth & Peppard, 2020) (Locoro & Ravarni, 2019) (Bub et al., 2020).

4 Discussion

In this chapter the commonalties and differences of the reviewed literature are discussed. In addition the limitations of this paper are clarified and a recommendation for further research is given. I cannot guess what roles the CIO will take in the future and in what way the introduction of the CDO will influence the traditional CIO position, but clear is that the responsibilities of the CIO keep changing and that role of the CIO is an evolving one.

4.1 Commonalities and Differences

The reviewed literature agrees on the point that the role of the CIO is not clearly identified and that the ambiguity of the role leads to confusion (Rockart et al., 1982). Up to a specific point the literature describes the same evolution of the functional line manager to a strategic driver of an organisation (Rockart et al., 1982) (Ross & Feeny, 1999) (Gottschalk & Taylor, 2000) (Cohen & Dennis, 2010) (Peppard, 2010). Due to the date of publication the main focus of the CIO role changes and includes the position as an innovation driver (Hu et al., 2016) (Haffke et al., 2016) (Horlacher & Hess, 2016) (Bub et al., 2020) (Gerth & Peppard, 2020). The main difference of the literature is the view on the CIO's position as a member of the top management team and at what point the CIO achieves this level. But in the end all of the papers come to the conclusion that the CIO position is a value creating one and a driver for business strategy. Therefore the CIO must be a member of the top management team.

4.2 Limitations and further research

This research is limited by the amount of literature used. For my research I only chose literature I was able to get access to and that was written in either English or German. A further limitation is given by the selection of databases I used for my research. As relevant literature I focused only digital literature and disregarded non digital literature like books and printed journals.

For further research I recommend an analysis of the CIO responsibilities regarding to new technology like artificial intelligence and IoT. Because the CIO position is still not defined and clarified this will be also a topic of discussion in the future. Furthermore, the interaction between CIO and CDO and which roles they take for leading the organizations through digital transformation might be an interesting topic for future research.

5 Conclusion

The different roles and responsibilities of the Chief Information Officer are still not specifically defined in the literature. Many different responsibilities of the CIO are described by several authors. The ambiguity of the CIO role leads to confusion and became an obstacle for the CIO's efficiency. It is clear that the role of the CIO and the importance has changed in the past and keeps changing in the future. The CIO position and its relevance grows proportional to the influence of technology on the business strategy. According to Moore's Law technology will continue to change rapidly so that it will influence organizations strategies more and more. The role of the CIO and the introduced CDO will play major key roles for developing future business strategies.

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