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# HOW GERMAN HOSPITALS GOVERN IT – AN EMPIRICAL EXPLORATION

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## Abstract

*Health care services in German hospitals are causing immense expenses. Successful IT Governance might help to support specific challenges for every organization with an adequate use of IT. The market structure of hospitals in Germany is very heterogeneous, e.g. in size and sponsorship. This paper analyses the state of the art of IT Governance based on a survey among 220 IT executives in German hospitals. The quantitative analyses of collected survey data reveal that hospitals govern their IT differently according to size and sponsorship. In addition, our analyses show that decision-making authority for the IT budget rises with hospital size and is positively correlated with the fraction of IT projects in the overall IT budget. We also show that the investments in innovative IT projects increase with hospital size. Our study revealed that a high number of private and larger hospitals lack a systematic IT Governance approach within the decision domain on IT projects. This study is the first to shed light into the empirical situation of IT Governance in German hospitals.*

*Keywords: IT Governance, IT Management, German hospitals, eHealth.*

## 1 INTRODUCTION

The expenses for healthcare services in the German healthcare sector were estimated at 239 billion euros in the year 2003, which constitutes an 11.1% share of the gross domestic product of the Federal Republic of Germany (Destatis 2006). Based on this background Germany is listed in the Top 10 of OECD countries for per capita expenses on health care services (Anderson et al. 2006) and according to the Federal Healthcare report of the Federal Statistical Office (2008b), about 59 billion Euros are spent in the hospital sector.

In many industrial branches innovative information technology (IT) and its use are key drivers for increasing effectiveness and efficiency in production processes for goods, services and successful business processes (Leimeister et al. 2009). The effect of IT usage in healthcare is found in medical service provisions (Jähn and Nagel 2004, Schweiger et al. 2007) and administrative support processes (Haas 2005, Lehmann 2005). Hacker and Schommer (2004) report on increased effectiveness and efficiency in examination, treatment and administrative processes in hospitals. IT usage can be a driver for diversification in competition and the creation of innovative strategic competitive advantages in hospitals and the health care sector (Piccoli and Ives 2005). Multiple studies report success of IT-driven improvements in administrative and business processes, e.g. information systems for the input and integration of treatment data, reminder functions, medicament management and medication

(Crane and Raymond 2003, Leimeister et al. 2005, Raymond and Dold 2002). Since the early 1990s, studies have shown that cost reductions are not only generated by the automation of information accumulation and processing but additionally by contemporary and optimized information allocation for decision makers (Borzekowski 2002). This fact verifiably induces improved treatment quality (Apkon and Sighaviranon 2001, Hacker and Schommer 2004) and fostering of patients (Leimeister et al. 2008b, Nahm and Poston 2000).

Despite the economic importance of the health care sector and important role of hospitals, Information Systems research has not been able to generate empirically collected data and declarative and conceptual models on IT management and information allocation in hospitals. A number of recent studies are either driven conceptually or are missing hypotheses testing on an empirical basis (Sachs 2005). Other studies focusing on special tasks of IT management, e.g. investment and budget decision making (Bernnat 2006), are missing the application of statistical analysis methods (Riedel 2006) or lack statistical significant results because of low participation numbers (Irving and Nevo 2005).

To close the gap in academic research and based on the above-mentioned immense expenses for health care services in Germany, a unique and empirically broad state of the art descriptive study on IT Governance in German hospitals was conducted.

### 1.1 Motivation for the study

In conducting this study, we were inspired by the approach taken by Weill and Ross (2004), who describe two sources of motivation when conducting a study on IT Governance in corporations. Weill and Ross were motivated by the stock-market premiums given to firms with excellent corporate governance and therefore “suspected a similar premium existed for excellent IT governance” (Weill 2004) and the “fact that relatively sophisticated financial governance in most enterprises could provide a good model for IT Governance” (Weill 2004). In addition, we identified a previously described gap in academic research on IT management and specifically IT Governance in German hospitals. Our motivation derives from the assumption that differences in IT Governance structures and operationalization exist across hospital size and sponsorship.

The foundation of our motivation derives from the results of survey studies conducted in the scope of the Krankenhaus-Barometer (Blum et al. 2007), which indicates differences in types of sponsorship and hospital size.

Future Objectives (values between 1 and 5; n= 304)	Hospital Sponsorship					
	public		non-profit		private	
	mean	rank	mean	rank	mean	rank
patient satisfaction	4.6	1	4.6	1	4.6	1
high process quality	4.5	2	4.5	2	4.5	2
good image of the hospital	4.5	3	4.4	3	4.3	3
intensification of the relationship between hospital and medical practices	4.2	4	4.1	4	4.2	4
(...)	(...)	(...)	(...)	(...)	(...)	(...)
revenue increase	3.6	10	3.4	11	3.8	8
realization of profit	3.4	11	3.4	12	3.8	7
achieving the highest possible return on investment	2.7	12	2.8	13	3.7	10

Table 1. Importance of future objectives across hospital sponsorship (extract from (Blum et al. 2007))

Table 1 displays the importance of hospital future objectives based on arithmetic mean and ranks results according to the type of hospital sponsorship. Although, the primary future objectives are identical across the three types of hospital sponsorship, we also see major differences. In all types of sponsorship, patient satisfaction, high process quality, the good image of the hospital and intensification of the relationship between hospital and medical practices, are the most fundamental objectives. However, private hospitals focus more on economic objectives than public (e.g. university)

and non-profit hospitals (e.g. comparable by type of sponsorship to organizations like the Red Cross). Increasing revenue, realizing profit and achieving the highest possible return on investment are ranked higher by survey participants from privately sponsored hospitals. We reflect that the realization of the mentioned objectives is achievable through a value proposition of IT utilization based on findings by Föhling et al. (2009), who found that IT utilization traces back to decisions and that these decisions are primarily influenced by the IT Governance. To consolidate our assumption of the influence of IT Governance, we hereby derive (1) revenue increase by the utilization of administrative information systems that support process cost controlling and increase the rate of return on capital employed through the allocation of (information) resources, (2) realization of profit by the utilization of medical information systems that enable new business models and treatment methods and (3) highest possible return on investment by optimized and more efficient treatment methods supported by medical information systems.

Table 2 displays composite results of a survey conducted by the Deutsches Krankenhausinstitut (Blum et al. 2007) which describes the differences in hospital size (measured by the number of beds) on the basis of three survey items. We assume that the chosen items: cooperations between hospitals, mergers between hospitals and new allocation of tasks between medical and non-medical staff, call for different IT Governance cultures and models.

Survey item (frequency of occurrence)	Hospital size (n=304)		
	50 to 299 beds	300 to 599 beds	> 600 beds
Cooperations between hospitals since 2004	43.9 %	53.3 %	56.5 %
Mergers between hospitals since 2004	7.5 %	11.1 %	16.1 %
New allocation of tasks between medical and non-medical staff	14.0 %	23.0 %	38.7 %

Table 2. Importance of objectives across hospital size (extract from (Blum et al. 2007))

Cooperations and mergers between hospitals require a flexible and interoperable IT landscape, which should have consequences for the IT Governance — especially in large hospitals. To enable and support many reallocations of tasks between medical and non-medical staff, IT managers should have a high degree of decision-making authority, and must understand the requirements of their medical and non-medical clients.

## 2 IT GOVERNANCE IN HOSPITALS

Weill and Ross (2004) state that “the difference between management and governance is like the difference between a soccer team running harder and practicing longer and the stepping back to analyze its composition and game strategy”. The result of an analysis may be that a team needs to introduce new coaches or different playing positions or provide diverse decision making responsibilities. Therefore a company and respectively a hospital organization needs to involve different people in “IT decisions, designing new ways or making IT-related decisions, or developing new techniques for implementing IT decisions” (Weill and Ross 2004) to achieve more value from IT artifacts. Along with other definitions of IT Governance (IT-Governance-Institute 2000, Krcmar 2005, Van Grembergen 2003), Weill defines IT Governance as “specifying the framework for decision rights and accountabilities to encourage desirable behavior in the use of IT” (Weill 2004). The definition implies a strict separation between management and governance. Whereas management talks about the specific decisions that are made, governance “is about systematically determining who makes each type of decision (a decision right), who has input to a decision (an input right), and how these people (or groups) are held accountable for their role” (Weill 2004). Consequently, the IT Governance framework proposes five major decision domains and six exclusive governance archetypes for making IT decisions. These were adopted and linguistically adjusted and translated into German to fit common expressions used in praxis and the German health care sector. Table 3 displays information on the

decision domains according to Weill (2004) and the corresponding terminology used in the underlying study and analyses (see Figure 3).

Decision domains according to Weill (2004)	Decision domains adopted and linguistically adjusted	Description according to Weill (2004)
IT Principles	IT Strategy	High-level statements about how IT is used in the business
IT Architecture	IT Standards	Standardization of technical capabilities that should be standardized enterprise-wide to support IT efficiencies and facilitate process standardization and integration. Activities that must be standardized enterprise-wide to support data integration
	IT Applications	An integrated set of technical choices to guide the organization in satisfying business needs. The architecture is a set of policies and rules for the use of IT and plots a migration path to the way business will be done (includes data, technology, and applications)
IT Infrastructure Strategies	IT Infrastructure	Strategies for the base foundation of budgeted IT capability (both technical and human), shared throughout the firm as reliable services, and centrally coordinated (e.g., network, help desk, shared data)
Business Application Needs	IT Projects	Specifying the business need for purchased or internally developed IT applications
IT Investment and Prioritization	IT Investments / IT Budget	Decisions about how much and where to invest in IT including project approvals and justification techniques

Table 3. Decision domains according to Weill (2004)

Based on considerations of corporate governance, state governance and information politics, Weill and Ross identified six IT governance archetypes; namely, *Business Monarchy*, *IT Monarchy*, *feudal*, *federal*, *IT Duopoly* and *anarchy*, through a logical combination of above mentioned decision maker types. Table 4 displays the IT Governance archetypes which describe the combination of people who have either decision rights or input in IT decisions (Weill and Ross 2004) and short descriptions outlining each archetype.

		Corporation decision makers	CxO Level Executives	Corp. IT and/or Business Unit IT	Business Unit Leaders or Process Owners
		Hospital decision makers	Hospital and/ or polyclinical <sup>1</sup> / clinical directors	Central hospital IT and/or clinic IT	Clinic directors or head of department/ assistant med. director
Governance Archetype	Description according to Weill and Ross (2004)				
<b>Business Monarchy</b>	A group of, or individual, business executives (i.e., CxOs). Includes committees comprised of senior business executives (may include CIO). Excludes IT executives acting independently.		x		
<b>IT Monarchy</b>	Individuals or groups of IT executives.			x	
<b>Feudal</b>	Business unit leaders, key process owners or their delegates.				x

<sup>1</sup> Polyclinic is a clinic for ambulant therapy.

<b>Federal</b>	C level executives and at least one other business group (e.g., CxO and business unit leaders)—IT executives may be an additional participant. Equivalent to a country and its states working together.	x	x	x
		x		x
<b>IT Duopoly</b>	IT executives and one other group (e.g., CxO or business unit leaders).	x	x	x
			x	x
<b>Anarchy</b>	Each individual user			

Table 4: Six IT Governance archetypes (Source: according to Weill (2004) and Weill and Ross (2004))

Additionally, Table 4 shows the results of the organizational and hierarchical entity mapping between corporation and hospital decision makers. The aim of the underlying study is to deliver first insights regarding the empirical situation of IT Governance in German Hospitals by conducting a descriptive analysis of collected data.

### 3 RESEARCH DESIGN

#### 3.1 Research method

In order to explore the IT Governance in German hospitals, we conducted 12 expert interviews on IT Governance in German hospitals to structure the research objective and questionnaire. The data was collected through a standardized online questionnaire. The questionnaire was adjusted linguistically to fit the professional domain terminologies of IT executives in German hospitals. The duration of the survey was three months, from March to June 2008. The questionnaire forms were pre-tested among ten experts and adjusted in advance where required. Address data was collected from commercially available domain-specific address data collections and internally compiled address data sets. After consolidation of address data sources and validation of doubles, 2391 different hospitals and medical institutions could be identified as potential participants. The numbers show that multiple contact persons in the same professional domain per institution/hospital were contacted. All mailings included an individual code to avoid multiple participations. The average response time for the questionnaire was approximately 30 minutes. The data collection included two follow-up calls for participation through email and postal mailings. Additionally, two articles describing the study, including a call for participation, were published in professional journals: *Krankenhaus-IT Journal* and *Management & Krankenhaus*. The results presented below are based on descriptive analysis of relative frequencies, t-tests and correlations with the use of the correlation coefficient by Spearman.

#### 3.2 Structure

After two researchers independently and iteratively conducted a data cleaning process, 206 data sets (11 anonymous) were collected from IT executives through the online questionnaire. More than two thirds of the IT executives (70%) hold an academic certification, whereas 30% graduated with an apprenticeship certificate.

Caption: * absolute	Sponsorship														
	Public					Private					Non-profit				
	Number of beds					Number of beds					Number of beds				
	< 200	200-799	>= 800	abs.*	%	< 200	200-799	>= 800	abs.*	%	< 200	200-799	>= 800	abs.*	%
<b>IT executive</b>	12	49	20	81	40,5%	13	19	6	38	19%	15	59	7	81	40,5%
%	14.8%	60.5%	24.7%			34.2%	50%	15.8%			18.5%	72.8%	8.7%		

Table 5. Sample structure (n=200)

For further analysis, the data set was segmented based on two segmentation attributes: *type of sponsorship* and *size of the hospital* as discussed previously. The size of the hospital was measured in number of beds. We adopted the classification of the hospital size from Leimeister et al. (2008a). Hospitals were classified into three categories “under 200 beds”, “200 to 799 beds” and “800 and more beds”. This segmentation is based on an interview series among experts from the German medical and hospital environment. The type of sponsorship is partitioned to three categories: “public”, “private” and “non-profit” and corresponds with the German hospital market structure.

Sponsorship	Public	Private	Non-profit
Federal Statistical Office	36.01%	38.37%	25.62%
Sample	40.50%	19.00%	40.50%
Size	Small (1-199 beds)	Medium (200-799 beds)	Big (800+ beds)
Federal Statistical Office	55.54%	40.54%	3.92%
Sample	20.00%	63.50%	16.50%

Table 6. Comparison between German hospital market structure and our sample (according to (Destatis 2008a))

When compared with data from the Federal Statistical Office, our sample is not consistent with the statistical data about German hospital market structure (see Table 6). While our sample consists of 40.5% non-profit hospitals, only 25.62% of the hospitals in Germany are under control of a non-profit sponsor. In contrast, our sample contains only 19% of private hospitals, whereas 38.37% of hospitals in Germany are held privately. We also see differences in hospital size between our sample and the German hospital market structure. Within our sample only 20% of all hospitals are small compared with 55.54% in the German hospital market. By contrast large hospitals are overrepresented in our sample, with a share of 16.5% compared to 3.92% in the German hospital market. Based on the structure of the sample displayed in Table 5 and Table 6, we accept that the informative value of conducted t-tests might be limited and its application restricted.

## 4 EMPIRICAL DATA

### 4.1 IT-budget

In a first step, we analyzed the distribution of the IT budget. The respondents could assign 100% of the IT budget to three different categories. The first category *Operations* contains all costs for the operations of current IT systems in the hospital. The second category *Projects* includes all expenses for projects beyond operating tasks. This part of the IT budget is invested to develop new and innovative IT solutions within the hospital. The last category *Organization* involves all personnel expenses.

The three left bars in Figure 1 show the comparison between the hospitals by size (n=203). The rightmost bar represents the average values across all hospitals (n=203). The IT budget for the IT organization in large hospitals with 800 beds and more is slightly lower (33.9%) compared to 35.1% in medium and 36.6% in small hospitals. On the other hand, large hospitals invest more in IT projects (22.1%), compared to 21.8% in medium and 18.1% in small hospitals.

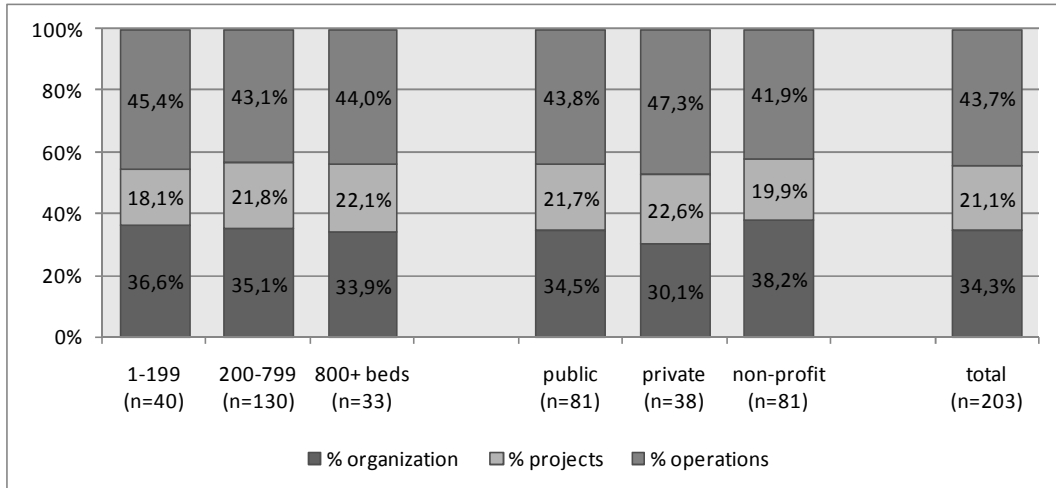


Figure 1. Relative distribution of the IT budget across hospital size and sponsorship (Source: sample data)

Bars number four to six from the left give an overview over the IT budget distribution across different sponsorships (n=200). Here we could identify differences in all budgeting areas. First, the part for IT operations represents almost half of the whole IT budget in private hospitals (47.3%) compared to 43.8% in public and 41.9% in non-profit hospitals. Second, the organizational part on the IT budget is much lower in private hospitals (30.1%) compared to 34.5% in public and 38.2% in non-profit hospitals. Finally, private hospitals invest a bigger share in IT projects (22.6%) compared to 21.7% from public and 19.9% from non-profit hospitals. T-tests could not reveal any significant differences in hospital size or sponsorship. This might result from the structure of the sample.

#### 4.2 IT decision-making authority

The second question was related to the decision-making authority. Three types of decision-making authority were formulated in the questionnaire: the IT manager can only prepare but not make decisions, the IT manager is allowed to make decisions within a specific amount of budget and the IT manager may decide over the full amount of the IT budget (see Figure 2).

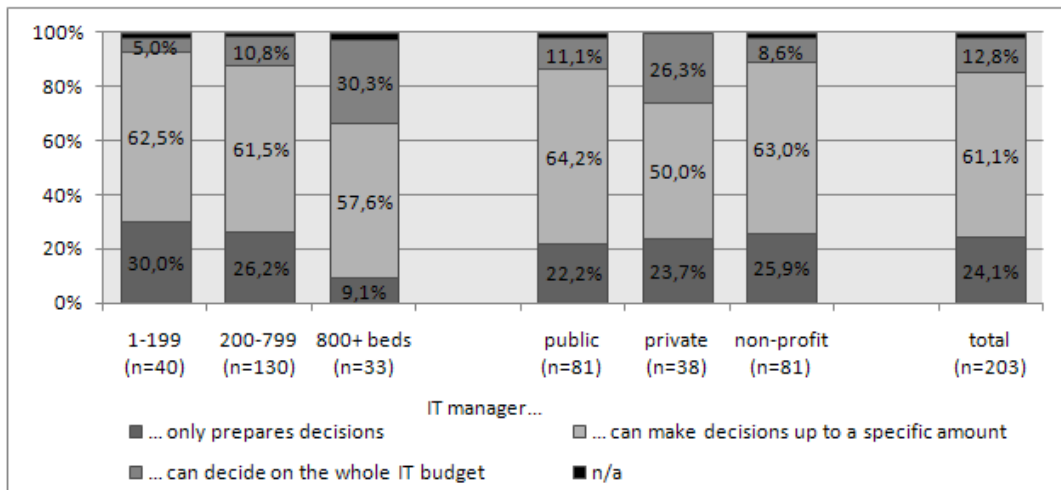


Figure 2. Decision-making authority (Source: sample data)

Our study revealed differences across sponsorship and size (see Figure 2). While only 8.6% of the IT managers from non-profit and 11.1% from public hospitals are allowed to make decisions within their full IT budgets, more than a quarter (26.3%) of IT managers from private hospitals may decide over



the full amount of the IT budget by their own. The percentage of IT managers which only prepare decisions is almost the same across all hospitals (from 22.2% in public over 23.7% in private to 25.9% in non-public hospitals). Across hospital size, IT managers from large hospitals are more likely to be able to make decisions by their own (30.3% in large, 10.8% in medium and 5.0% in small hospitals) than in medium and small hospitals. This fact is also underpinned by a correlation between the freedom of IT budget decisions (decision-making authority index) and the number of beds ( $r=0.202$ ;  $p=0.004$ ;  $n=203$ ; see Table 7). The decision making authority index is based on a three point scale: “prepare IT decisions” was mapped on a value of 1, “make decisions within a specific amount of budget” was mapped on a value of 2 and “make decisions within whole IT-budget” was mapped on a value of 3 (higher values represent higher decision authorities).

Another analysis of decision-making authority index and the different areas of IT budget revealed a positive correlation between the decision-making authority and IT projects ( $r=0.170$ ;  $p=0.017$ ;  $n=203$ ). The more decision-making authority the higher the part of IT projects on the whole IT budget. One explanation is that IT managers with low budget responsibility have difficulties to convince other stakeholders of their ideas for IT projects. Another explanation is that IT managers which execute more IT projects receive more trust from the other stakeholders and therewith more authority for decision-making.

	<b>IT-operations</b>	<b>IT-projects</b>	<b>IT-organization</b>	<b>Number of beds</b>
<b>Decision making authority index</b>	-0,022 / 0,762 n=203	0,170* / 0,017 n=203	-0,053 / 0,460 n=203	0,202** / 0,004 n=203

Table 7. Correlations between decision making authority index (Source: sample data)

Results of the t-test between hospital sponsorship across hospital size (see Table 8) disclose that differences in decision-making authority exist between big private hospitals and public (level of significance: 0.026) as well as non-profit (level of significance: 0.048) hospitals. The results need to be interpreted carefully as large public and non-profit hospitals are underweighted in the sample.

<b>Hospital size</b>	<b>Hospital sponsorship</b>		
	<b>public vs. private</b>	<b>private vs. non-profit</b>	<b>public vs. non-profit</b>
<b>1-199 beds</b>	0.230	0.549	0.547
<b>200-799 beds</b>	0.243	0.621	0.007**
<b>800+ beds</b>	0.026*	0.048*	0.687

Table 8. T-tests between hospital sponsorship across hospital size about decision-making authority (Source: sample data)

### 4.3 IT decision domains

As previously described, we analyzed all IT decision domains across hospitals by classifying our sample in hospital sponsorship and size. The first IT decision domain we focused on is *IT Strategy*. Figure 3 shows that the fraction of the federal archetype increases and the fraction of IT duopoly decreases with hospital size. This can be explained by an increasing number of departments at larger hospitals. Decision processes for the IT strategy more often follow the archetype of an IT Monarchy in non-profit hospitals (34.2%) than in public (24.7%) and private (19.8%) hospitals. In public hospitals the most frequent archetype is federal, possibly because the share of large hospitals in public hospitals is higher than in private and non-profit ones, according to our sample data (Figure 3 and Table 5). Results for the decision domain *IT Standards* show that the most common archetype for IT standards is IT Monarchy (from 57.5% in small to 69.7% in big hospitals). This is not surprising, considering that decisions surrounding IT standards are often technically-driven, and do not primarily affect business process issues. In any case, almost one-fifth of the hospitals use a federal archetype in decisions on IT standards. The biggest share of the federal archetype can be found in private hospitals

(23.5%), the smallest in non-profit hospitals (5.3%). Noticeable is the high share of IT duopoly in non-profit hospitals (15.8%) which is almost twice as high as in public hospitals (8.6%).

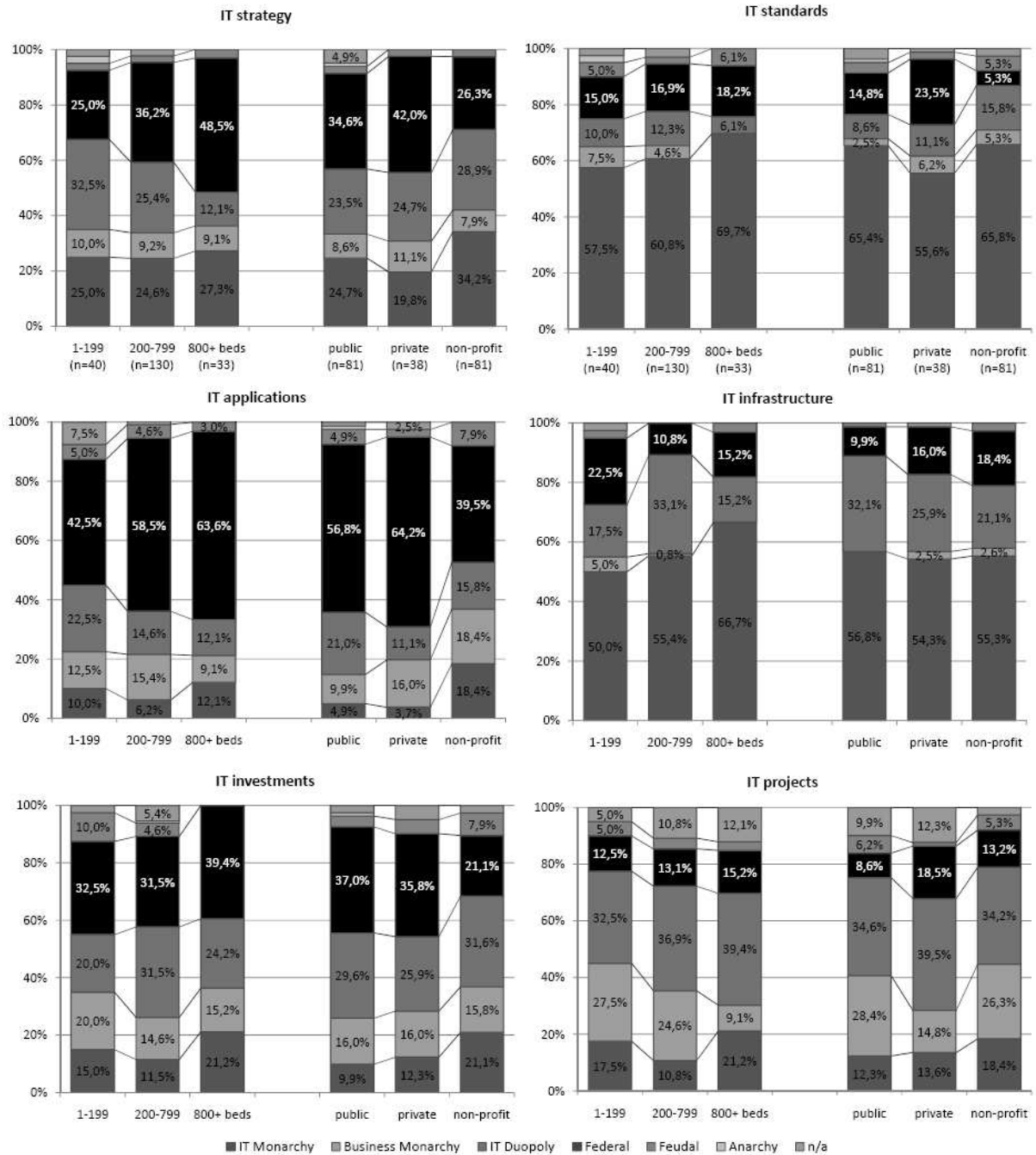


Figure 3. Decision areas (Source: sample data)

Next, we analyzed the decision domain *IT Applications*. In this decision domain, the archetypes are distributed very differently. IT Monarchy plays an unimportant role. The most mentioned archetype is federal. The fraction grows with the hospital size (42.5% in small, 58.5% in medium and 63.6% in large hospitals). This result shows that the clinical departments which use IT applications are mostly involved in decisions about these applications. In non-profit hospitals we identified a percentage of 18.4% and in private hospitals a percentage of 16% in which decisions on IT applications are made according to a Business Monarchy archetype — that means, without the involvement of IT decision makers and departments. The lower percentage of the federal archetype in non-profit hospitals is

derived from the high share of small and medium sized hospitals for this sponsorship type (see Table 5). In addition, the share of IT Monarchy in non-profit hospitals is much higher than in the other types of hospitals. One explanation might be that IT managers in non-profit hospitals place themselves near to medical and operating departments so they get more trust in selecting the best application for the requirements of their internal customers. The decision domain *IT Infrastructure* is dominated by the IT Monarchy archetype. The second important archetype is IT Duopoly. The federal archetype only plays a role in small hospitals (22.5%). The distribution of archetypes is highly similar across all sponsorship types. More than 50% of the decisions are made within a IT Monarchy governance type. These results demonstrate that IT infrastructure issues as well as IT standards are highly specified decisions of IT specialists in German hospitals.

The four main governance archetypes within the *IT Investment* decision area in German hospitals are IT Monarchy, Business Monarchy, IT Duopoly and Federal archetypes, with the last two archetypes being more dominant according to sponsorship and hospital size. The share of the IT Duopoly archetype is especially high in medium-sized (31.5%) and non-profit (31.6%) hospitals, whereas the share of the federal archetype is high in large (39.4%) and public (37,0%) hospitals. The results might be influenced by the share of large public hospitals in our sample data (24.7% compared to 15.8% of large private and 8.7% of large non-profit hospitals).

Our descriptive analysis on the *IT Projects* decision domain reveals that decisions on projects are mostly conducted in an IT Duopoly governance type. Just above 39.0% of the participants from larger hospitals confirm that an IT Duopoly governance is used for project decisions. A comparable picture describes the numbers derived from the survey data on small and medium sized hospitals where 32.5% and respectively 36.9% of participants indicate an IT Duopoly archetype for decisions on IT projects. Nevertheless, we see a relatively high fraction of the answer item “not applicable” (n/a), especially in medium (10.8%) and large (12.1%) as well as public (9.9%) and private (12.3%) hospitals. This indicates that the decision domain on IT projects does not exist in the mentioned sponsorship types and sizes of hospitals.

## 5 DISCUSSION

Based on different objectives and attributes between small and large as well as between private and non-private (public and non-profit) hospitals, we analyzed the IT governance approaches between hospital sizes and sponsorships. Overall, we concentrated our analyses on three topics: IT budget, IT decision-making authority and IT decision domains.

The relative distribution of IT budgets across German hospitals is dominated by IT budgets concerning IT operations. One explanation for this distribution could be that German hospitals deal with many legacy systems. In contrast, IT project-related budgeting which is invested to develop new and innovative IT solutions within the hospital, covers the smallest share. Although the partitioning of the IT budget differs between hospital size and sponsorship, these differences are not statistically significant.

In a next step, we identified a significant correlation between decision-making authority and the percentage of IT projects on the overall IT budget. We assume that IT managers invest mainly in IT projects. In other words, the more decision-making authority on IT budget, the more IT improvement through innovative IT project deliverables can be expected. Furthermore, with the help of t-tests we proved statistically significant differences between large and medium, as well as small hospitals in decision-making authority. In other words, the larger the hospital size measured in number of beds, the higher the decision-making authority of IT managers. We could also show that these significant differences only exist between private and non-private (public and non-profit) sponsorships.

We assume that private hospitals are more dedicated to increasing revenue and optimizing return on investment than hospitals under different sponsorship types based on findings of described similar studies. Our study revealed that IT managers from private hospitals try to support these objectives with a higher fraction of IT projects on the overall IT budget.

The third topic of the underlying study investigated the structures of IT decision domains in German hospitals. Our study revealed that in most hospitals a project-oriented specification of business needs for purchased or internally developed IT applications is not conducted in a systematic IT Governance approach. The high absence rate of a systematic IT Governance execution, especially in private and large hospitals in the decision domain IT Projects is very surprising as IT project-related budgeting is invested to develop novel IT solutions and drive innovation.

## **6 LIMITATIONS AND FURTHER RESEARCH**

This study is not without its limitations. First, the study is limited by its data collection process and data set structure. The collected data represents a snap shot of reality and therefore conclusions on dynamics and timely progression cannot be derived. In the future, multiple and frequent data collection processes could lead to interesting findings over time. The data set structure is not representative along sponsorship and size segmentation. Second, the study only considers the perspective of chief information officers and IT managers in German hospitals, which might generate a bias on question items. Further analysis might be coupled with additional qualitative data collection, in order to create a deep and coherent understanding of these preliminary findings. In combination with further in-depth statistical analysis, the researchers plan to generate and test structural equation models to expose cause and affect chains in IT Governance in German hospitals and to identify the role of contingency factors in choosing the optimal IT Governance archetype. The generated findings could be used to discover similarities and differences to industry-related results and patterns discovered in comparable studies.

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