

Tenure and Background of CIOs in Germany - Influencing Factors and International Comparison

Patrick Hillebrand
OTH Regensburg
Regensburg, Germany
patrick.hillebrand@st.oth-regensburg.de

Markus Westner
OTH Regensburg
Regensburg, Germany
markus.westner@oth-regensburg.de

Abstract—The average tenure of Chief Information Officers (CIOs) has increased over the past few years. Nevertheless, the average tenure of CIOs is shorter than that of Chief Executive Officers (CEOs). While most studies on tenure and background are based on data from US IT executives, studies on German CIOs are missing. This study analyzes the tenure of German CIOs as a proxy for management effectiveness and how certain factors influence it. An original and unique dataset of 384 IT executives from German companies is examined. The data include the size and industry sector of the companies, educational and professional backgrounds of the CIOs, and the CIOs' reporting lines. Data were analyzed using the chi-square test and Fisher's exact test. The German CIOs had a median tenure of 4.0 years. However, if we examine executives who are currently in office and executives with a completed term of office separately, the median tenure differs. The results also show that German CIOs do not have shorter tenures than German CEOs. When compared with US CIOs, the results depend on the values selected for comparison. In addition, the analysis shows that neither the size and industry sector of the companies nor the educational and professional backgrounds of the CIOs and managers of the CIO reports have a statistically significant influence on the tenure of IT executives. The factors examined in this study can be considered as preconditions for the CIO position. In the future, factors that play a role during tenure should be examined.

Index Terms—CIO, Chief Information Officer, CIO tenure, CIO background

I. INTRODUCTION

A LONG tenure for Chief Executive Officers (CEOs) is linked to superior firm performance [1]. This indicates successful work by the executives. Consequently, the CEO is often replaced when the company performs poorly because there is doubt about his or her ability to effectively implement strategies to increase the company's value [1].

In addition to the CEO, the Chief Information Officer (CIO), as the top information technology (IT) executive, has been an established position in companies for several years. The average tenure of CIOs has increased over the past 10 years but has stagnated in recent years [2]. Despite this increase, CEOs on average still have a longer tenure; according to a study by the consulting firm Korn Ferry, CIOs have significantly shorter tenures at 4.6 years compared to CEOs at 6.9 years [3].

Although other studies have examined the tenures of CIOs during a similar period, they have arrived at different conclusions. CIO Magazine's 2020 State of the CIO Report shows that CIOs have an average tenure of 6.5 years in 2020 [4]. This result is consistent with that determined by Kappelman et al. [2]. Nevertheless, all studies conclude that most

IT executives hold their positions for only three or fewer years [2, 4].

Many factors can influence the tenure of CIOs. Dawson et al. [5] examine the tenure of senior executives, particularly CIOs. The aim of their work was to determine differences in tenure based on factors such as gender, size, and type of organization. Recently, Jones et al. [6] examined the background of CIO. Their findings suggest that the background of a CIO has little to do with what a CIO does once in office. For example, they found that whether an IT executive was hired externally or promoted internally did not influence their reporting line. However, this study did not investigate whether these factors had an impact on the tenure of CIOs.

All the previously mentioned studies were based on data from American CIOs. German IT executives were not included in these studies. This is consistent with the results of a recent literature review, which found that quantitative research on IT executives is primarily based on data from the US [7].

This study aims to address these gaps. It examines the tenure of CIOs in Germany and attempts to answer the following research question: 'Which factors significantly influence the tenure of CIOs?'

To address this question, the remainder of this article is structured as follows. First, the existing literature is reviewed, and hypotheses are derived. Next, the methodology used is described, including the collection of data, description of the data sample, and statistical methods. The results of the analysis are presented and discussed in the following section. Finally, we present the limitations of this study and avenues for future research.

II. LITERATURE REVIEW AND HYPOTHESES BUILDING

A long CEO tenure is linked to superior firm performance and can indicate a successful executive [1]. Therefore, in this study, long tenure was used as a proxy for successful work. Even though the CIO has different tasks and responsibilities than the CEO, it can be assumed that if a CIO performs poorly, he or she will also be dismissed. In the following section, we hypothesize the factors that may influence tenure and, thus, the success of CIOs.

Studies have yielded different results regarding the tenure of CIOs. According to a study by the consulting firm Korn Ferry, CIOs have significantly shorter tenures at 4.6 years compared to CEOs at 6.9 years [3]. Other studies arrive at an average tenure of 6.5 years and 6.6 years respectively [2, 4]. There may be cultural differences between Germany and the US.

However, organizational culture, rather than the societal culture of each country, largely influences how the CIO operates in its role [8]. Therefore, the tenure of the CIOs should not differ by country. Based on these arguments, we propose the following hypothesis H1.

H1: The tenure of German CIOs is comparable to that of US CIOs.

In 2018, German-speaking CEOs who left office had an average tenure of 6.6 years [9]. In a study of how CEO age and CEO tenure moderates the relation between certain financial factors, Neifar and Ajili [10] determined a tenure of 6.5 years for German CEOs. These figures are consistent with the average tenure of US-American CEOs, which is 6.9 years [3]. Since the CIO has a significantly shorter tenure than the CEO, we propose the following hypothesis H2.

H2: The tenure of German CIOs is shorter than that of German CEOs.

Dawson et al. [5] analyzed the tenure of executives in relation to company size. They also found that managers in smaller organizations had the longest tenures, followed by slightly shorter tenures in larger organizations. According to this study, executives have the shortest tenures in medium-sized companies. They argue that medium-sized companies could be used as steppingstones, or that large companies could attract better pay. To measure size, we used turnovers from companies. It is therefore interesting to see whether the results differ when the number of employees is used to measure size. In summary, we propose hypotheses H3a and H3b.

H3a: The tenure of CIOs differs according to the size of the company, based on the number of employees.

H3b: The tenure of CIOs differs according to the size of the company, based on turnover.

The role of IT is unique to different organizations and industries. Therefore, the role of the CIO differs depending on whether companies have a high or low level of operational and strategic dependence on IT [11]. Industry-specific experience and knowledge of a CIO could therefore be particularly helpful for new business-oriented opportunities [6]. However, in a survey conducted by Mazzola et al. [12], IT executives changed industries particularly frequently on their way to become top IT executives. In addition, the industry in which they started their careers was often not the one in which they became CIO [12]. Mazzola et al. [12] concluded that IT skills are either industry-independent, or that industry knowledge is not a significant factor in the success of a CIO. Therefore, hypothesis H4 is proposed.

H4: The tenures of CIOs do not differ by industry.

CIOs are perceived as innovative and technologically knowledgeable, yet highly detail-oriented [13]. Many CIOs have a technological or engineering background. They often seem to lack political skills or the ability to communicate technical problems in such a way that other executives understand their messages [11]. These skills are relevant to an increasing business focus, and IT executives are expected to actively participate in business discussions [14]. Moreover, a CIO should be a business leader, rather than an IT manager [11]. Managers with an economic background already possess these skills.

Regardless of the subject area, a high level of education is an important prerequisite for becoming a CIO [12]. Therefore, we propose the following two hypotheses H5a and H5b.

H5a: CIOs with a background in economics have the longest tenures.

H5b: A higher level of education is associated with a longer tenure.

Whether a CIO has been promoted to this position internally or externally depends on the circumstances. For example, a successful CIO is often followed by an executive from within the organization to sustain success. The new manager already knows the organization and does not have to familiarize himself with it first [15]. In addition, companies with the primary goal of increasing efficiency beyond their IT function are more likely to hire a CIO from their ranks [6]. Companies that want to make strategic changes tend to hire a CIO outside the organization [15]. An externally hired CIO can use the beginning of his or her tenure to influence perception through the choice of activities [13]. However, a disadvantage is that they do not know the organization and may find conditions other than expected [15]. Whether a CIO is promoted internally or hired externally has advantages and disadvantages and depends on the circumstances of the organization. Therefore, hypothesis H6 is proposed.

H6: There is no difference in tenure whether CIOs were hired internally or externally.

Most CIOs in the US come to office from an IT position. However, this number has steadily decreased in recent years [2]. Furthermore, internal promotions mostly occur in the IT position [12]. The steady decline in previous IT positions and the need for a stronger business focus may indicate that a previous IT position is no longer the most promising [14]. However, according to Jones et al., the background of a CIO has little influence on the tasks a CIO performs once in office [6]. Thus, we propose the following hypotheses: H7a, H7b, and H7c.

H7a: The tenure of the CIOs is independent of the previous position.

H7b: Similar to findings from the US, the majority of externally hired CIOs in Germany also come from a position outside IT.

H7c: Similar to findings from the US, the majority of internally hired CIOs in Germany also rise from an IT position.

Most US CIOs report to the CEO, followed by the Chief Financial Officer (CFO). The number of CIOs reporting to the CEO has increased in recent years, while the number of CIOs reporting to the CFO has decreased [2, 16]. Whether a CIO is promoted within the organization or hired from outside the organization can affect CIO reports. According to Jones et al., internally promoted IT executives are more likely to report to the CFO and IT executives hired from outside the organization are likely to report to the CEO [6]. Based on this finding, we propose the following hypotheses H8a, H8b, and H8c.

H8a: Similar to findings from the US, the majority of German CIOs also report to the CEO.

H8b: Similar to findings from the US, the majority of German CIOs who have been promoted internally also report to the CFO.

H8c: Similar to findings from the US, the majority of German CIOs who are hired externally also report to the CEO.

III. METHODOLOGY

A. Data Collection

To test the hypotheses, data from two sources were collected and combined into a single dataset. The basis for the selection of CIOs is the "Top-500" company database of the German edition of CIO Magazine [17]. The database lists companies based in Germany with a turnover of more than one billion euros and was chosen for several reasons: (a) it contains information on companies, such as turnover, number of employees, and type of industry; (b) key figures on the company's IT organization are available; and (c) current IT executives are already listed. Companies with more than 5,000 employees were included in this study. Smaller companies often do not have their own separate IT organizations and therefore do not have a CIO. After applying this criterion, 330 companies remained for further investigation. The database was queried in mid-October 2020. No updates or changes after that date were included in the study.

The LinkedIn social network is primarily used to gather information about CIOs. On LinkedIn, users can create profiles that contain information about their professional careers. If a CIO did not have a LinkedIn profile, the German social network alternative Xing or press releases were used. The following information was collected from these sources: (a) the beginning and end of tenure, (b) previous position, (c) degree and specialization of education, and (d) current title of the CIO. The previous position was used to determine whether the CIO was promoted internally or externally. In addition, the department in the previous position was determined. Current IT executives of a company and their predecessors were included in the analysis. The LinkedIn and Xing data were collected until the end of October 2020. Thus, the length of the tenures spans until and included October 2020. All transitions of the CIOs to new positions from this date were not included in this data sample.

B. Data Sample

Data were collected from 384 CIOs from the previously mentioned 330 companies. However, CIOs could only be identified for 268 companies. Thus, no data on IT executives were available for these 62 companies. The tenures of all CIOs cover the period from 1990 to 2020, but only nine CIOs became CIO before 2000. Sixty CIOs took office between 2000 and 2010 and 315 from 2010 onwards.

Table I shows the distribution of the previously mentioned 268 companies based on (a) revenue, (b) IT expenditure, (c) number of employees, and (d) number of IT employees. The companies in which CIOs are employed have a median turnover of €4.5 billion, with most having a turnover of €2 to €5 billion. The median number of employees at these companies was 16,885. IT organizations have a median IT budget of € 77.50 million available for IT expenditure. However, at 32.6%, most companies had a budget of only €2 million. The CIOs had a median number of 365 IT employees. However, many companies have only 100–250 IT employees.

TABLE I. COMPANY PROFILES

Turnover in billion €	N	Percentage
<= 2	38	14.2
> 2 to 5	114	42.5
> 5 to 10	48	17.9
> 10 to 20	31	11.6
> 20 to 50	24	9.0
> 50	13	4.9
Total	268	100.0
IT budget in million €	N	Percentage
<= 50	93	34.7
> 50 to 100	73	27.2
> 100 to 250	51	19.0
> 250 to 500	22	8.2
> 500 to 1,000	17	6.3
> 1,000	12	4.5
Total	268	100.0
Number of employees€	N	Percentage
5000 to 10,000	72	26.9
> 10,000 to 20,000	89	33.2
> 20,000 to 50,000	60	22.4
> 50,000 to 100,000	25	9.3
> 100,000	22	8.2
Total	268	100.0
Number of IT employees€	N	Percentage
<= 100	20	7.5
> 100 to 250	87	32.5
> 250 to 500	69	25.7
> 500 to 1,000	45	16.8
> 1,000 to 5,000	36	13.4
> 5,000	11	4.1
Total	268	100.0

Table II presents the distribution of the CIOs by industry type. Most CIOs in this dataset are from the (a) manufacturing, (b) retail, and (c) automotive sectors.

TABLE II. INDUSTRY TYPES OF CIOs

Industry type	N	Percentage
Automotive	43	11.2
Chemical	34	8.9
Construction	11	2.9
Energy and raw materials	23	6.0
Finance	8	2.1
Food	16	4.2
Health	9	2.3
Manufacturing	128	33.3
Media	15	3.9
Retail	59	15.4
Transportation	38	9.9
Total	268	100.0

Table III shows that most of the CIOs (94%) were male. Only 23 of 384 CIOs in this dataset were female. This is well below the 17% reported by Fortune 500 companies in 2016 [16]. However, in 2018, only 2.1% of new German-speaking CEOs were female, which suggests that a low percentage of women were not limited to the position of the CIO [9].

TABLE III. GENDER OF CIOs

Industry type	N	Percentage
Female	23	6.0
Male	361	94.0
Total	384	100.0

As indicated in Table IV, responsible IT executives in Germany have different titles. By far the most common title is "CIO / Group CIO", which is held by 65% of IT executives. Furthermore, 28 executives hold the title "Director / Managing Director IT" and 37 hold the title "Head of IT /Group IT". However, in some companies, the Chief Digital Officer (CDO)

and Chief Technology Officer (CTO) are responsible for IT. This could indicate that there is no CIO position in the organization.

TABLE IV. TITLES OF CIOs

Industry type	N	Percentage
CDO	5	1.3
CIO & CDO	12	3.1
CIO & additional title	13	3.4
CIO (Regional /BU)	7	1.8
CIO / Group CIO	252	65.6
CTO	7	1.8
Director / Managing Director IT	28	7.3
EVP/SVP/VP Group IT	11	2.9
Head of IT /Group IT	37	9.6
Other	12	3.1
Total	384	100.0

As Table V shows, most CIOs have a degree in economics followed by science and engineering. In this study, business informatics and industrial engineering were attributed to economics. These figures clearly show that German CIOs not only have technical or engineering backgrounds [11]. Only three CIOs came from a discipline that could not be assigned. Data were missing for 49 CIO because the field of education could not be specified.

TABLE V. CIOs' FIELDS OF EDUCATION

Field of education	N	Percentage	Valid Percentage
Valid			
Engineering	58	15.1	17.3
Science	97	25.3	29.0
Economics	177	46.1	52.8
Other	3	0.8	0.9
Total	335	87.2	100.0
Missing	Not specified	49	12.8
Total		384	100.0

As shown in Table VI, almost all the CIOs have an academic degree. Most CIOs have a master's degree or are equivalent to their highest educational level. 74 CIOs also had doctorate holders. The category "Other" includes non-academic educational backgrounds. If a higher degree means a higher qualification, it is notable that ten people in this dataset have become IT executives without academic education. Data were missing for 36 CIO because the degree of education could not be specified.

TABLE VI. CIOs' DEGREE OF EDUCATION

Degree of education	N	Percentage	Valid Percentage
Valid			
Bachelor	12	3.1	3.4
Master	252	65.6	72.4
Doctorate	74	19.3	21.3
Other	10	2.6	2.9
Total	348	90.6	100.0
Missing	Not specified	36	9.4
Total		384	100.0

In addition to education, the previous positions a CIO has held also shape his skills and experience. To test the hypotheses regarding the professional background of the CIO, previous positions were divided into three categories. The entry "CIO" indicates that the executive was already the CIO of another company in the previous position. "IT" stands for a previous position within an IT organization. "Business unit" includes all positions outside the IT organization. As shown in Table VII,

the previous positions were distributed almost equally. The percentage of German CIOs who come from a business unit is similar to 31.1% of CIOs in the US [2]. The previous position could not be specified for eight CIOs.

TABLE VII. CIOs' PREVIOUS POSITIONS

Previous position	N	Percentage	Valid Percentage
Valid			
CIO	114	29.7	30.3
IT	138	35.9	36.7
Business unit	124	32.3	33.0
Total	376	97.9	100.0
Missing	Not specified	8	2.1
Total		384	100.0

As illustrated in Table VIII, most CIOs were hired externally. The percentage of externally hired individuals was 79.3%, which was significantly higher in the US. [2]. It would be interesting to learn the reasons for this discrepancy through future research. Data are missing for five CIO because it could not be specified if the CIO was promoted internally or hired externally.

TABLE VIII. CIOs HIRED INTERNALLY OR EXTERNALLY

Previous position	N	Percentage	Valid Percentage
Valid			
Internal	138	35.9	36.4
External	241	62.8	63.6
Total	379	98.7	100.0
Missing	Not specified	5	1.3
Total		384	100.0

Table IX shows that the CIO reports to many executives. The majority of German CIOs report to the CFO, followed by the CEO. Therefore, hypothesis H8a, which states that CIOs in Germany also report to the CEO by a majority, is not supported. 13 CIOs in this data sample report to the Chief Digital Officer (CDO). This is surprising because the position of the CDO is quite new compared to the CIO. Data are missing for 163 CIOs because the reporting structure could not be specified.

TABLE IX. CIOs' REPORTING STRUCTURES

Previous position	N	Percentage	Valid Percentage
Valid			
CDO	13	3.4	5.9
CEO	55	14.3	24.9
CFO	95	24.7	43.0
COO (Operating)	9	2.3	4.1
CTO	15	3.9	6.8
Group CIO	4	1.0	1.8
Other C-Level	17	4.4	7.7
Is a board member	13	3.4	5.9
Total	221	57.6	100.0
Missing	Not specified	163	42.4
Total		384	100.0

As Table X shows, most CIOs under two-thirds have a tenure of less than five years. However, 59 CIOs had been in office for more than 10 years and had an above-median tenure.

TABLE X. TENURES OF CIOs

Tenure	N	Percentage	Cumulated Percentage
≤ 1	41	10.7	10.7
> 1 to 3	114	29.7	40.4
> 3 to 5	87	22.7	63.0
> 5 to 10	83	21.6	84.6
> 10 to 20	50	13.0	97.7
> 20	9	2.3	100.0
	384	100.0	

As shown in Figure 1, CIO tenures were not normally distributed. In addition, owing to the chosen data collection approach, the dataset contained many CIOs that are currently in office. As a result, the average tenure may be distorted. Therefore, current and completed tenures must be considered separately. Figure 1 shows that 36 CIOs had only recently moved to their positions and still had a tenure of less than one year. In addition, most IT executives currently in office have tenures between one and three years. If, on the other hand, one looks at CIOs with a completed tenure, it is noticeable that the tenures are more evenly distributed.

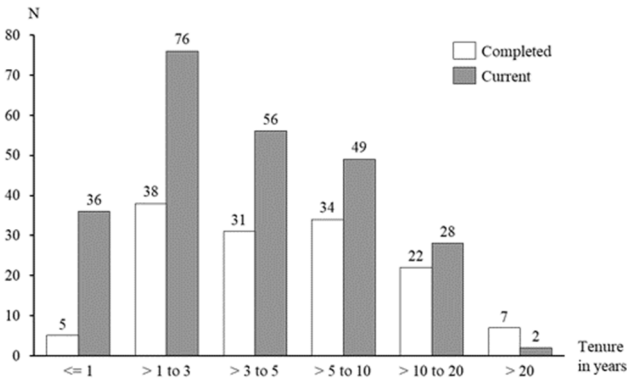


Fig. 1. Distribution of completed and current tenures.

Table XI displays the descriptive statistics for tenure. The median tenure of all 384 is 4.0 years while it is 4.7 years for completed tenures and 3.7 years for current tenures. The arithmetic mean is given in Table XI because it was used to test Hypotheses 1 and 2.

TABLE XI. CIOs HIRED INTERNALLY OR EXTERNALLY

Tenure	N	M	SD	Mdn
Current	247	4.76	4.15	3.70
Completed	137	6.57	5.51	4.70
Total	384	5.50	4.80	4.00

The tenure of the CIOs was analyzed using statistical tests. As shown in Table XI, most CIOs (64%) are currently in office. It was not possible to determine the length of tenure of these CIOs. To avoid excluding 247 CIOs, two groups were formed based on the median of the completed tenures. One group includes all CIOs who have a tenure above or equal to 4.7 years, regardless of whether they are currently in office or not. The other group includes all CIOs with a completed tenure of less than the median of 4.7 years. Figure 2 illustrates the formation of the two groups and highlights the CIOs included in the tests in grey. 152 executives are currently in office and have below-median tenure at the time of October 2020. However, these CIOs may also have an above-median tenure of a few years and might be deemed “successful” in the future. However, since the length of tenure cannot be predicted, and

thus it cannot be determined whether the CIOs will be successful in the future, they are excluded from the tests.

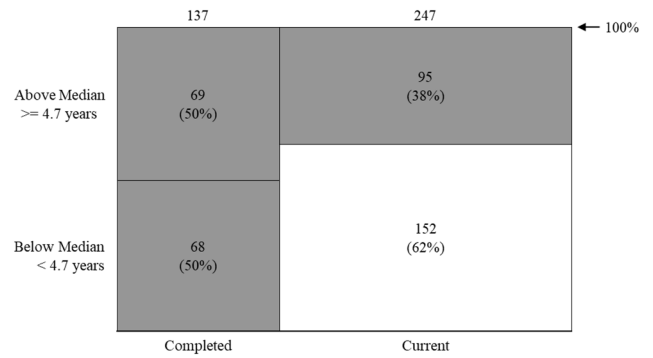


Fig. 2. Distribution of completed and current tenures.

As shown in Table XII, 232 CIOs consisting of two groups were used for the statistical tests. Of these, 164 had tenures greater than or equal to 4.7 years. 68 CIOs had tenures of less than 4.7 years.

TABLE XII. GROUPS OF CIOs FORMED

Groups of CIOs	N
Above Median ≥ 4.7 years (Completed & Current)	164
Below Median < 4.7 years (Completed)	68
Total	232

C. STATISTICAL METHODS

IBM SPSS Statistics 27 was used to analyze the dataset and test the hypotheses. As the CIOs were split into two groups, tenure was now a categorical variable. The data collected on the CIO background were categorical variables. Therefore, the chi-squared test was used for the analysis. The chi-squared test can be used to determine whether two or more independent samples differ in their distribution over a variable. A significant test statistic indicated that the groups differed in the distribution of the variables of interest. However, the test did not indicate which group was different [18]. These differences were identified in a post-hoc analysis using Bonferroni correction. If the cells of a cross table had an expected frequency of less than five, Fisher’s exact test was used.

IV. RESULTS

A. Tenure

Since no statistical test was necessary for the first two hypotheses, 384 CIOs were examined here. The average completed tenure shown in Table XI corresponds to the values of 6.5 years and 6.6 years [2, 4]. The average current tenure is also close to the value of 4.6 years [3]. However, it is unclear whether the abovementioned studies included only completed or current tenures. Whether German CIOs have a longer tenure than their US counterparts depends on comparative values. Therefore, H1 was only partially supported.

With 6.6 years, the average tenure of CEOs leaving office corresponds to the mean value of the completed tenures of CIOs, as shown in Table V [9]. This comparison shows that German CIOs do not have shorter tenures than German CEOs do. Therefore, H2 was not supported.

B. Size of the Organizations

Next, we examined whether being a CIO in a large organization can be advantageous for an above-average tenure. A chi-squared test showed that there was no statistically significant difference in corporate turnover between CIOs with below-median and above-median tenures ($\chi^2(5, N = 232) = 6.128, p = .294$). Figure 3 illustrates these results. Even if the difference is not statistically significant, it is noticeable that more CIOs in companies with turnover equal to or less than €2 billion have a tenure that is below average.

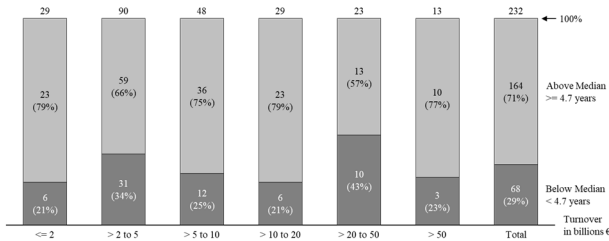


Fig. 3. Comparison of above-/below-median tenures by turnover

In the same way, there is no statistically significant difference in the number of employees of organizations between CIOs with an above-median tenure and CIOs with a below-median tenure, $\chi^2(4, N = 232) = 3.316, p = .506$. Figure 4 shows that the percentage of CIOs with above-median tenure differs between companies with 50,000 and 100,000 employees and companies with more than 100,000 employees.

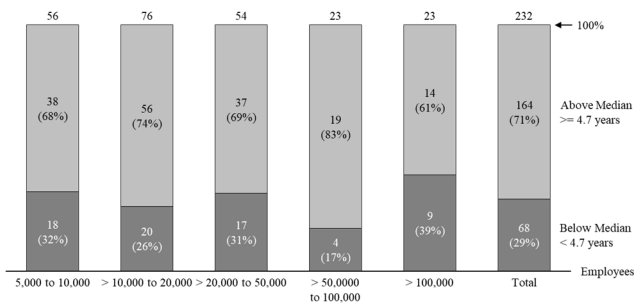


Fig. 4. Comparison of above-/ below-median tenures by employees

Therefore, CIOs in large companies do not have a longer tenure than those in smaller companies, which is why Hypotheses H3a and H3b are not supported. It must be considered that this study only considered companies with more than 5,000 employees. Therefore, further investigations should be conducted without limiting the number of employees.

C. Industry Type of the Organizations

Next, the industry type of the organization in which the CIOs operate is analyzed. An Exact Fisher test was conducted to determine whether there was a difference in the industry type between CIOs with below-median and above-median tenures. The results of this test also showed no statistically significant difference ($p = .756$). Although Figure 5 shows that all the CIOs in the construction industry have above-median tenures, this can be neglected because of the small number of CIOs. Hypothesis H4, which states that CIOs' tenure does not differ by industry type, is supported.

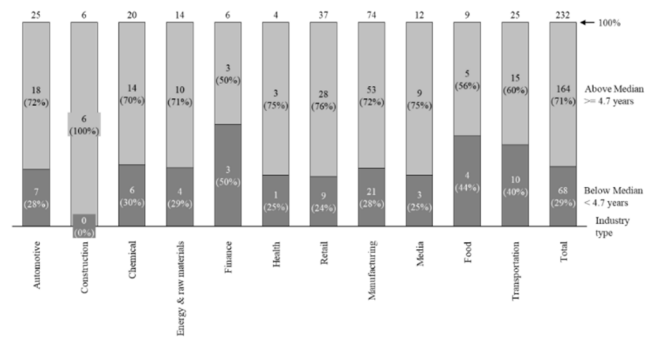


Fig. 5. Comparison of above-/ below-median tenures by industry type

D. Educational Background

The next step was to examine educational background in more detail. This includes the fields of education and the degree of education. An Exact Fisher test was conducted to determine whether there was a difference in the field of education between CIOs with below-median and above-median tenures. The results of this test also showed no statistically significant differences ($p = .200$). It should be noted that the field of education could not be specified for the 29 CIOs. Even if the difference is not statistically significant, Figure 6 shows that CIOs with a degree in economics are the only group of CIOs with below-median rather than above-median tenure. The test rejects hypothesis H5a, that CIOs with a degree in economics have the longest tenure. Thus, a degree in economics is not a factor that automatically leads to long-term office.

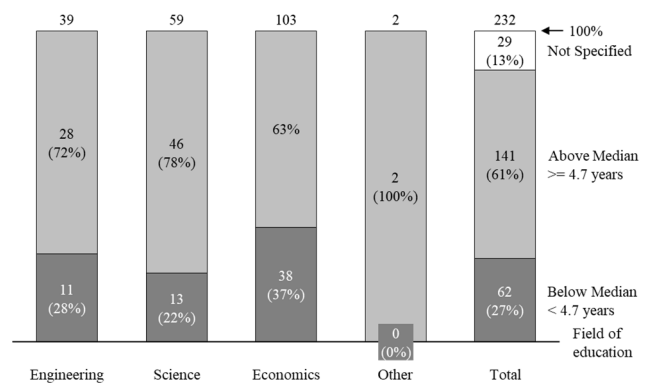


Fig. 6. Comparison of above-/ below-median tenures by field of education

In addition, we examined whether there was a difference in the degree of education between CIOs with below-median and above-median tenure. The results of Fisher's exact test showed no statistically significant difference ($p = .751$). Therefore, CIOs with above-median tenures do not have a certain degree of education more often than expected. The test shows that a higher degree is not associated with longer tenure. Thus, Hypothesis H5b was not supported. Figure 7 also shows that more CIOs with a doctorate degree have below-median tenures than those with above-median tenures. An additional doctorate did not extend the average tenure of the CIOs. However, the frequency of CIOs with a master's or doctorate degree shows that a higher education degree is a prerequisite for the position of the CIO. It should be mentioned again that the degree of education could not be specified for 20 of the 232 CIOs.

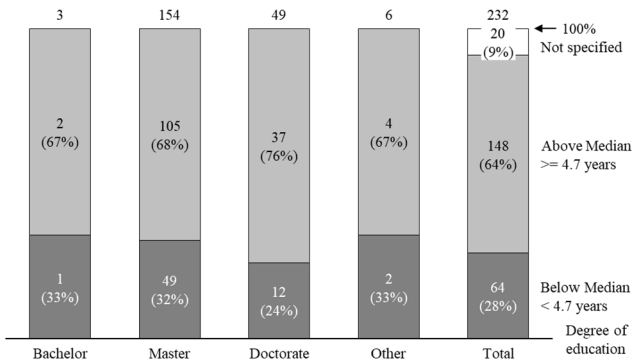


Fig. 7. Comparison of above-/ below-median tenures by the degree of education

E. Professional Background

Next, their professional background was examined. The focus here is on the previous position and whether the CIOs have been promoted internally or moved externally. First, we examined whether there was a difference in the previous position between below-median and above-median tenures. A chi-square test showed no statistically significant difference ($\chi^2(2, N = 225) = 1.059, p = .589$). This supports hypothesis H7a, which states that CIO tenure is independent of the previous position. The results show that there is no position that is a particularly good prerequisite for long tenure. Figure 8 illustrates the results because only the previous CIO position is more likely to have a below-median tenure than an above-median tenure. The previous position could not be determined for 7 of the 232 CIOs.

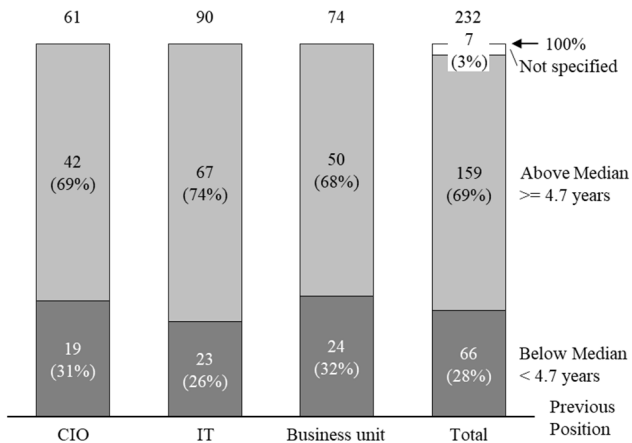
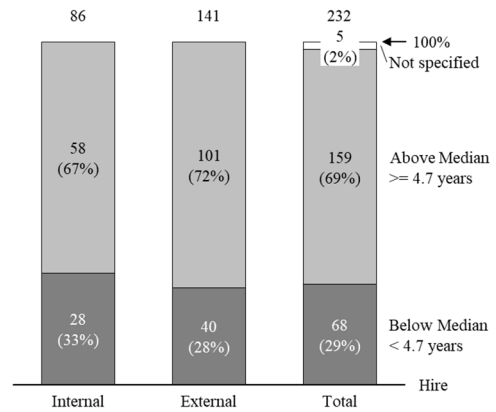


Fig. 8. Comparison of above-/ below-median tenures by previous position

Second, we analyzed whether there was an impact on whether CIOs would be promoted internally or hired from outside. A comparison of above- and below-median tenures showed no statistically significant difference between internally and externally hired CIOs, $\chi^2(2, N = 227) = 0.447, p = .504$. The results of the chi-square test indicate that CIOs with above-median tenures are not promoted internally or hired externally more often than expected. Figure 9 illustrates the results. At approximately 70%, the proportion of CIOs with below-median tenure is similar for both internal and external hires. The previous position could not be determined for 7 of the 232 CIOs. In summary, Hypothesis H6 is supported.

Fig. 9. Comparison of above-/ below-median tenures by internal/ external hire



The next step was to determine whether there was a connection between the previous position and an internal or external hire. As tenure was not a factor, 384 CIOs were included. A chi-square test was carried out to check whether the majority of externally hired CIOs came from a business unit and whether the majority of internally hired CIOs were promoted from an IT position. The test showed a statistically significant difference in the previous position between internally and externally hired CIOs, $\chi^2(2, N=376) = 104.679, p < .001$. The effect size for these results was relatively strong (Cramer's $V = 0.528$) (Cohen, 1988). Post-hoc comparisons using the Bonferroni correction showed that only the difference in the previous IT position was statistically significant. Thus, CIOs with previous IT positions are promoted internally more often than expected. Figure 10 shows that the difference was also significant for the previous CIO positions. However, this difference can be neglected because of the categorization used. The previous position could not be determined for 8 of the 384 CIOs. Therefore, Hypothesis H7c, which states that internally hired CIOs in Germany also rise from an IT position by a majority, is supported. In contrast, IT executives from a position outside IT are not increasingly hired externally. Therefore, Hypothesis H7b is not supported.

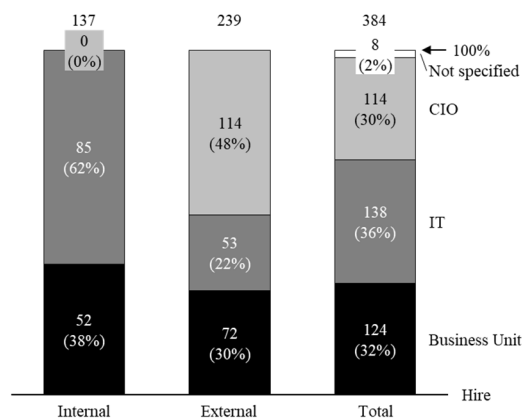


Fig. 10. Percentage of the previous position by internal/ external hire

F. Reporting Structure

Finally, the reporting structure was examined. As Figure 11 shows, the majority of German CIOs report to the CFO, followed by CEO. A more detailed report structure is provided in Table IX. Therefore, Hypothesis H8a, which states that the majority of CIOs in Germany also report to the CEO, is not supported. To test the other hypotheses, the CIOs who report to the CEO or the CFO are primarily relevant. All others were grouped under "Other." To test whether externally hired CIOs reported by a majority to the CEO and internally promoted CIOs reported by a majority to the CFO, a chi-square test was performed. The results show no statistically significant difference in the reporting structure between internally and externally hired CIOs, $\chi^2(2, N = 206) = 2.121, p = .346$. Thus, Hypotheses H8b and H8c were not supported. Whether a CIO is promoted internally or hired externally, therefore, has no effect on the executive he reports to. Figure 11 shows the distribution of CIO reports and whether they were hired internally or externally. There were also no differences in the category "Other." When analyzing the reporting structure, it

should be noted that for many CIOs, the reporting structure could not be specified.

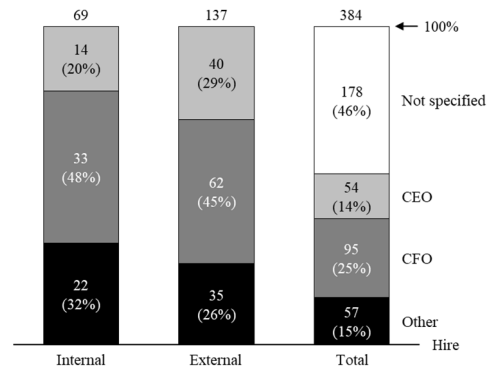


Fig. 11. Percentage of the previous position by internal/ external hire

G. Summary

Table XII summarizes all of the hypotheses tested, the tests used, and the results.

TABLE XIII. SUMMARY OF THE TESTED HYPOTHESES AND RESULTS

Hypothesis	Support	N	χ^2	p-value	Effect size
H1: The tenure of German CIOs is comparable to that of US-American CIOs.	Partially *	384	-	-	-
H2: The tenure of German CIOs is shorter than that of German CEOs.	No	384	-	-	-
H3a: The tenure of CIOs differs according to the size of the company, based on the number of employees.	No	232	3.316	.506	-
H3b: The tenure of CIOs differs according to the size of the company, based on turnover.	No	232	6.128	.294	-
H4: The tenures of CIOs do not differ per industry.	Yes	232	**	.756	-
H5a: CIOs with a background in economics have the longest tenures.	No	203	**	.200	-
H5b: A higher level of education is associated with a longer tenure.	No	212	**	.751	-
H6: There is no difference in tenure whether CIOs were hired internally or externally.	Yes	227	0.447	.504	-
H7a: The tenure of the CIOs is independent of the previous position.	Yes	225	1.059	.589	-
H7b: The majority of externally hired CIOs come from a position outside IT.	No	376	104.679	.120	-
H7c: The majority of internally hired CIOs rise from an IT position.	Yes	376	104.679	<.001	Relatively strong
H8a: The majority of German CIOs report to the CEO.	No	384	-	-	-
H8c: The majority of externally hired CIOs report to the CEO.	No	206	2.121	.346	-
H8b: The majority of internally promoted CIOs report to the CFO.	No	206	2.121	.346	-

* Depends on values selected for comparison. ** Fisher's Exact test was used

V. DISCUSSION

The results show that neither (a) the size of the company, (b) the industry type, (c) the educational background, (d) the previous positions, nor (e) the reporting structure have a significant impact on the tenure of CIOs. However, several findings require further investigation.

When examining tenures, perspectives and comparative values play a decisive role. The mean value of completed tenures of 6.6 years paints a picture of relatively long tenures. The median of 4.7 years of service paints a more differentiated picture. The perception that CIOs have a short tenure is possibly influenced by the large number of position changes in recent years. For example, the average tenure of IT executives currently in office is only 4.8 years. The median value were 3.7 years. However, the fact that CIOs have only short tenures was not proven by the analysis in this study.

The size of the companies was examined based on their turnover and the number of employees. Due to the exclusion criteria, the companies had a minimum size. Therefore, it

cannot be excluded that this is the reason why no differences were observed. An investigation without limitations could provide further insights into whether company size influences CIO tenure.

The analysis clearly shows that German CIOs do not only have a technical or engineering background. Half of CIOs have a degree in economics. However, IT executives with a degree in economics do not have the longest tenures. This study cannot confirm that German CIOs are only technically oriented managers.

IT executives in Germany are well-educated. The vast majority of CIOs have at least one master's degree or diploma at the highest educational level. Many also have doctorate degrees. In terms of current tenure, the proportion of CIOs with only a bachelor's degree increased. An additional master's degree or even a doctorate degree takes more time. It would therefore be interesting to examine whether there is a trend towards an earlier career start and an increase in other forms of further education.

Even if the differences in completed tenures are not statistically significant, a previous position as a CIO does not automatically result in a long tenure in the next CIO position. For example, executives who have moved from an IT position or business unit have a longer tenure. This is surprising, because the executive has already gained experience in the same position in another company. It is also possible, however, that higher expectations are associated with the new manager. For example, a CIO may have been hired for strategic change and may not have been fully implemented.

CIOs that move upward internally are particularly likely to move from an IT position. One reason for this could be that IT executives are familiar with the IT organization and landscape and do not require a long transition period.

Most German CIOs moved to office from an external position. In addition, external hires are most often obtained from previous CIO positions. However, this is not surprising. If an external CIO is hired, he should have already demonstrated leadership qualities in the previous CIO position.

In this study, we only examined whether CIOs moved to the CIO position from a certain previous position, particularly frequently either internally or externally. Therefore, it would be interesting to investigate whether a combination of these criteria allows for long tenure.

Unlike IT executives from the US, German CIOs do not report most frequently to the CEO but to the CFO. As the results show, the German CIO reports to many different managers. Surprisingly, 13 IT executives in this data sample reported to the CDO. This could indicate that IT on its own cannot contribute sufficiently to the digitization of the company. It would therefore be interesting to learn in interviews why the CIOs in these companies are located under the CDO.

VI. CONCLUSION

This study examines the tenure and background of German CIOs and thereby adds to the current body of knowledge of CIO research [19].

The results show that two-thirds of IT executives have tenures of less than five years. However, almost 15% of CIOs have a tenure of more than 10 years. Furthermore, the results of the statistical tests show that none of the factors considered has a decisive influence on the length of tenure of CIOs alone. Future research could combine these factors to obtain more detailed results.

Besides this limitation, this study also has several other limitations that offer possibilities for further research. The CIO Magazine's Top 500 database and profiles in social networks were chosen as sources for data collection. Therefore, the results of this study depend on the reliability of the data. Not all relevant information can be collected from every executive through these sources. Therefore, future research should focus on other sources of data.

The dataset contains the current CIO of a company, as well as its predecessor. In the case of a predecessor, the length of tenure can be specified, whereas in the case of the current CIO, the length of tenure is still uncertain. Therefore, the two groups were considered separately. However, whether the frequencies of these factors have changed over time has not been examined.

For example, the proportion of CIOs from the US that came into office from an IT position has fallen in recent years [2]. Further studies should investigate whether this development can also be observed among German IT executives.

Although the results show that none of the factors significantly influence tenure, we cannot conclude that the background of the CIO is unimportant. For example, a non-IT background does not necessarily mean that the CIO has no IT knowledge or experience [6]. When appointing new CIO positions, the skills of the CIO should align with the company's requirements. The type of CIO organization needs vary with time and industry [6]. Based on this background, an organization can select a suitable IT executive. However, the CIO must understand why he was hired [15]. This allows him to align his studies with the expectations of the organization.

In this study, we examined factors that can be regarded as preconditions for the position of the CIO. These factors do not significantly influence IT executives' tenure. Therefore, we endorse Jones et al.'s proposal to investigate what a CIO does once he is in office, regardless of his background [6]. This will help to draw a more complete picture of the factors that significantly influence the tenure of CIOs.

REFERENCES

- [1] S. S. Dikolli, W. J. Mayew, and D. Nanda, "CEO Tenure and the Performance-Turnover Relation," *Rev Account Stud*, vol. 19, no. 1, pp. 281–327, 2014, <https://doi.org/10.1007/s11142-013-9247-6>.
- [2] L. Kappelman et al., "The 2019 SIM IT Issues and Trends Study," *MISQE*, vol. 19, no. 1, pp. 69–104, 2020.
- [3] Korn Ferry, *Age and Tenure in the C-Suite*. [Online]. Available: <https://ir.kornferry.com/news-releases/news-release-details/age-and-tenure-c-suite-korn-ferry-study-reveals-trends-title-and>
- [4] CIO Magazine, *2020 State of the CIO*. [Online]. Available: <https://www.idg.com/tools-for-marketers/2020-state-of-the-cio/>
- [5] G. S. Dawson, M.-W. Ho, and R. J. Kauffman, "How Are C-Suite Executives Different? A Comparative Empirical Study of the Survival of American Chief Information Officers," *Decision Support Systems*, vol. 74, pp. 88–101, 2015, <https://doi.org/10.1016/j.dss.2015.03.005>.
- [6] M. C. Jones, L. Kappelman, R. Pavur, Q. N. Nguyen, and V. L. Johnson, "Pathways to Being CIO: The Role of Background Revisited," *Information & Management*, vol. 57, no. 5, pp. 1–14, 2020, <https://doi.org/10.1016/j.im.2019.103234>.
- [7] K. Drechsler, "Information Systems Executives: A Review and Research Agenda," *ECIS 2020 Research Papers*, pp. 1–16, 2020.
- [8] G. M. Hunter, "The Chief Information Officer: A Review of the Role," *Journal of Information*, vol. 5, no. 1, pp. 125–143, 2010, <http://dx.doi.org/10.28945/1328>.
- [9] Strategy&, *2018 CEO Success Study*. [Online]. Available: <https://www.strategyand.pwc.com/de/de/studien/ceo-success/ceo-success-gsa-deep-dive-2018.pdf>
- [10] S. Neifar and H. Ajili, "CEO Characteristics, Accounting Opacity and Stock Price Synchronicity: Empirical Evidence From German Listed Firms," *J. Corp. Acct. Fin.*, vol. 30, no. 2, pp. 29–43, 2019, <http://dx.doi.org/10.1002/jcaf.22386>.
- [11] V. Krotov, "Bridging the CIO-CEO Gap: It Takes Two to Tango," *Business Horizons*, vol. 58, no. 3, pp. 275–283, 2015, <https://doi.org/10.1016/j.bushor.2015.01.001>.
- [12] D. J. Mazzola, R. D. St. Louis, and M. R. Tanniru, "The Path to the Top: Insights From Career Histories of Top CIOs," *Communications of the ACM*, vol. 60, no. 3, pp. 60–68, 2017, <http://dx.doi.org/10.1145/2959086>.
- [13] P. A. Gonzalez, L. Ashworth, and J. McKeen, "The CIO Stereotype: Content, Bias, and Impact," *The Journal of Strategic Information Systems*, vol. 28, no. 1, pp. 83–99, 2019, <https://doi.org/10.1016/j.jsis.2018.09.002>.
- [14] R. Babin and K. A. Grant, "How Do CIOs Become CEOs?," *Journal of Global Information Management*, vol. 27, no. 4, pp. 1–15, 2019, <https://dx.doi.org/10.4018/JGIM.2019100101>.

- [15] A. B. Gerth and J. Peppard, "The Dynamics of CIO Derailment: How CIOs Come Undone and How to Avoid it," *Business Horizons*, vol. 59, no. 1, pp. 61–70, 2016, <https://doi.org/10.1016/j.bushor.2015.09.001>.
- [16] SpencerStuart, *State of the CIO in 2018*. [Online]. Available: <https://www.spencerstuart.com/research-and-insight/the-state-of-the-cio-in-2018>
- [17] CIO Magazin, *Top-500*. [Online]. Available: <https://www.cio.de/top500>
- [18] T. M. Franke, T. Ho, and C. A. Christie, "The Chi-Square Test," *American Journal of Evaluation*, vol. 33, no. 3, pp. 448–458, 2012, <https://doi.org/10.1177/1098214011426594>.
- [19] S. Kratzer, M. Westner, and S. Strahinger, "Four Decades of Chief Information Officer Research: A Literature Review and Research Agenda Based on Main Path Analysis," *The Data Base for Advances in Information Systems*, vol. 54, no. 3, 2023.