HEALTH TECHNOLOGY PROCUREMENT

A SYSTEM ANALYSIS OF HEALTH TECHNOLOGY PROCUREMENT IN HOSPITALS IN THE NETHERLANDS

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Master thesis

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Mit dem Wissen wächst der Zweifel.

Johann Wolfgang von Goethe

CONTENTS

GLOSSARY

AHP	Analytic Hierarchy Process
BPMN	Business Process Model & Notation
CE	Conformité Européenne
CP	Clinical Physics
CT	Computed Tomography
EUDAMED	European Databank on Medical Devices
FTE	Fulltime-equivalent
HBHTA	Hospital Based Health Technology Assessment
HSP	Health System Performance
HT	Health Technology
HTA	Health Technology Assessment
HTM	Health Technology Management
MDR	Medical Devices Regulation
MES	Manages Equipment Services
MRI	Magnetig Resonance Imaging
MT	Medical Technology
MTCP	Medical Technology & Clinical Physics
NTFEP	New Technology Funding Evaluation Program
OECD	Organisation for Economic Co-operation and Development
PI	Power Interest
PIA	Power Interest Attitude
PMCF	Post-Market Clinical Follow up
RACI	Responsible Accountable Consulted Informed
TCO	Total Cost of Ownership
VBP	Value Based Procurement
WHO	World Health Organisation

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EXECUTIVE SUMMARY

Technology has an increasing role in the modern day health care system. Healthcare Technology Management (HTM) is an area of biomedical engineering including the domains of planning, needs assessment, selection, procurement, donations, inventory, installation and maintenance of medical equipment (WHO, 2017). This thesis deals with HTM in Dutch hospitals from the viewpoint of procurement of high-cost medical equipment. Procurement is considered the main shifting point between resources and being able to provide care with the available technology.

Through literature search and semi-structured interviews, we study the decision process for health technology procurement from the hospitals perspective, to answer the following question: What procedures improve the effectiveness of the multi-layered decision making process of procurement of health technology in hospitals in the Netherlands? To be able to answer this question, three perspectives are described.

First of all, actor and stakeholder interaction within the decision arena. In the hospital we can define three actor types: clinical, operational and business actors. The project team for procurement processes generally includes a project leader, medical technology and clinical physics, procurement and users. Although it is preferable to have business oriented project leaders, the role is often fulfilled by operational or even clinical actors.

The second perspective concentrates on external influences on the decision arena. Two types of external influence are described: regulation and industry influence. The recently introduced agreement medical technology is considered to be the most influential piece of regulation, despite it being a directive and not a law. The agreement medical technology introduced new procedures in terms of risk analysis and justification and induced big steps towards an increasingly formalized procurement process. Despite the fact that the covenant and all other applicable regulation steers to set up procurement processes as functionally oriented as possible, relational capital appears to be important in practice. However, statements about industry interference are variable.

The third and final perspective introduced a process view. Procurement processes can generally be described in six steps: specification, selection, contracting, ordering, monitoring, and, aftercare (Veeke and Gunning, 1993). However, two preceding steps are suggested which are: budgeting and initiation. Budgeting holds the allocation of a yearly budget to the division which is the result of a dialogue between applicants, an investment committee and planning & control. The initiation phase is a second gatekeeper in which the actual project initiation is justified and accepted. When we combine the three perspectives several lessons can be learnt.

- Frequently a project leader lacks the competencies to lead a project properly. This has major influence on going through the project steps and the project outcome. A project leader should be a neutral actor who has no advising role towards the project team in terms of content. A competent project leader could increase buyer-supplier relationships which would decrease negative effects from disproportional social capital between physicians and manufacturers. It is suggested to consider full time project leaders with proper education to contribute to an effective purchasing process.

- In the procurement process the ability to save financial resources decreases as is proceeded through the steps. Assuming that the added steps of budgeting and initiation are executed well, the specification step is crucial for the outcome of the project. Participants indicate however that the means of specification does not serve the goal. Detailed programs of requirements are the status quo but lack the ability to differentiate between options because too many basic requirements have to be registered. It is suggested to change towards a best value approach where the desired outcome is described.

- A best value approach improves and demands buyer-supplier relationship. The specification and selection step melt together and the specification of solutions happens in cooperation with a manufacturer. Hospitals and the industry are dependent on each other for executing their purpose. Therefore cooperation between the two industries is already perceived as positive but legislation counteracts this. At this moment this is in this form not allowed for academic hospitals as they are subject to the tender law.

We can conclude that an improved systems approach is essential for an effective procurement process and a project leader should provide in this. Having proper project lead creates the opportunity to experiment with the best value approach and break loose from the strict program of requirements homogenizing the healthcare technology market. Future research could test the potential of this method to increase opportunity for innovation for manufacturers, as well as hospitals.

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INTRODUCTION

I would rather have questions that can't be answered
than answers that can't be questioned.

Richard Feynman

1

In desperate need of a ventilator, it was not available. COVID-19 has revealed the hidden need for Healthcare Technology Management (HTM) to create strong, resilient health systems. Enabling countries to respond to pandemics and maintain health care performance (HSP) requires due attention to the management of its health technologies, including medical devices and equipment (Howitt *et al.*, 2012; Kruk *et al.*, 2018). According to the World Health Organization (WHO), 76 percent of countries worldwide have a designated unit within the country's ministry of health that manages technology of medical devices. Still there was a worldwide shortage of patient-ready medical equipment such as ventilators and surgical masks when COVID-19 spread around the globe (Ranney *et al.*, 2020). Those shortages revealed a fragility to a crucial system which is highly complex. In the extreme case of the current pandemic national ministries of health got a spotlight function. However, not only national governments are involved in decision making processes concerning health technologies. In more usual times multi-layered decision making processes involving numerous stakeholders lay the foundation for HTM. This is an ever ongoing and evolving process crucial for modern society with its ever raising life expectancy and increasing technological complexity.

The WHO defines HTM as an area of biomedical engineering including the domains of planning, needs assessment, selection, procurement, donations, inventory, installation and maintenance of medical equipment, training for safe use and finally decommissioning (WHO, 2017). To safeguard a country's health system performance[1] (HSP) it is important to create insight in the underlying processes of HTM. To secure these processes, suitable policy and understanding of the the underlying (decision making) processes is essential.

1.1. RELEVANCE

Every step within the process of HTM is connected and essential to guarantee an optimal future proof health system performance, and, depending on the product is a cyclic or continuous process. This study takes on the perspective from the procurement process of healthcare technology (HT) on the decision making processes. The view from this perspective will still range over all steps as the decision whether or not to procure a certain product depends on the outcome of all other steps, but with procurement as a starting point is taken from the cutting edge between being able to deliver the best care possible and spending the resources available to do this. Procurement forms the - almost literal - gate between available products and new technologies and actually using them. Thus, procurement of HT is a crucial part of HTM with the potential to create huge inefficiencies within health systems. And this figurative gate can adopt many shapes consisting of disparate building blocks, unknowing if the shape and materials are right for the purpose.

The complexity of this process and the challenge of effective execution of it is also revealed when taking a look at the numbers. The use of technology within health care is rapidly increasing. Health spending in OECD countries experienced an average growth of 2.4% per year between 2014 and 2018, which is significantly higher than the first five years after the 2008 crisis with a growth of 1.0% per year respectively (OECD, 2019). Considering that 69% of the growth in health spending between 1981 and 2009 can be accounted for by medical technological change, it is incredibly important to study the driving forces of this part of healthcare spending, HT procurement (Willemé and Dumont, 2015). Systematic mistakes and misuse of healthcare funding caused by flawed control systems induce a structural waste of financial resources and the WHO states malfunctioning of the acquisition system as one of the major explanation of this problem (WHO, 2010).

Inefficient or ineffective procurement processes slow adoption of new medical technologies. Delay in keeping up with recent developments carries several consequences. Not being able to provide technically available treatments can unnecessarily cost lives or increase burden of disease which could have been prevented (Sorenson and Kanavos, 2011). Besides that the indirect waste of resources, as a result of ineffective HTM, causes a sub optimal performance of health systems. Procurement of high tech HT involves big capital, many stakeholders and, depending on the system, also inter-hospital competition (ECORYS, 2017).

The aim of this study is to create insight in how procurement choices are made when hospitals are in need of new medical equipment, to be able to create evidence based insight in effective practices for hospital professionals. It is important to understand how decision makers interact among each other, why they make certain decisions and what effects this has on the costs and the speed of the process. National governments, regional governments, insurance companies, hospital boards and physicians are just a few stakeholders involved with possibly all different interests or ideas of how to improve care. Studies are continuously performed to reflect the performance of HT but when not adopted in hospitals the potential is lost. Currently,

[1] In this study the definition of Smith et al. is used which states 'performance measurement seeks to monitor, evaluate and communicate the extent to which various aspects of the health system meet key objectives' (Smith *et al.*, 2010). For an extensive explanation of performance of a system we suggest to read chapter 1 of Smith et al.'s book.

there is a scientific lack of understanding how HT procurement decisions come about and how policy interferes with this. Because of the growing role of HT and therefore influence on HSP, there is an increasing call for a better understanding of HTM (Pallikarakis, 2020; Shuren and Califf, 2016; Sorenson and Kanavos, 2011).

1.2. SETTING & MAIN QUESTION

Because of the heterogeneity of the multi-layered decision making process across countries, one national system - that of the Netherlands - will be studied. We will map the process of high-tech HT procurement and discuss its implications. The results are put in an international perspective to improve understanding of the current system to make HTM evidence based.

As a member of the European Union, the Netherlands introduced the Medical Devices Regulation (MDR) during this study. This greatly shows the topicality and societal awareness of HTM. Technological development has grown its roots in the foundation of modern Dutch - and European, and Global - society. As hospitals are the main users of high tech HT this research is carried out from the perspective of the hospitals decision making process. Hospitals are society's motor for transforming resources into health, and technology functions as a catalyst, making the process faster, more efficient and reliable.

The system boundary conceptual model in figure 1.1 shows the viewpoint for this study with the assumed related stakeholders. The starting point of this study will always be the hospital itself as deliverer of care and purchaser of healthcare technology. So the system boundary is limited to decision processes within the hospital. However, in the Netherlands delivering care is considered partially a public service which induces significant influence from government regulation on its doings. The aforementioned MDR is an example of European legislation effectuating in member states and therefore this is also considered an external influence in the decision process. Furthermore, also the supply system of medical equipment and insurance companies are considered as external factors. For example, insurance companies presumably have the power to reimburse certain treatments instead of others, influencing the need for certain technologies. Also the supply system is assumed to have some power as some of the technologies are highly specialized, not widely available and often not interchangeable. In this study the area of influence is limited to intramural processes and regulations. The mentioned external influences are considered in the process analysis as they are assumed to play some role but can not be altered.

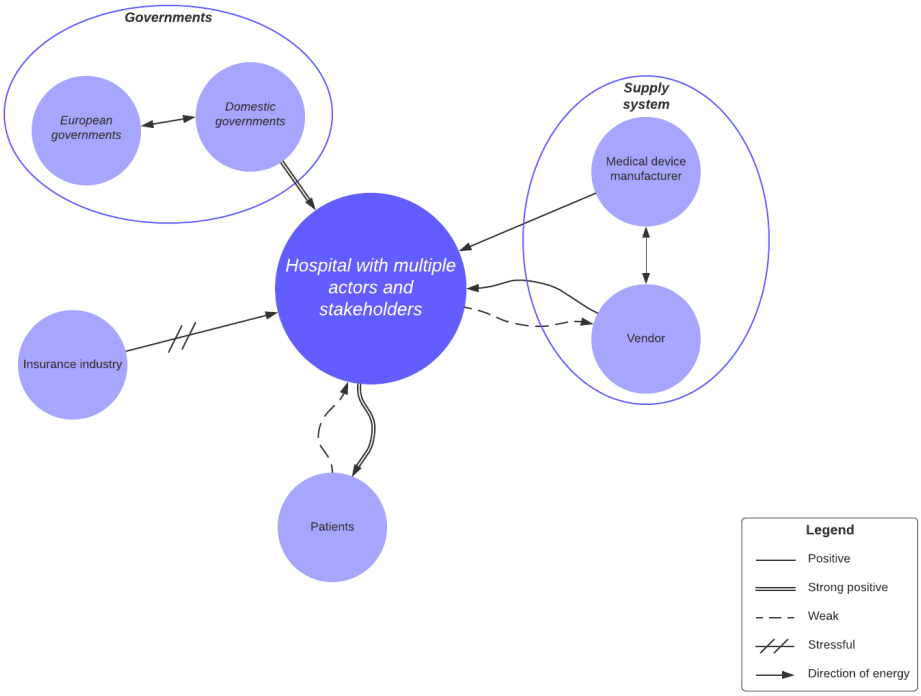

Figure 1.1: System boundary conceptual model demarcating the viewpoint of this research.

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1.2.1. MAIN RESEARCH QUESTION

The call for more collaboration, transparency and process-innovation has already spread throughout the industry which gave way to various forms of ownership and procurement. Leasing, loaning, pay-per-view, collaborative procurement, outsourcing and financing via science are just a few examples introduced to reduce the financial burden, service commitments and more (ECORYS, 2017; Gobbi and Hsuan, 2015). Although the literature describing HT procurement and its newest forms is growing rapidly, a clear view of the current process in the Netherlands is not yet available causing a blurry view on the status quo and its performance.

There is a clear call for more research on "the role and influence of procurement on balancing the adoption and affordability of medical technologies" (Sorenson and Kanavos, 2011) and how collaboration in the procurement process can improve (Abdulsalam and Schneller, 2020). To be able to work on those topics, a profound understanding of the system is necessary. Summarizing, we learnt that HSP is increasingly dependent on HTM. Getting the right technology in the right place appears to be an adaptive complex system calling for an interdisciplinary approach to create insight in the underlying processes of HT procurement.

In this study we aim to contribute to filling the gap between understanding the need for HT and its effectiveness in the clinic by focusing on the effectiveness of the decision making process of HT procurement in order to identify constructive policy interventions on this process; **What procedures improve the effectiveness of the multi-layered decision making process of procurement of health technology in hospitals in the Netherlands?** Effectiveness is hereby defined as the process as a whole being fit for purpose. This holds that the process should not take longer than necessary, should not cost more than necessary and provides a positive contribution to healthcare in several aspects are considered. The purpose of the decision making process is to provide a hospital with reliable equipment and at the same time being financially efficient enough that the care process can be sustained over an extended time period. Reliable hospital equipment incorporates, apart from maximizing technical safety and minimizing functional down-time, user satisfaction.

1.3. DEFINITIONS

HEALTHCARE TECHNOLOGY

Healthcare technology is a broad and ever broadening concept. The subject is not unambiguously defined and will always be subject to interpretation, viewpoint and personal preference. In general definitions the scope of HT can reach beyond technology as a physical, electronic piece of equipment. Software and pharmaceuticals are universally accepted as healthcare technologies too. As this study is performed in a member state of the European Union, first we will take a look at the definition used in the most recent act, the MDR:

Medical Devices Regulation Article 2.1 from (EU) 2017/745

'medical device' means any instrument, apparatus, appliance, software, implant, reagent, material or other article intended by the manufacturer to be used, alone or in combination, for human beings for one or more of the following specific medical purposes:

- diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease,
- diagnosis, monitoring, treatment, alleviation of, or compensation for, an injury or disability,
- investigation, replacement or modification of the anatomy or of a physiological or pathological process or state,
- providing information by means of in vitro examination of specimens derived from the human body, including organ, blood and tissue donations,

(...)

This definition as defined in the MDR confirms the wide range of what medical technology could be. On the other far end of the spectrum is a measure of the OECD. There the density of exclusively CT and MRI machines is used as an indicator of HT adoption. However, in examining other statistics it appears that HT is a wider concept.

In this study it is important to differentiate between technologies with different kinds of procurement

processes. We differentiate continuous and cyclic processes. A continuous process applies to technologies used in high piece volume and, usually, a relatively low piece price. Examples are surgical masks, pharmaceuticals and beds. Although the last mentioned, beds, do not have low piece price, they are continuous as they are often standardized over all departments in a hospital and essential for almost every delivery of care. The cyclic process applies to technologies which are only procured in low volume, have a high piece price and recurs regularly but not frequently. CT and MRI machines as used by the OECD are good examples of the target technologies. However, the scope of this study is wider than those.

The scope of this research is on technologies with a cyclic procurement process which recurs regularly. This includes technologies such as CT and MRI machines and certain lab equipment. Those technologies serve as a starting point in this study to orientate on the field. In case other technologies are relevant and bring notable differences to the studied process, this will be discussed in the analysis. As mentioned before, technologies such as pharmaceuticals and surgical masks do not fit this study. Also exceptional purchases such as particle accelerators are outside of the scope as the procurement process for such technologies differs too much from the target process.

HEALTH SYSTEM PERFORMANCE

The ultimate goal of all healthcare related research may be assumed obvious; increasing peoples health and thereby, whether or not consciously, contribute to the United Nations Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages [2]. In most societies, increasing peoples health or promoting well-being for all at all ages is a task for a dedicated healthcare system. We state that a healthcare system performs well if all members of the society it is meant to serve, have equal access to the care they need and that this care suits current standards. This means the system should perform to its full potential. There is however no fixed definition of good health system performance and therefore we have to compose a definition suitable for this study. Performance of a system can be measured by indicators ideally related to the performance of the whole system you want to measure, but can be disturbed by faulty interpretation or oversight (Iadanza *et al.*, 2019). By merely analysing financial, technological and organisational indicators, a major shortcoming is the true essence of our goal, understanding the causal process which has such a major and increasing influence on HSP. In the definition of HSP we should take into account the interrelation with HTM, which is proved to be related to HSP. David and Judd tested the hypothesis that HTM is positively related to HSP and concluded that guidance of health technology is critical for improving patient outcomes (David and Judd, 2020). But that leaves us with the question; what are improved patient outcomes exactly and how strong do they weigh against other factors? Fermot et al. touch upon a curious topic here; perceived health benefit. Perceived health benefit blurs the seemingly clear vision of what HSP concerns (Fermont *et al.*, 2016). This increases the need for not only health technology assessment but also health technology policy assessment. The design, execution and assessment of policy is however a very delicate topic which generally cannot be measured in mere numbers. Ethical trade-offs in decision making have to be considered when making technology assessments (Giacomini *et al.*, 2013). We see that health system performance is a conjunction between technology, policy, healthcare and many more colliding processes. An appreciated combination of the above aspects is secured in the definition of performance of a health system postulated by Smith et al.: 'health conferred on citizens by the health system, responsiveness to individual needs and preferences of patients, financial protection offered by the health system, and, productivity of utilization of health resources' (Smith *et al.*, 2010).

HEALTH CARE TECHNOLOGY ON PERFORMANCE

Generally, researchers seemingly agree on the hypothesis that HTM has a considerable impact on healthcare (David and Judd, 2020), including the adoption of health technology and who is involved in this process - mainly due to the growing importance of HT to healthcare processes worldwide - and patient outcomes, consequently health system performance (David and Judd, 2020; Sorenson and Kanavos, 2011). Healthcare technology and performance are however not connected one on one. It is also important to notice that the technologies itself do not perform to their full potential when they are not used properly (Yelton and Schoener, 2020; Leonard *et al.*, 2019). So the influence of healthcare technology on performance should be questioned case specific. Yelton and Schoener quote one of their interviewees magnificently in their paper: “Devices are Ferraris that have been driven like Fiats.” (Yelton and Schoener, 2020). It is key that users "know how to drive". This emphasizes that HT does not simply improve healthcare when installed in a clinic. Considerate choices have to be made in the procurement process to determine if the required skills and basic resources

[2] https://www.un.org/development/desa/disabilities/envision2030-goal3.html

1

are available to use a technology to its full potential (Howitt *et al.*, 2012). So to guarantee full potential HSP, the right HT should be in a clinic. When the suitability of technologies for a certain hospital, treatment or department is assessed correctly, then HT can be operated to its full potential and performance of a health system increases.

Inefficient Innovation

A clear example of users who don't know how to drive is described by Shishkin and Zasimova (2018). Huge inefficiencies and an utter waste of resources is induced why a faulty HT procurement process in which not the right actors are involved and the wrong intentions are followed. The case of Russian acquisition of innovative medical technologies and the causes of its inefficiencies are studied. A lack of understanding between the hospitals (i.e. healthcare provider) and authorities (i.e. resource provider) exists. Hospitals were mainly concerned about their image and the possession of certain technologies would benefit this image. This causes a focus on acquiring the most prestigious technologies and innovations instead of creating the ability to deliver the best healthcare. On the other hand, authorities seemed to privilege hospitals with more technologies even more with a lake it or leave it way of offering certain equipment, not resources. This results in the inability of hospitals to maintain the equipment or even train the skills to operate them (Shishkin and Zasimova, 2018).

VARIABLES OF INTEREST

Before we discussed health system performance and how this is affected by healthcare technology. Here the use of indicators has been mentioned but also the assessment of ethical implications and policy processes. To describe the effectiveness of the procurement process, a conscious review of the used indicators, dependent variables, and how to process them is crucial. Fennigkoh fully dedicated a paper to the significance and meaningfulness of HTM performance indicators. He considered previously reported indicators and questioned the credibility of conclusions from trend lines. To extract relevant knowledge from indicators, regardless of their origin, the user needs appropriate knowledge of analytical tools (Fennigkoh, 2019). Earlier Fullman et al. build a framework upon numerous existing indicators to measure HSP in 195 countries (Fullman *et al.*, 2018). They acknowledge that for achieving good health system performance around the globe, it is essential to evaluate where "gains have occurred or progress has faltered" (Fullman *et al.*, 2018). For doing so the global burden of diseases was consulted and combined with the Healthcare Access and Quality Index, resulting in a comprehensible statistical analysis. However, this method solely portrays outcomes whereas we are looking for procedural characteristics. Therefore, quantitative indicators are not ideal in this study and qualitative measures have to be found and defined. It must be emphasized that the interpretation of performance indicators is just as important as finding the right ones and that this is an iterative process. The relevance of specific indicators can differ per region and when data is interpreted automatically, this should be accounted for. Filho, Martins & Garcia developed a dedicated methodology for defining management indicators in (primary) health care and concluded HTM evolved to be a systems science for which an interdisciplinary team is crucial for success (Filho *et al.*, 2020). This draws our attention to the importance of an analytical approach towards defining procurement effectiveness, although combined with a pragmatic perspective on what is available.

HEALTH TECHNOLOGY PROCUREMENT

The above discussed literature emphasizes the need for careful decision making when it comes to the procurement of HT. Sorenson Kanavos' research confirms the interdisciplinary systems science conclusion of Filho, Martins Garcia in a cross country comparison of medical technology procurement in Europe (Filho *et al.*, 2020; Sorenson and Kanavos, 2011). They examined the purchase of specific technologies in 5 countries and described a multi-actor system with various interests and describe several policies in action such as lists of medical devices that can be purchased, imposed by the national government. Overall, national policy is often concentrated on financial mechanisms based on historical costs of treatments or equipment. Those financial mechanisms in some countries provoke time delays in novel technology adoption caused by the structure of the system. For example, in Italy so called case-fee payments determine the subsidy a hospital gets for certain treatments. Those case-fee payments are not updated frequently causing them not to reflect actual costs (Sorenson and Kanavos, 2011). This discrepancy complicates the adoption of new technologies. When hospital funding is based on existing workflows and technologies, high tech equipment requiring big

investments but with the potential to relief the health system in other places, is ruled out. Creating trust between involved stakeholders is crucial in acknowledging the origin of each others needs and aiding one another in reaching their goals. More collaborative relationships between parties are necessary to prevent suspicion-creating practices such as opportunistic pricing by suppliers and lack of transparency (Abdulsalam and Schneller, 2020).

Procurement protection

An example where honest and transparent cooperation between parties proved successful is described by Mundy *et al.* (2019). Aquapheresis offered a promising solution for fluid overload removal in heart failure patients. The new treatment would be cost saving duo to the patients not needing to be admitted to the hospital anymore and experience better outcomes. However, after an early performed HTA from a state instance the new solution appeared to be too selective. Only select cases could receive this treatment resulting in the technology only being an addition instead of a replacement to the old technology. Funding was stopped and healthcare instances were protected from buying the ineffective technology.
Here a governmental organisation interferes with the development of new technologies. Although hospital based HTA's are increasingly popular for their good results and specificity, this state wide innovation program is able to protect institutions from wasting resources and accelerate promising developments, more than single hospitals would be able to.

1.4. RESEARCH APPROACH

Because we are dealing with a dynamic socio-technical system involving many stakeholders with differing interests, motivations and knowledge resulting in actor-specific behavior in a multi-layered decision making process which has not been mapped in detail before, we will use several modelling techniques to map the structure of the decision making process. The models will be used to create insight in the decision making process of HT procurement. The produced models aid in visualizing a complex process and help in identifying bottle necks or gaining structures, serve in understanding of how different actors in the system behave and interact. The model has to be provided with accurate structural data to be able to provide the desired insight. Literature review and expert interviews should provide accurate structural information from which a conceptual framework can be built. As imposed by the main research question, a model of the Dutch system will be made. In the analysis we will get back to existing literature to create insight in the position to the global perspective. Policy interventions can originate from expert interviews and literature. The results should be discussed with involved experts to verify the real world feasibility after which ultimately a policy advice can be given. In the following section, the structure of this thesis is described.

With an expected lifetime of five to ten years[3] (Ivlev, Vacek, *et al.*, 2015) the machine needs replacement frequently enough to be highly relevant to study and it makes a good compromise between smaller technology such as ventilators and larger technologies such as proton accelerators.

1.4.1. THESIS STRUCTURE

This thesis is structured in five main parts. (1) In the introduction the relevance of the topic was addressed and we shaped the setting of this research and put forward the main research question. (2) In chapter two, the second part, we formulate sub questions and research methods. We also study previously used methods in process related research in the healthcare sector. The used modelling techniques are presented and ordered in a modelling flow diagram. (3) A literature analysis of the current state of affairs. The literature analysis constitutes three themes. The first studies actors and stakeholders. The second identifies established guidelines described in literature. The third theme examines the current state of academic literature on procedural practices. The analysis serves to create an extensive theoretical foundation. The literature should provide an extensive view of HT procurement practices around the globe. An analysis of actors, guidelines and processes is presented and a clear definition of effective procurement process can be formulated. This supports the further comparison of this research in the fifth part, chapter 7. (4) In the fourth part of this research, chapter 4, 5 and 6, the analysis of the Dutch procurement system is presented. A formal actor model based on interviews, gray literature such as consultancy reports and legislative documents is presented in chapter 4. In chapter 5

[3] Ecorys (2017). "De waarde van zorgtechnologie".

the identified external influences which should be considered are presented and discussed. In chapter 6 the results of the interviews will be presented in process models. (5) In chapter 7, the final part of the analysis, everything is brought together and formal and informal policy practices and their implications are discussed to build towards answering the main research question. Finally in the last part of this research, chapter 8, the conclusions are presented.

2

Sub Questions & Research Methods

If I can bicycle, I bicycle.

Sir David Attenborough

This chapter introduces the sub questions considered to answer the main question. Subsequently a short literature search is performed to get acquainted with common research methods of this field. Finally, the used research methods are presented.

2

2.1. SUB QUESTIONS

The main research question posed is: **What procedures improve the effectiveness of the multi-layered decision making process of procurement of health technology in hospitals in the Netherlands?**

We can break down the main question into several sub questions. First of all it is essential that the right stakeholders with specific functions and proper intentions are involved. As scientific literature has not revealed particularly much about the stakeholder and actor interaction in the Netherlands, gray literature should reveal the basic structure. Of this several conceptual models will provide a further basis to work on in later stages of this study. On the basis of the conceptual models developed with gray literature, the actual actor and stakeholder interaction on site is studied and documented in conceptual models.

From the literature study it also became apparent that several external influences are potentially crucial in the functioning of the system. Therefore, also a study of external influences on the studied system is required. In the system boundary conceptual model as shown in Figure 1.1 several assumptions have been made about external factors influencing the studied system. Those will be tested for completeness and expanded if necessary.

Finally the separate studied factors, actor and stakeholder interaction and external influences, are combined to study the process as a whole and identify effective practises.

To break down the main question, the following sub questions can be posed:

1. Which theories have been described in existing **literature** applicable to procurement of health care equipment procurement around the world?

2. What is the current decision making process of healthcare equipment procurement in hospitals in the Netherlands in terms of **actor and stakeholder interaction**?

3. What **external factors** influence the procurement of medical devices for intramural care in the Netherlands?

4. What **procurement steps** can be described to capture the complexity of the procurement process of high cost healthcare equipment in hospitals in the Netherlands?

2.2. RESEARCH METHODS

As described in the introduction, the main method for the answering of the research questions, after the literature research, is expert interviews. Expert interviews with hospital employees in several functions should provide the necessary insights in the system as-is. Sub question 2 is a brief extension to the literature review in order to combine the theoretical insights from the literature review with indications and claims from gray literature to create a basis to work with in the expert interviews. Sub questions 3 and 4 are elaborated with the expert interviews. The interviews are based on the literature review as well as the extension of sub question two. Depending on the participant some of the conceptual models from the earlier sub questions might be presented to address different topics. Whereas question 2 will be addressed briefly, question 3 and 4 form the basis of data collection and are described in considerate detail. Finally sub question 5 is also described extensively. Analysis of all the gathered data combined should provide the necessary insights to find auto which practices causes this system to function the way it does.

2.2.1. APPROACHES TO HEALTH TECHNOLOGY PROCUREMENT RESEARCH

Research to decision processes of technology procurement within a hospital setting seems to be scattered. Because of the diffuse nature of the topic, it is relevant to not only examine the results of previous research but also their methods.

In the following section, literature regarding healthcare operational processes will be discussed briefly. This will contribute to the design of this research. Subsequently, the used methods are presented.

Interviews The most dominantly used methods of gathering information concerning the decision processes of supply chain management and particularly procurement within hospitals is performing interviews with involved stakeholders (Hinrichs *et al.*, 2013; Madhlambudzi and Papanagnou, 2019). In most cases this concerns an iterative process in which stakeholders are interviewed to identify other involved stakeholders as often formal relations and powers are unclear. In a hospital setting, interviews seem to be the most effective way of collecting information as the majority of praxis emerges from knowledge (Ham *et al.*, 2021). In an interview structure can be combined with the ability directly to ask for more information or explanation when necessary. When trying to understand the motivation of actors deeds this information is crucial.

Observation Apart from active interviews also observation is a recurring method of gathering information about healthcare supporting processes. Among others, Hinrichs *et al.* (2013) and Ham *et al.* (2021) used this method to identify real world relations and rules by which is acted. This method is an important addition to interviews as it appears that actors often are not aware of rules they work by and the majority of behaviors is not formalized in policy- or other documents (Ham *et al.*, 2021). So where in interviews the ability to inquire about internal motivations is useful, in observation can be found out whether the actor acts like they think.

Literature Although the topic considered is highly specific and relatively scattered because of the heterogeneity of systems around the world, literature is increasingly a source of information (Sorenson and Kanavos, 2011) and sometimes used as the primary focus of information gathering (Bastani *et al.*, 2020). Bastani *et al.* (2020) based a strong analysis of strategic purchasing of advanced medical equipment in Iran on a scoping study (so fully based on literature). In later stages of their research the Delphi method was just used to verify their findings. After performing a structured search in multiple databases several steps involving multiple researchers were performed to assess the quality of papers and include them in the scoping study (Bastani *et al.*, 2020). The attention given to the search process bears witness to attention given to not only the model to make, but also to the data put in. It is key to understand the importance of a well structured literature search as lack of width in the orientation phase can lead to a biased model and, when interviews, observation or other follow the literature search, questions can be biased which results in skewed results.

Apart from academic literature, gray literature is essential in identifying stakeholders and rules in this area of research (Ham *et al.*, 2021; Madhlambudzi and Papanagnou, 2019; Sorenson and Kanavos, 2011). As stated above, literature about the topic is scattered and apart from that, a crucial share of necessary information to understand the researched process is not academic. Regulation should be found in policy documents from supra-national, national and regional governments, hospitals and technology providers. Regulation and financial streams are expected to play a significant role and should therefore be studied with due diligence.

CONSOLIDATION

To consolidate the gathered information in order to show trends and draw conclusions the methods are more diffuse. As mentioned above, Bastani *et al.* (2020) used the Delphi method to verify a model they constructed based on their scoping study. Several iterations of the Delphi method in which people from health insurance organisations and experts from fields of i.e. Health Economics could indicate their agreement of aspects of the model on a Likert scale (Bastani *et al.*, 2020). Verifying the consolidation of information with experts in the field is a crucial task for the credibility of a study. Failing to check results with involved stakeholders in a field of research where implications of results are not obvious and are subject to interpretation, potentially leads to wrong conclusions and a useless policy advice.

Findings are also presented in several ways but although exclusively static. Apart from textual discussions and tables in most studies, some also produced static models (Bastani *et al.*, 2020; Hinrichs *et al.*, 2013; Lindgreen *et al.*, 2009; Sorenson and Kanavos, 2011). Those models were mainly used to present interaction and hierarchy of actors and prove useful because the structure of a system becomes clear at a glance. This study will build forward on actor interaction models and combine existing models to create an overarching conceptual framework of actor involvement.

REMARKS

Above the main methods are described but those can be altered in many ways to their specific needs. Alternative methods such as surveys are used but seem less appropriate for this research. As we are looking for the views from different actors which might differ significantly, a standardized survey does not fit our purpose. It is expected that different roles know different part of the process which cannot be drawn out together.

2.2.2. METHODS FOR LITERATURE REVIEW

LITERATURE

Appropriate literature is gathered in order to perform a targeted review. First, an additional unstructured orientation phase on Google Scholar conducted in January 2021 supplied scattered literature related to the research topic used to get acquainted with the matter and enable the researcher to develop a more targeted search method. Subsequently, three main search tables were developed containing different combinations of relevant keywords and several appropriate synonyms. Table 2.1, 2.2 and 2.3 show the final search structure. Vertical columns and horizontal rows represent synonyms separated by an "OR" and search combinations separated by an "AND" respectively. The search combinations are performed between February and March 2021 in Scopus and Pubmed but the strong emphasis of the results is laid on Scopus as Pubmed returned mainly medicine studies and we are focusing on supporting processes of healthcare. For every search, the first 200 results, sorted on relevance and limited to 10 years old (e.g. 2011 and later), are examined by title and saved in an Excel document. Subsequently the selected literature is assessed for their contribution by the abstract and scored on a 5 step Likert scale ranging from "fully relevant" to "excluded". The "somewhat relevant" articles contain for example either relevant methods or procurement is just a small part of it.

All selected articles after title and abstract assessment are used in the targeted review and examined in ways appropriate for the respective literature. Two main streams are used to study the literature. First, we looked for previously used methods for research to the procurement processes in hospitals. In the first stream we studied "how to analyze" the topic. Second, we extracted previously identified process characteristics, actors and stakeholder interaction and external influences and interaction. We identify and interpret multiple styles of procurement mentioned in the literature. The second stream represents "how systems behave in practice". In this analysis, several conceptualizations are created and interpreted to support structure the studied system.

GRAY LITERATURE

As indicated before the performed targeted literature study did not return substantial recent scientific literature about the procurement system of HT in Dutch hospitals. Therefore in this section the aim is to produce a rough map of the system to be expected. This is done by combining the performed literature search and a short additional analysis of available gray literature. Although satisfactory scientific literature is not found, industry analysis from banks and consultancy firms, and news articles are available. An open search in public search engines such as Google delivered several reports and news articles to build upon. Therefore a web search to available news articles, consultancy reports and government documents has been performed. This will be used complementary to the interviews described below.

Consultancy reports Several consultancy reports have been identified to provide a broad insight in what the system of interest entails en how actors are involved. Three documents are used in the analysis namely (Berenschot, 2021), (ECORYS, 2017) and (Gupta, 2017).

Government documents Several regulatory documents have been collected as well. Data about in-hospital actor participation will be extracted. However, government regulation is considered an external influence on the process and is discussed in more detail in chapter 5.

News articles News articles provide an insight in actual events currently happening. When regarding news articles in this analysis it has to be taken into account that reportings are likely to contain several kinds of bias. First of all, something out of the ordinary has to befall before it is newsworthy. Therefore we don't expect to find much about the usual practice in the procurement process. Another bias which might occur is that a strategic actor intentionally draws attention to a specific topic. Then, in the interpretation of the data, awareness of a possible intention is advised.

SEMI-STRUCTURED INTERVIEWS

In professional semi-structured interviews participants will be asked about their vision of the procurement processes in their respective workplaces. The interview consisted of two parts. All interviews took place online through Zoom or Microsoft Teams video calls and lasted between 50 and 75 minutes. The interview as used can be found in its complete form in appendix A.

	combine with AND →			
	health* technology management	perform*	hospital	procure*
	health* technology policy	quality	intramural	purchas*
combine	clinical engineer*	effective*		
with OR↓	medical device*			
	health* equipment			
	health* tech*			
Results in Scopus	148			
Results in PubMed	255			

Table 2.1: Search terms used to find appropriate literature focused on procurement of hospital equipment

	combine with AND →			
	medical device*	hospital	procure*	netherlands
	health* tech*	intramural	purchase*	dutch
combine	medical tech*			holland
with OR↓	health* equipment			
Results in Scopus	27			
Results in PubMed	62			

Table 2.2: Search terms used to find appropriate literature focused on procurement of hospital equipment in the Netherlands

	combine with AND →			
	health* tech*	management	agent based model*	procur*
	clinical engineer*	policy	abm	purchas*
combine	health* equipment	governance	agent simul*	
with OR ↓	medical tech*		decision model*	
	medical device*		decision making	
			decision process	
Results in Scopus	410			
Results in PubMed	487			

Table 2.3: Search terms used to find appropriate literature focused on decision modelling of procurement of hospital equipment

Participants Participants for the interviews were gathered via the network of colleague researchers in the field. Also, at the end of every interview participants were asked for additional contacts to expand the network of interviewees through the snowballing effect. Not only was this method useful to create a cohesive and complete network of participants, also it was particularly useful to deliberate with a participant to judge which professionals were most useful to consult to complement the view of the previous participant and complete the description of that particular hospital. LinkedIn was used to find extra participants where necessary.

Based on the literature review we started with an initial list of possible expert participants. Healthcare professionals from this list were approached and other professionals opted by participants were keenly assessed and included. As we purposefully were looking for a holistic view on the process, there are few professionals not helpful. Also participants turned out to be very helpful in identifying valuable complementary representatives from their respective hospitals which provided a balanced distribution between business- and functional experts.

All participants were approached either by colleague researchers and emailed after their consent, emailed directly or approached on LinkedIn. The latter group of participants were sent a brief message inviting them for an interview for scientific research as there is a limit of 300 characters when not connected. After connecting, contact via email was proposed and consented in all cases. The emails to all participants contained a standardized summary of the research they were invited to, explaining what we were doing, whom were invited, why it was done and how the interview would proceed. In the summary was also already mentioned that further suggestions were welcome and together we would work on identifying the complete list of involved stakeholders within the hospital. Replies consisted of three types. Approached healthcare professionals either consented to participate and an appointment was made by email of phone. Alternatively they wished not to participate in which cases no reason was requested to respect their professional and personal privacy and choice. Lastly, some approached professionals considered themselves not suitable to the study but offered to connect us to other professionals from their network, which was highly appreciated and accepted kindly.

Aiming for a combination of a generalizable picture of procurement of HT in Dutch hospitals and at the same time a thorough understanding of processes and actor and stakeholder interaction, 12 participants in 8 different hospitals were interviewed. Among the participating hospitals were 3 academic hospitals, 4 general hospitals and 1 specialized hospital (Table 2.4). Table 2.5 summarizes the roles of the participants. Often, participants were involved in numerous procurement processes for a wide range of necessities. They were asked to focus on high investment equipment. Also, as indicated in chapter 4 several participants fulfilled a double role also being part of an investment committee. The equipment of interest, taken CT and MRI machines as standard, has a life expectancy of approximately 10 years. Deviations from this will be discussed later on.

Hospital ID	Nr of beds	Operating income
Academic hospital 1	1000+	1300 m*
Academic hospital 2	700+	800 m*
Academic hospital 3	800+	900 m**
General hospital 1	800+	500 m**
General hospital 2	400+	350 m**
General hospital 3	700+	180 m**
General hospital 4	400+	150 m*
Specialized hospital 1	200+	400 m*

Table 2.4: Core characteristics of participating hospitals. *book year 2020 **book year 2019

Open questions In the first part open questions in the themes participant, stakeholders, decision processes, money flow, external influence, and goals were addressed. The questions were composed based on the literature review and used as a guideline during the interview. The goal of this part of the interview was to obtain as much from the knowledge of the participants about stakeholders, interactions, policies, finances and limitations and benefits without influencing their train of thoughts too much by imposing the researchers thoughts. To accomplish this the interview questions were composed as open as possible and assumptions were only imposed when clarification seemed necessary. To create a natural flow in the interview dependant variables and control variables were fitfully incorporated. In the analysis of the results the right variables can be anal-

Role	#
Clinical Physician	3
Estate Staff	1
Finance	1
Medical Technology	2
Procurement	4
Technical Physician	1

Table 2.5: Roles of participants

ysed against each other. Also, the categories of the questions do not follow the line of the sub questions of this research. This too is to create a natural flow in the interview enabling the interviewee to follow a story line without too many interruptions or amendments from the interviewer. The line of the interview appeared successful and interviewees indicated that the structure was comfortable and natural.

Participants Before starting the interview several control variables were registered and when necessary complemented after the interview. Kind of institution, official professional function and life expectancy of medical devices were filled in by the researcher. In the interview was asked in the procurement of what medical devices the participant is involved and in what steps.

Involved people One of the major purposes of the interview is the identification of all stakeholders and actors affected by or involved in the decision making process. Also, three key functions, initiator, accountable and responsible, are identified and described.

Decision processes This theme addresses several questions regarding considerations made in the decision process. Also the way financial analyses are performed is addressed here as we define that as a factor influencing the choice rather than a predetermination, which would shift this topic to the next theme.

Money flow As appeared from the literature money, and availability of it and not in the last place also the willingness to and discretion of spending it wisely, is a major component of effective procurement. In this section the focus was laid on the predetermined part of finances. Questions were directed at finding out who provides the budget, who sets the budget at what stage and how strict this is and whether if the financier had a special influence in the decision making process.

External influence Also external influences were of major influence in the literature. Therefore this is, although the scope of this research is on the intramural process, essential to understand how external influences work on the internal processes.

Goals Finally we are also interested in the general attitude towards their role in the purchasing process of professionals in different roles. This also appeared to be of importance based on the literature review. Therefore we asked the participants why they contribute to this process and what they ultimately want to reach while fulfilling their role.

Furthermore the participants were asked whether they would implement any changes in the system as-is. This would presumably only indicate the existence of a feeling of dissatisfaction about the process of their own respective power.

DIALOGUE & MODEL

In the second part of the interview a dialogue was initiated. The participants were asked to describe the procurement process from start to end from their perspective. The interviewer responded to statements and tried to construct simple conceptual models during the dialogues. When possible the interviewee and interviewer placed aforementioned actors in a PIA diagram and sketched processes to get the right level of detail together.

Initially is was planned to show the participants half filled in models and fill them together. It turned out that this method was not productive due to lagging software while online sharing the screen and building by

the stories told. However, the second part of the interview still fulfilled its intention and delivered specific stories, actor analysis and timelines which could be reproduced into visual models later. Because of this, it was not essential anymore to separate the two parts of the interview strictly. Therefore, as mentioned before, the complete interview had a more open character in which the story-building was done throughout the interview with contingent follow up questions.

2.2.3. DATA STRUCTURING

After the data collection as performed in the interviews, the goal of the third, fourth and fifth sub questions is to produce a conceptualisation and analysis of the process and the involved actors and stakeholders. To be able to perform this analysis the data needs to be structured.

CODING INTERVIEWS

First of all, all interview audio recordings are transcribed. Transcriptions are transcribed verbatim with the exception of broken sentences where the participant did not finish the sentence. Also the questions asked by the interviewer are not transcribed in most cases as the interview outline is already available. Transcriptions were made in the free web app oTranscribe [1] and exported as .txt files. Subsequently, all the interview audio recordings and transcripts were imported to ATLAS.ti version 9.0, which was the newest version available at the time of reporting [2]. Atlas is a tool for qualitative data analysis and research and a license is provided by the TU Delft.

Next, the interviews are coded. Coding of interviews is done to gather similar data from different interviews in order to be able to compare what different participants said in a structured way. Below, the steps followed are described briefly:

1. Select three interviews. Those are subjectively assessed by the researcher and will be used to develop a coding system with.
2. Add base codes. Base codes code an entire interview and indicate what kind of hospital is discussed and which role the participant fulfilled.
3. Irrelevant parts are excluded from coding. Examples too far out of the scope of this research and the introductory explanation and closing words are not coded.
4. Open coding. The remaining fragments are coded swiftly and freely. No attempt is made to create an overarching structure yet.
5. Longer text fragments are coded with multiple codes when necessary.
6. Answers are coded according the the themes and questions used in the semi-structured interview.
7. Axial coding. Codes are merged and grouped. Synonyms are nested an a hierarchy is introduced. For example: codes such as "physician" and "doctor" are merged into one as they represent an identical role. Also, codes such as "physician" and "procurement manager" are grouped as they all represent roles.
8. Recurring themes are identified and coded using text search for signal words.
9. Apply coding to other interviews. The resulting coding is applied to the remaining interviews. In all stages changes can be made but the main structure is established. Coding is this stage is more selective as an idea has been formed about recurring topics and peculiarities.

FREE MODELS

During the interviews several simple models have been produced. Those models are checked with the audio recordings and when necessary adapted. Also, as was described earlier, because of hardware or software limitations, modelling during interviews turned out to be a cumbersome task. Therefore the storytelling parts of the interviews were merely scribbled down on paper during the interview. To visualize the basic structure described in interviews and reduce the amount of coding necessary, free models are produced to use in the later analysis. The models were used to create insight for the researcher.

[1] https://otranscribe.com
[2] https://atlasti.com

- PIA diagrams. PIA or power interest attitude diagrams are used to indicate power and influence, interest and attitude of involved actors. In the interviews the viewpoint of the participant is adopted. Although this delivers varying results which are hard to combine and generalize, it provides material to identify differences in perception about powers, interests and attitudes.
- Actor interaction diagrams. Actor interaction diagrams are used to identify relations between actors. Actor diagrams in this study are exclusively based on formal interactions. Informal interactions are not included as the size of the data set is not sufficient to deliver reliable information about those relations.
- RACI charts. RACI charts document who in a process is Responsible, Accountable, Consulted and Informed for specific tasks.
- Process diagrams. Process diagrams are used to create insight in how a process progresses chronologically, and which tasks have to be performed by whom.

2.2.4. CONCEPTUALIZATION & SYNTHESIS

In the conceptualization of the problem, the workflow as shown in figure 2.1 is used. First of all the system boundaries were defined in the introduction in chapter 1. This is essential to be able to produce clearly demarcated models. As this research studies internal processes and guidelines for hospitals to improve their respective procurement process, the starting point is to consider where their power of influence reaches. Environment factors such as European legislation have to be identified and judged. Subsequently as seen in the left line of the workflow diagram, the actors involved in the studied process are modelled in an actor model to identify their interactions and relation to each other. Also, important actors are modelled in a power-influence-interest-attitude diagram. Although this power-influence-interest-attitude diagram is hard to define and extremely subjective, especially due to the subjective judgement of attitude of other actors than the participants themselves towards the purchasing process, they are used to develop insight in the perceptions of actors. This diagram is based on a traditional power-interest diagram where one dimension has been added, attitude, to show willingness to cooperate for the desired result - an effective procurement process - and power is redefined as power-influence. This will raise certain actors who do not have the absolute power of stopping or continuing a process but do have a lot of influence on the specification of the final decision. On the right side of the workflow diagram first an actor specification is made. The actors identified to be involved, based on the actor model, are studied in more detail in order to describe their possible states and actions. A formal actor scan is used to develop insight in actors values, resources and perceptions. Combined with their respective power-influence, interest and attitude, finally, a conceptual decision making model is made. Combined with the earlier steps, the decision making model is used to create insight in effective procedures in HT procurement.

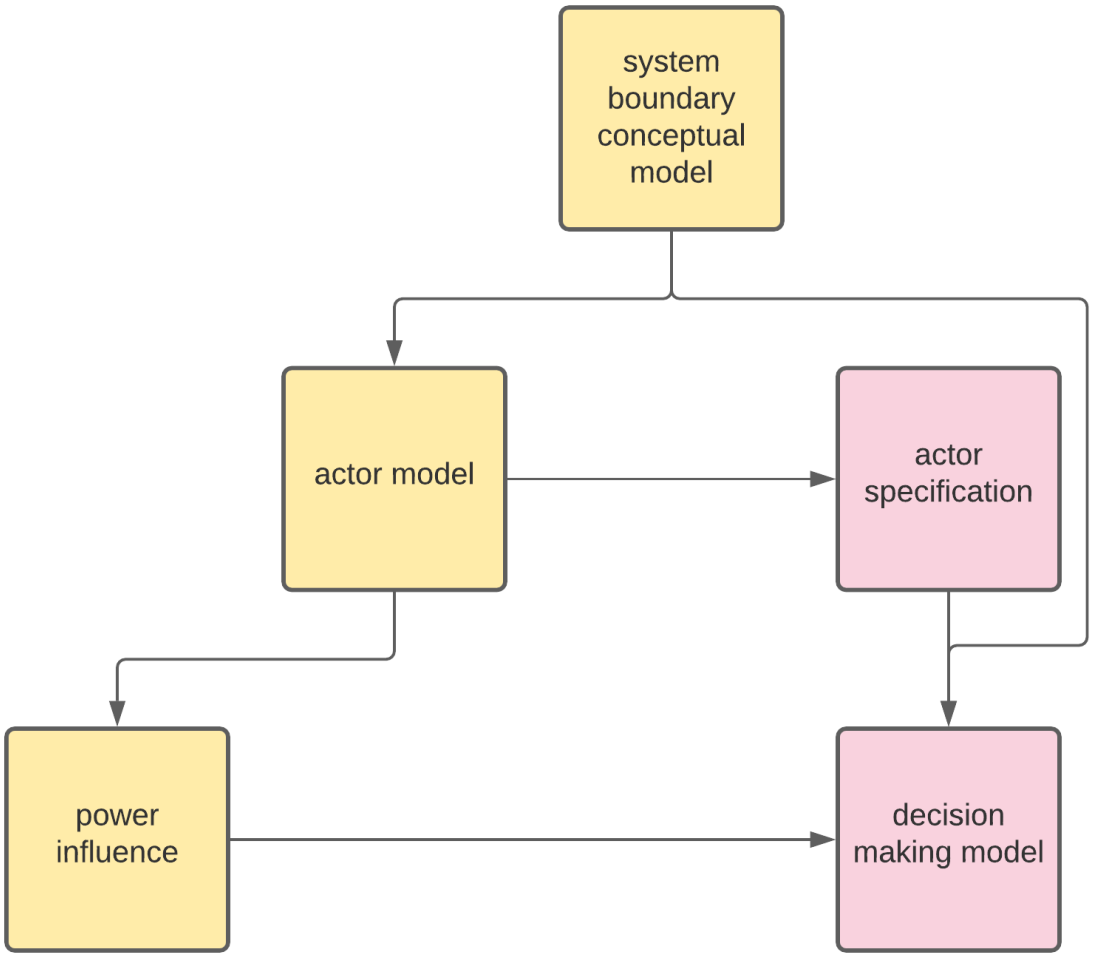

Figure 2.1: Flow of conceptual modelling. The yellow boxes represent generalized models, mostly applicable on systems performing the addressed task. The pink boxes represent specific models. Those are specific to a system and should be changed fundamentally before use on other systems. Diagram own creation of author

3

LITERATURE

If I have seen further
it is by standing on the shoulders of Giants.[1]

Sir Isaac Newton

[1] This quote can be traced back to the 12th centry neo-Platonist French philosopher Bernard de Chartres and was first recorded by his disciple John of Salisbury (Merton, 1993). Here, the modern phrasing of Sir Isaac Newton is used to reflect the rhetoric.

In order to develop a comprehensive understanding of the status quo in healthcare technology procurement a targeted review is conducted. As a cohesive framework about health technology procurement is not identified, this chapter dedicates to a literature study to identify which theories have been described in existing literature and focuses on a world wide view. In this chapter a theoretical foundation for the study is laid.

This chapter studies the existing literature about procurement of health care equipment and discusses several theories which can be related to this process. This serves three purposes. First of all, it is used to create a cohesive framework of theories. Research in this topic appears to be fragmented and despite a lot of high quality valuable literature, a holistic overview could create more insight in identifying links between actor structures, external factors, and procedures. Secondly, it provides a theoretical framework for the rest of this thesis research. Studying existing findings and theory enables us to categorize what we find and put it into perspective. Third and last, it is used to specify this research. To be able to create the perspective in comparison with existing literature it is convenient to study matters which have been written about in other geographical areas or times. This is to prevent a standalone research in which implications can hardly be interpreted because of a lack of history.

Purchasing decision making processes in a high tech medical equipment context is still a scattered subject with active research communities in several countries. However, in many countries, under which the Netherlands, it is hard to find appropriate literature which potentially is scarcely existent. To our best knowledge no recent articles have been published on the topic of interest specifically. The research area is however reviving. Ongoing analysis of the Dutch hospital logistics a superposition of this research and will be reviewed in this chapter. In order to develop a comprehensive description and analysis of the system it is important to consider previously used methods and findings. A leading article in this area of research is one by Sorenson and Kanavos (2011). Despite being ten years old at the time of writing this, their methods and findings are useful in creating the international perspective. Review on this article will appear later in this chapter. Methods which proved themselves effective can be helpful in conducting the research in a new geographical area when cultural and systematic differences are taken into consideration. Apart from some minor procedural differences between countries, this scientific part is considered country neutral. Earlier findings, although in other countries and therefore fulfilling a comparative function, potentially give this research a jump start by creating a solid knowledge base of involved stakeholders and observed behaviours. Also less obvious factors which might otherwise be neglected are noted. Therefore, a targeted review for literature about the hospital purchasing process of high tech equipment is conducted. The information from this review is used to place findings of the Dutch procurement system in perspective and create insight about its position in an international comparison.

The following section describes practices identified in literature healthcare technology procurement globally. Three main streams are identified, actor interaction, procedural characteristics and external influences.

3.1. ACTORS AND STAKEHOLDERS

When studying the purchasing process of medical equipment it is crucial to correctly identify involved stakeholders and actors and to understand their course of action. Note that the here identified actors are gathered from several studies performed in different countries and therefore producing a general oversight of actors potentially involved in the procurement process in the Netherlands. Even within countries stakeholder involvement is not consistent throughout hospitals and can differ depending on the device being procured.

The literature demonstrates that sometimes a more holistic view on the purchasing process is required instead of only considering the functional ability, quality and cost of equipment relevant for clinical and business-related actors. Operational actors involved in the decision making process can address circumstances resulting in a binding advice. This can be illustrated with the example of the operational actor "estates department". Seemingly they have nothing to do with the technology used for clinical care processes. However, location within a hospital potentially influences the decision process. Structural capacity of hospital buildings for carrying the weight of equipment can restrict the maximum weight of a machine. Next to that, an available transport route through the hospital is necessary and technical building requirements must be implementable, for example for water cooled MRI machines. Lack of involvement of departments or actors responsible for estates or building management can lead to delays in installation or skyrocketing costs, either due to unusable technology or big structural changes in existing buildings (Lindgreen *et al.*, 2009; Madhlambudzi and Papanagnou, 2019).

3.1.1. ACTOR TYPES

The need for this holistic view can be translated into three main actor types,

- clinical,
- operational,
- business.

Clinical actors are clinical end users, operational actors are for example estates department, materials managers and clinical engineering and business is defined by finance departments or the board of directors so to speak (Gaev, 2018).

The importance of all actor types is recognized throughout the literature. A UK study showed a discrepancy between the two, actors and stakeholders, as high interest stakeholders not always got the opportunity to involve in the decision process: "...it can be seen that not all those involved in training for correct device use are consulted upon for new device purchases." (Hinrichs *et al.*, 2013). Studying and interpreting table 4 from Hinrichs *et al.* (2013) where involvement of several roles is indicated per step in the procurement process, the following steps are chosen for the basis of a PIA diagram: Signing off requisition form, Choosing which device to purchase, Trialing of new products, Placing the order with suppliers, Conducting acceptance tests on new devices, Coordination of medical device purchase and use, Strategic contract planning and monitoring, and, purchasing pumps and devices. For all actors it is counted in how many tasks they were involved and in how many hospitals this was. Actors often involved (i.e. in many hospitals) in many tasks are considered to have higher power than actors less involved in the selected tasks. Interest is mainly based on "distance to patient safety". The closer an actor is to delivering safe care, the higher interest is assumed. Combined with further interpretation of the text the PIA diagram as shown in figure 3.1 is produced. Apart from the four roles included in the table, finance is added as a role due to the importance of financial restrictions. So, although there is no direct involvement in the equipment selection process, finance, usually in the form of an investment committee, has considerable power/influence. It is noteworthy that clinical end users indicate to be involved in any step of the process in just two of five cases. What is interesting to see is that, according to the interpretation of the text and table of Hinrichs *et al.* (2013), there seems to be a negative relation between power and interest, in which interest is closely related to proximity to the actual care process.

According to Madhlambudzi and Papanagnou (2019) stakeholder model, involvement can be defined in four measures: power, legitimacy, urgency and proximity. Within those four measures they discussed the positioning of actors formally involved in the decision making process of diagnostic equipment in UK hospitals. From this analysis we interpreted a PIA diagram as shown in 3.2 (Madhlambudzi and Papanagnou, 2019). Surprisingly, it can be seen that occasionally key stakeholders, such as biomedical department, BD, is left out completely.

Applying the four measures of Madhlambudzi and Papanagnou (2019) to the clinical end users of Hinrichs *et al.* (2013), a clinical end user scores high on three out of four measures and is crucial in the selection process of new equipment. According to the interpretation of the analysis of Madhlambudzi and Papanagnou (2019) the laboratory department (similar to clinical end users in Hinrichs *et al.* (2013)) is placed significantly higher in the PIA diagram. As both are UK studies and both are fairly recent, the discrepancy emphasizes the importance of clear definition of results. Potentially the landscape has changed in the six years between the two studies or the focus was divergent. However, it is not clear whether results are missing or actors are truly not involved in the indicated tasks.

3.1.2. ACTOR INTERACTION

Proper identification of stakeholders and their tasks is essential to create insight in the decision making process of HT procurement, however, stakeholder interaction is often lacking in current analyses. Failing to identify key stakeholders and truly involving them in the process can lead to unsatisfactory procurement and loss of means (Madhlambudzi and Papanagnou, 2019).

Besides, actors not always know the formal hierarchy of the hospital. Among clinicians often uncertainty exists about who the medical device coordinator is and it is unclear who is involved in deciding about new equipment (Hinrichs *et al.*, 2013). Also, stakeholders are not always aware of guidelines aiding decision making and sometimes procurement decisions are made without proper consultation of the end users. Because of a lack of understanding between departments, sub-optimal decisions are made, often just based on lowest

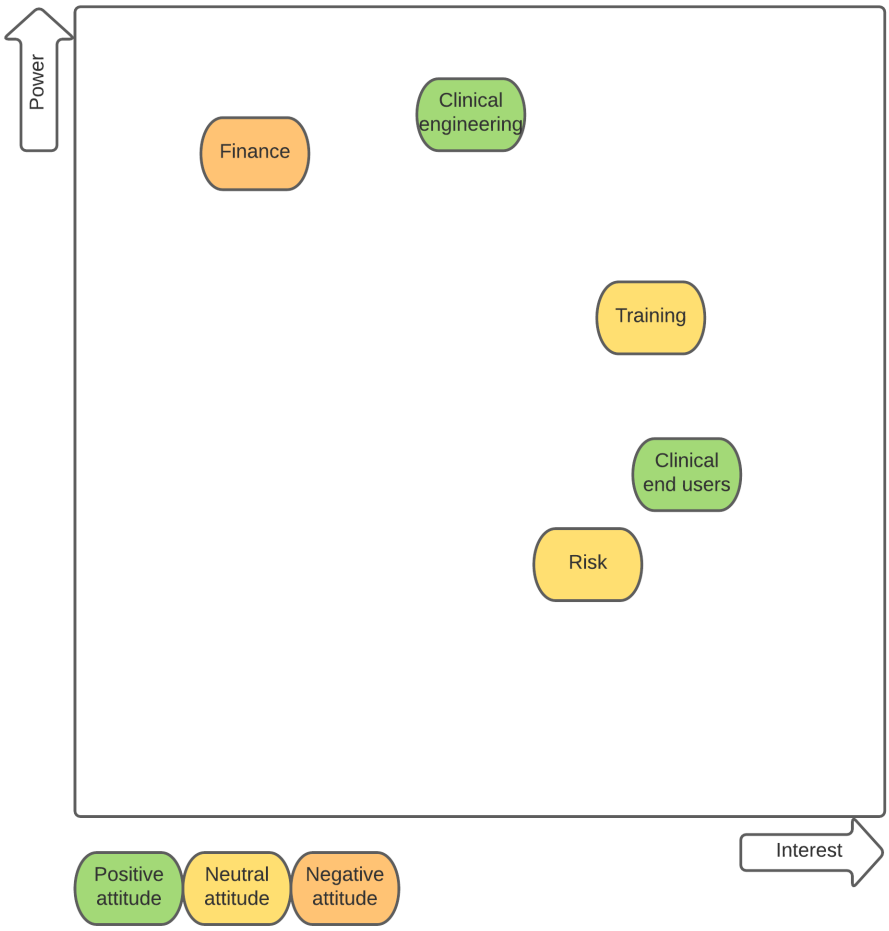

Figure 3.1: PIA diagram interpreted from Hinrichs *et al.* (2013). Clinical engineering was involved in all selected steps. Training was not always consulted upon device purchase. Clinical end users set requirements but not always met. Risk was sometimes not involved at all.

price. This can cause restraint in using devices because of quality or functional shortcomings. More collaboration between management, procurement departments and clinical users would improve performance and safety (Hinrichs *et al.*, 2013).

3.2. GUIDELINES & EXTERNAL INFLUENCES

Political pressures are proven to be of significant influence to the decision making process and therefore can affect effectiveness (Bastani *et al.*, 2020). Lack of policy concerning health technology procurement can create friction between major stakeholders as providers tend to show opportunistic pricing behaviour (Bastani *et al.*, 2020).

Before elaborating on guidelines concerning HT procurement around the world it is important to notice that we assume that often strict guidelines enhance safety and secures certain quality prerequisites, ensures fair competition through tenders and regulated processes, and are the foundation of a smooth and efficiently operating process. But only often. Sometimes technical personnel or physicians have valid reasons to demand a certain decision, product, functionality or quality which cannot be reproduced by following only the guidelines. It is always important to abide to sheer sense of intelligence and keep thinking. Stakeholders and especially end-users and technical or estate managements input should be considered and assessed on its reasonableness (Madhlambudzi and Papanagnou, 2019).

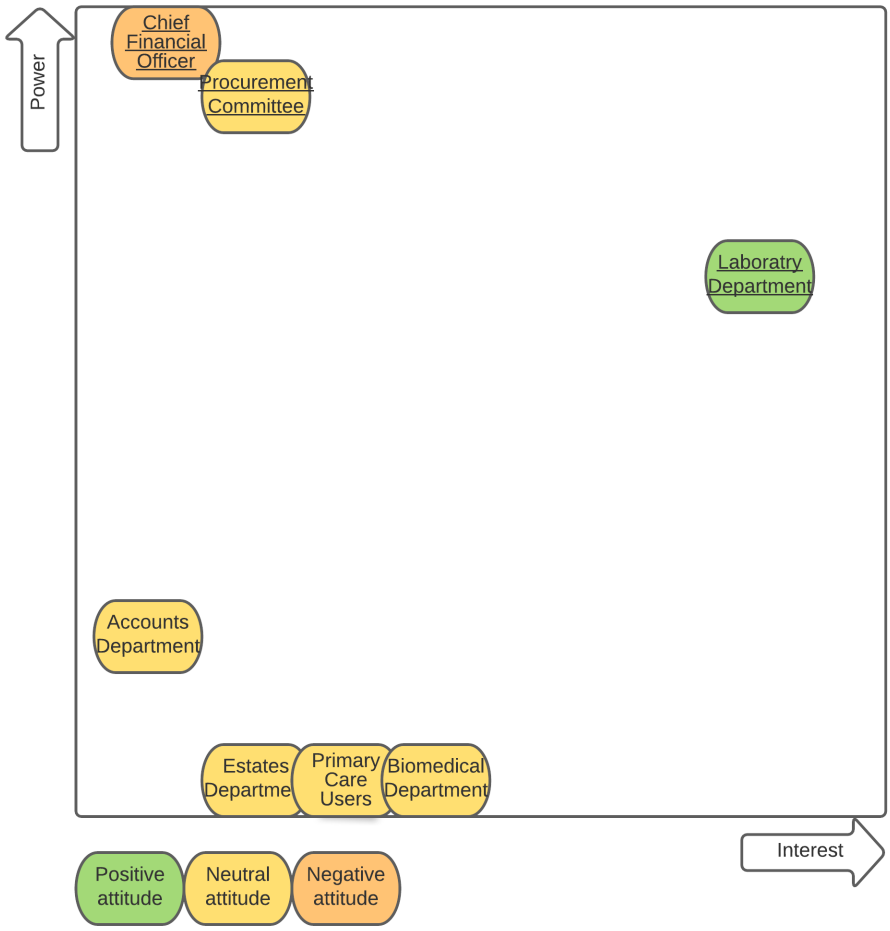

Figure 3.2: PIA diagram interpreted from Madhlambudzi and Papanagnou (2019). Diagram own creation of author.
CFO can block the process financially. PC can block the process procedurally. LD are the main users, specify requirements/supplier. AD notifies end-lease. BD determines best use of eequipment, risk mis buys. Ignoring ED leads to delay, costs. PCU is not relevant in scope of large equipment.

Financing In many countries healthcare is (partially) state funded and as costs of healthcare and the share of medical technology is increasing, policy makers increasingly involve in regulating expenditure. Several European countries make use of case-mix, diagnostic-related groups-based systems (diagnose- behandelcombinaties) to fund hospitals. Although volume caps are applicable in most countries to restrict technological investments, most countries allow additional payments to enable investments in new, high cost technologies (Sorenson and Kanavos, 2011). Hypothetically this gives insurance companies large influence as they are effectively financing the hospitals.

Targeted Innovation Funding Australia's state of Queensland developed a funding program to evaluate new technologies and improve effectiveness and efficiency for healthcare institutions. The New Technology Funding Evaluation Program (NTFEP) is part of a governmental body and instead of solely regulating medical equipment by enforcing safety standards, they provide means to assess promising new technologies in an early stage. This program has proven to be effective as it enables the state wide adoption of technologies initially only intended for specialist use when proven useful and, most importantly, it contributes to the identification of ineffective technologies in an early stage. Healthcare institutions often lack the opportunity to extensively test and evaluate equipment before purchasing and sometimes only learn their true applicability after investing. Millions of dollars can be saved and patient outcomes can be improved if healthcare institutions are protected from bad procurement (Mundy *et al.*, 2019).

A clear demonstration of the importance of the evaluation of new technologies turns up in Russia. The regulation of innovation is to such an extent inefficient that Shishkin and Zasimova (2018) wrote a paper on the Russian practice of adopting innovation starting with: "The adoption of new medical technologies is a complex process which often generates losses in efficiency...". (Shishkin and Zasimova, 2018). In Russia high tech equipment in hospitals strongly relates to prestige and is used to attract patients, physicians and to gain more privileges. Hospitals can request technology at the government and have no further voice in specific requirements. Regardless of who finances equipment, governmental approval is necessary for every high investment purchase and no health technology assessment is performed at all. Because of this policy structure initial costs play a disproportional role in procurement, either to keep investment costs below the legal minimum to get governmental approval or because funding only considers purchasing costs of the technology itself and not how to further integrate it in the hospital. This causes an environment with many costly technologies which cannot be used properly (or even at all in 30-40% of purchases) or which cannot be repaired due to expensive replacement parts (Shishkin and Zasimova, 2018).

Inefficiencies in adopting innovation such as described above can be solved however. Communication between different departments will always be a key factor in optimizing healthcare supporting processes (Hinrichs *et al.*, 2013; Sorenson and Kanavos, 2011). Though when systems have difficulty living up to this for any reason, innovation can be assessed in a decision framework. Smart Innovation is such a framework developed in the US but is promising for applications elsewhere. Initially is was developed to counteract the increasing health costs of which a large contribution comes from health technologies. It describes a standardized way of assessing new technologies and evaluating their effectiveness in target hospitals. Although sometimes inefficiencies arise from other causes than lack of knowledge in the hospital (such as absence of decisive authority), an independent party performing the reviews could assist in establishing power against corruption or prestige actions from either government bodies or hospital workers (Landaas *et al.*, 2020).

In fostering innovation of healthcare technology it is important to pay due attention to the balance between innovation by market forces and safety. A number of countries wield a list of allowed devices to be used in healthcare. This is an effective way to safeguard a certain degree of safety of a nations healthcare system and protects healthcare providers from severe bad buys. However, the is a discrepancy between the speed of innovation and the speed of some governments (Sorenson and Kanavos, 2011). When such lists are not updated frequently, target prices are outdated and new, potentially life saving, innovations are ruled out of competing.

Centralization vs Decentralization Integration and differentiation, or centralization and decentralization, affect the organizational structure of hospitals and can be enforced from above by authorities or implemented from below by joining forces. In a centralized purchasing system one entity is responsible for procurement decision making whereas in a decentralized system all hospitals arrange their own procurement. The degree of centralization offering highest effectiveness for hospitals regarding procurement of equipment is highly dependent on the broader system it operates in. In general buying in smaller quantities leads to less favorable negotiating positions and higher piece prices. On the other hand, decentralization creates the possibilities to pursue highly specific requirements and procure only the most effective solutions (Jenoui and Abouabdellah, 2018). Sorenson and Kanavos (2011) found significant variation in prices, even within countries, as a result of favorable and less favorable negotiation positions due to disparate interference of government bodies, who generally benefit the side of the buyer (Sorenson and Kanavos, 2011).

Research argues for differentiation in the process of high tech medical equipment procurement (Bastani *et al.*, 2020). In the years around 2000 in Europe there was a general trend of decentralization of procurement processes across countries which caused increased fragmentation and subsequently initiated a trend towards centralization again. In most countries studied by Sorenson and Kanavos (2011) a public tender process is required to create fair competition between vendors.

It seems that although centralization usually increases scale and presumably bundles forces to create a strong negotiating position, buyers of medical equipment are often still no match for sellers. A way to reach combined forces without general centralization are purchasing groups which either operate top-down or bottom-up, respectively binding or voluntary.

Hospital based health technology assessment Apart from a national or international health technology assessment, hospital based HTA (HBHTA) is also promising for better decision making for specific hospitals. The earlier mentioned Smart Innovation from Landaas *et al.* (2020) is a proven example of this. Health technology assessment is an interdisciplinary approach to the value of medical devices. Acknowledging not only

medical implications but also social, ethical, economical and other feasibilities. Also in Europe the motion for HBHTA is increasing. In France, several hospitals implemented such a HBHTA and proved its use once again (Billaux *et al.*, 2016). Billaux *et al.* (2016) do however address the importance of who performs such an assessment. They published a study dedicated to the views form different health equipment users, of which (in France) only one professional is responsible for device management. They found several fundamental differences in perception such as reducing the length of hospital stay and financial consequences which were considered by hospital pharmacists but not by physicians and surgeons. Also they emphasize the importance of awareness of conflict management and specific interactions, particularly those between physicians and the medical device industry (Billaux *et al.*, 2016).

This conflict is emphasized by the results from Callea *et al.* (2017). In an Italian study investigating the impact of regional and HBHTA's on the procurement process of medical devices they conclude that HBHTA mainly effectuates cost containment instead of supporting an effective procurement process as a policy instrument (Callea *et al.*, 2017). Influence from HBHTA is generally still found to be limited. However, suggestions to increase the efficacy of the instrument are promising. Elevating to a system level and cooperation between HT manufacturing industry and hospitals potentially provides improved insight in clinical- and cost-effectiveness of technologies (Hatz *et al.*, 2017; Callea *et al.*, 2017).

3.3. PROCESSES

The following section elaborates on different phases involved in purchasing medical equipment. Bastani *et al.* (2020) distinguish five questions representing processes: what to buy, from whom to buy, for whom to buy, at what price to buy and what mechanism to buy (Bastani *et al.*, 2020). Although not all studies work by the same definitions, this framework seems representative for the purchasing process and even more so it shows clearly when for whatever reason one of the phases cannot be performed. For example, from Shishkin and Zasimova (2018) appears that the adoption of new technologies leads to severe inefficiencies in the health system. When this situation is laid against the 5 phase framework of Bastani *et al.* (2020), one sees that health care institutions often lack the legal ability to decide on what to buy and from whom to buy, and at what price to buy is strongly affected by whether or not funding is received. In figure 3.3 below an interpretation of the study of Madhlambudzi and Papanagnou (2019) is shown in the form of a Business Process Model and Notation diagram[2]. For practical purposes only the decision making process is modeled and the following processes such as placement and training are left out. In the model can be seen that the five steps defined by Bastani *et al.* (2020) are performed by three actors which is in line with the PIA diagram from figure 3.2. Multiple ways of performing the steps within the procurement process exist. Below several practices are discussed.

Purchasing frameworks Several purchasing frameworks have been described in the literature. One model actively taught in an established Dutch procurement organisation is the so called race car model described by Veeke and Gunning (1993). The race car model describes six steps in procurement which are: specification, selection, contracting, ordering, monitoring, and, aftercare. Those steps are surrounded by several sideline activities such as keeping track of performance indicators and are subordinate to organisation policy and procurement policy as shown in 3.4.

The race car model is however general. The WHO describes a model more focused on procurement within the healthcare environment. This model includes technology assessment and device evaluation and pays more attention to installation (WHO, 2011). The complete flow chart produced by the WHO can be found in 3.5. Apart from the fact that the WHO model is, needless to say, more specialized towards procurement within the healthcare system, a notable difference is the order and structure regarding financial planning. The race car model describes a structure in which purchasing policy is enforced, in the diagram, literally from above. Purchasing policy is established outside the project team and also sets the financial frames to operate in. The WHO model meanwhile wields a structure in which "Funding and budget analysis" is performed only in the third step, after technology assessment and device evaluation.

Decision Parameters The simplest method of deciding on which device to purchase is to assess individual parameters and decide accordingly. A questionnaire performed by Hospodková and Vochyánová (2019), including 21 healthcare facilities found that, in order, device price, technical specification, suppliers service, quality of provided services and brand were the primary parameters to assess.

[2] https://www.bpmn.org

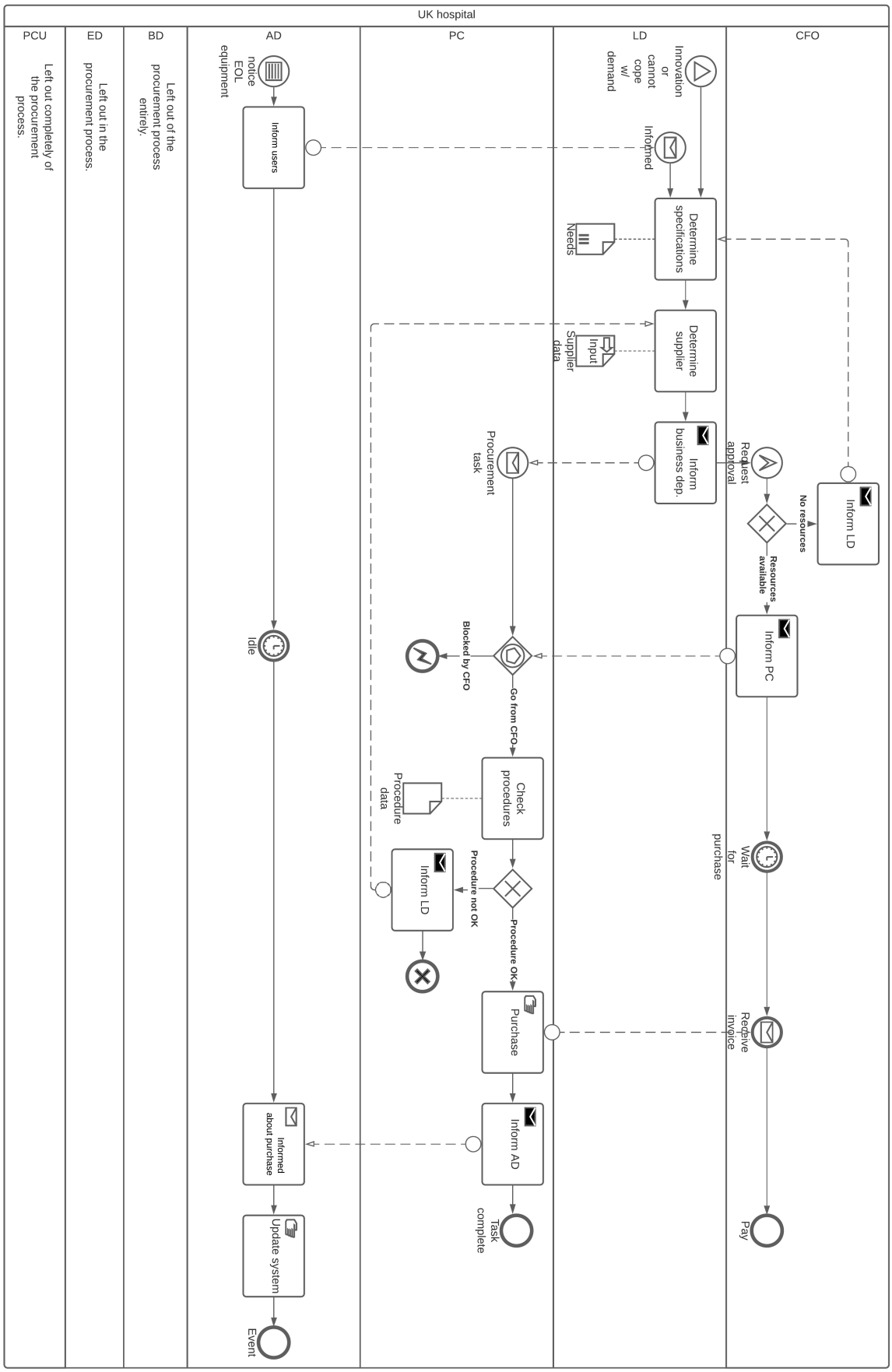

Figure 3.3: BPMN diagram interpreted from Madhlambudzi and Papanagnou (2019). CFO, chief financial officer; LD, laboratory department; PC, procurement committee; AD, accounts department; BD, biomedical department; ED, estates department; PCU, primary care users. Diagram own creation of author.

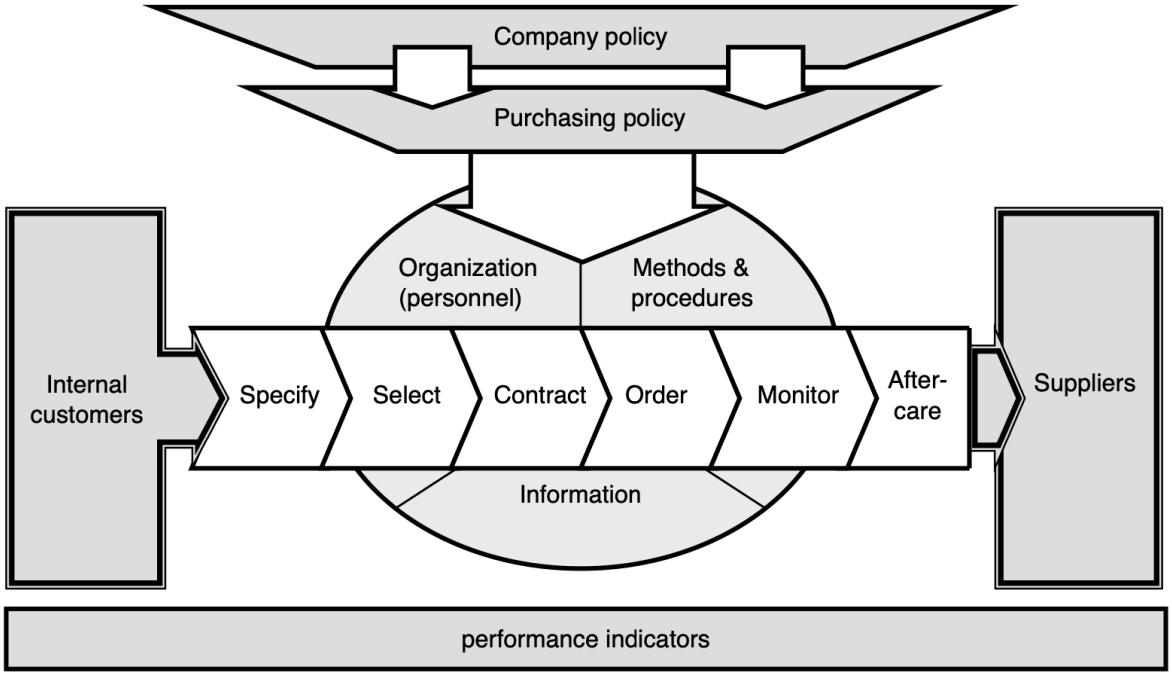

Figure 3.4: Race car model for procurement as presented in Heijboer (2004). Model from Veeke and Gunning (1993) and Lenselink and Telgen (1999)

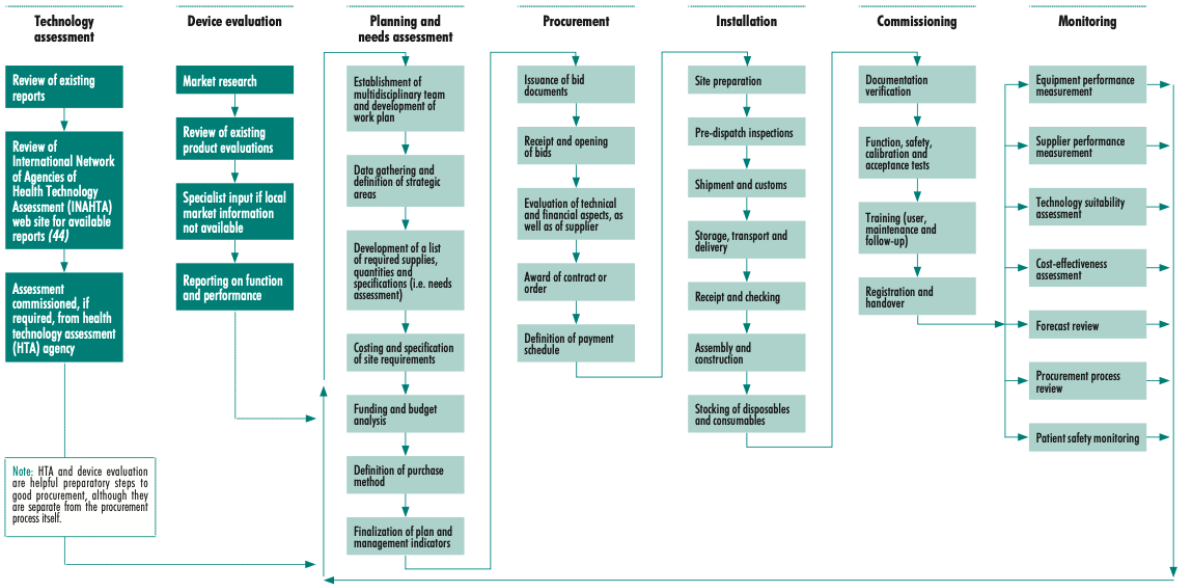

Figure 3.5: Procurement model as presented in WHO (2011).

Although economic parameters are necessary in procuring hospital equipment, they should not be the only deciding factor. In strategic purchasing it is important to pay attention to more parameter types (stewardship and position of the health system, structure, and management of the providers, position of stakeholders, health technology assessment, pricing, and contracting as defined by Bastani *et al.* (2020)). This proves to be a complicated task and it appears likely that inefficiencies could be found in the Netherlands too. Bastani *et al.* (2020) are able to name problems with population health needs, patient empowerment, fragmentation despite decentralization and destructive competition in Denmark, Estonia, France and Germany respectively.

Apart from an initial purchasing price, medical equipment can be contracted with a service agreement. This covers training, maintenance, software and repair. Suppliers usually only get paid after fulfilling contracted work or, which is increasingly popular, based on outcome measures (Madhlambudzi and Papanagnou, 2019). This is a step towards a more value based approach of procurement which will be discussed later.

Technical parameters also play an important role. Ivlev, Vacek, *et al.* (2015) studied multi criteria decision analysis for the selection of MRI machines in Czech republic. They found main magnet system and the gradient system as the most important elements and ease of use and safety as less important. This is in contrary to the findings of Lindgreen *et al.* (2009) where patient comfort is considered important but particularly ease of use or "operator comfort". Interviews with clinicians revealed that the ethos follows the idea that operators need to work with the equipment for long times, daily, and patients need to be at ease but do not come for comfort. The idea is that operating comfort makes clinicians work harder and therefore achieve better which serves the ultimate goal of patient safety (Lindgreen *et al.*, 2009).

Parameter scoring Numerous models exist to compare and digest all parameters and present an optimal choice in a decision process. Literature points out that often no objective standards are maintained for the specification of medical equipment (Girginer *et al.*, 2008). Ivlev, Kneppo, *et al.* (2014) studied different multi criteria decision analysis methods and concluded that analytic hierarchy process (AHP) is the most effective method for use in the purchasing process of medical equipment. It comes closest to the human intuitive process of decision making, although still missing important aspects such as expert competence (Ivlev, Kneppo, *et al.*, 2014). AHP could prove useful in the process of formalizing parameter scoring in HT procurement (Girginer *et al.*, 2008; Santos and Garcia, 2010).

Total Cost of Ownership Total cost of ownership (TCO) is a way of calculating the overall costs of a device over a determined amount of time and is most effective in the procurement of large investment equipment. As most medical equipment lasts for an extended amount of time, often longer than 5 years, procurement costs only represent a small portion of the total costs. Professionals involved in medical device procurement judge TCO a useful method to assess medical devices before purchasing, cut costs and improve efficiency. Apart from procurement costs, Cost of Acquisition, TCO is composed of Cost of Commissioning, Cost of Operation, Cost of Maintenance, Cost of Production and Removal and Disposal cost. According to a study performed by Hospodková and Vochyánová (2019) in the Czech Republic based on 21 hospitals, the initial investment for acquiring equipment ranged from 17% to 46%. Despite the positive reactions to TCO it is rarely used for decision making in the healthcare sector. Many healthcare institutions indicate that decision making is based on procurement costs (Hospodková and Vochyánová, 2019).

TCO is a method frequently used in other sectors and within healthcare has significant potential of increasing efficiency and reducing costs. Equipment with a prolonged lifespan requires maintenance and operating costs. Especially when building a new room or department in a hospital it is crucial to include personnel costs in the balance sheet as those amount to be the highest charge.

Purchasing Groups Many institutions around the world increasingly make use of purchasing groups. Purchasing groups support affiliated organisations in acquiring the desired technologies from a fair supplier and usually for better prices then individual institutions could negotiate. Although several advantages come with purchasing group cooperation, Gaev (2018) addresses the lack of end user involvement in establishing the required product features as one major drawback, resulting in reduced effectiveness of specialized equipment and therefore diminishing efficiency and potentially patient safety. (Gaev, 2018).

3.3.1. BUYER-SUPPLIER RELATIONSHIPS

Buyer supplier relationships are potentially of major influence to the decision making process. The establishment of a buyer-supplier relationship can be a strategical choice potentially benefiting both parties. However, when not managed well, negative effects may arise as well. Abdulsalam and Schneller (2020) describe, among other, opportunistic pricing behaviour and physician-supplier alliances as barriers for effective cooperation. They suggest that increased information sharing would benefit strategic relations between the parties.

Blonska *et al.* (2013) confirm the suggestion that increased information sharing benefits strategic relations for both parties. Relational capital creates a reciprocity in which supplier development induced by the buyer is returned. Without the relational capital benefits for the supplier do not return to the buyer is not obvious.

3.4. THE DUTCH SITUATION

Earlier it was stated that to our best knowledge the Dutch procurement process of healthcare equipment as we study it has not been scientifically documented yet. There is however a great availability of gray literature on the matter. Consultancy reports, government documents and news articles provide insight in what happens and which rules should be followed.

ECORYS (2017) conducted a study to the role of medical technology in the Netherlands and identified the agreement medical technology as field norm for hospital protocols and described the procurement committee as chain director of the procurement process. Gupta (2017) conducted a study to profit in the Dutch health sector. In this study they also described profit in relation to market power of involved actors. Of this power we created an interpretation diagram in the form of a power interest grid. Note that in contrast to other figures in this study, attitude is not added as not enough information was available in the source to produce a reliable visualization of this factor. The main conclusion is that actors farthest away from the end customer, the patient, have highest power in the industry measured on the ability to make profit. The place on the interest axis is also based on the distance to patient care. This diagram creates insight in the position of the hospital, which is where the decision arena is positioned, relative to physicians, and the industry.

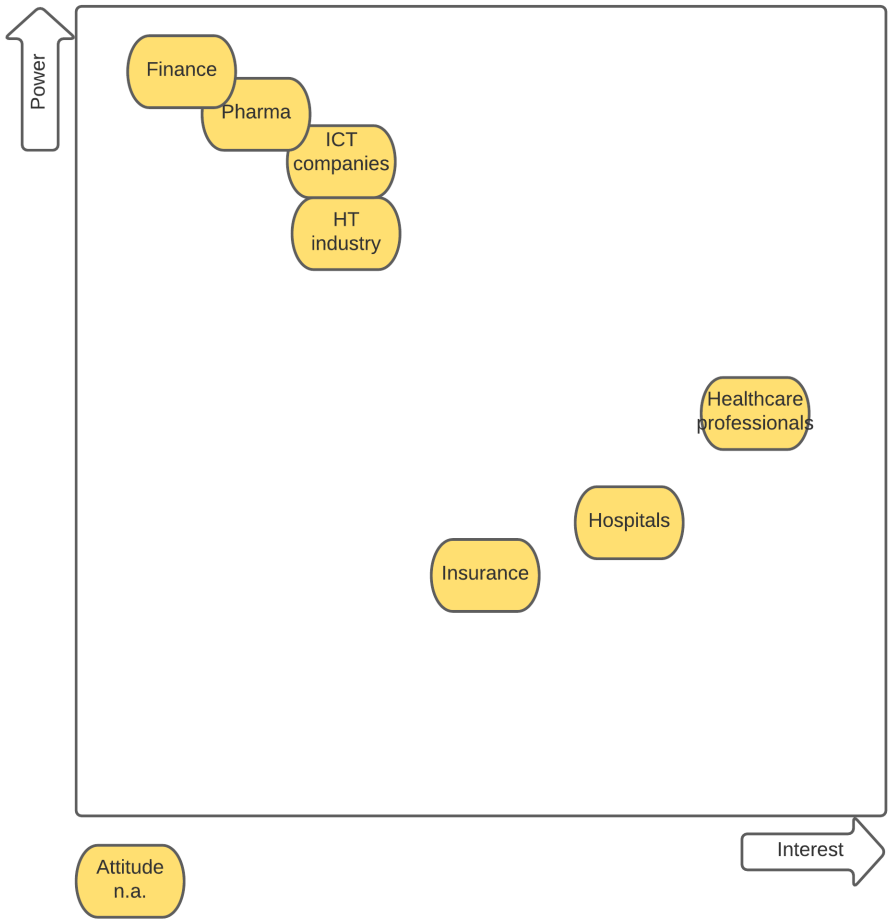

Figure 3.6: PIA diagram interpreted from Gupta (2017)

To understand the internal process of procurement in the hospital it is necessary to understand the environment it is functioning in. The industry is represented by supplying companies, either directly manufacturer or with the intervention of an importer or distributor, and the health care insurance industry. In the actor diagram in figure 3.7 an actor diagram based on the findings of the ECORYS (2017) consultancy report is shown. Here, the role of procurement is identified as the chain director between the internal process and the external relations. This structure is used as a starting point for what happens outside of the hospital.

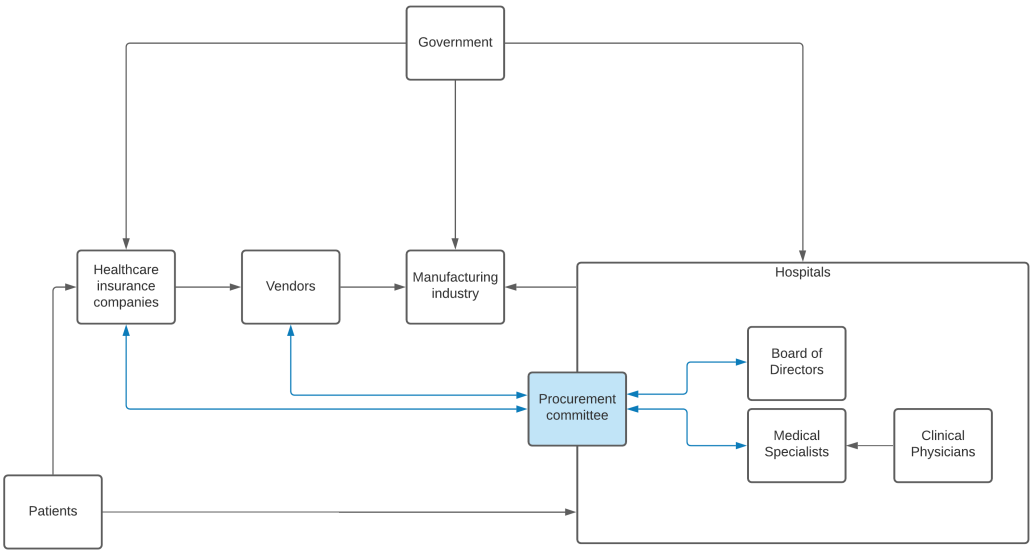

Figure 3.7: Actor diagram interpreted from ECORYS (2017)

3.5. SUMMARY

As stated at the start of this chapter, we aimed to learn about existing literature to create a theoretical framework, to know what to look for, and to be able to specify this research based on existing literature to be able to create perspective to realize maximum relevance. Based on the knowledge gained in the literature review several conclusions about the working of the procurement system have been found.

Literature provided us with a theoretical basis to structure this thesis and adopt several frameworks. First of all three actor types are used to describe and discuss actors throughout this thesis, clinical, operational and business actors. The bundling of the actors within the three types creates opportunity to transfer results to systems with minor differences from an actor and stakeholder perspective. Furthermore, it has been established that adequate collaboration between the three actor types is likely to improve performance and safety.

Scholars have looked in the procurement process of medical devices in hospitals from many perspectives. Different frameworks for procurement have been described but significant overlap can be seen. The differences are self-evident, seen the nature of the specificity of the considered models. Several theories and practices within certain steps of the procurement models been proven successful in supporting an effective procurement process, such as the use of TCO. Meanwhile, on other theories no agreement is established yet, for example HBHTA. However, a clear connection between the three considered areas connected to the procurement process is not laid yet.

4

ACTOR AND STAKEHOLDER INTERACTION

He explained to me with great insistence that every question possessed a power that did not lie in the answer.

Elie Wiesel

4.1. INTRODUCTION

In this chapter the second sub question is addressed: **What is the current decision making process of healthcare equipment procurement in hospitals in the Netherlands in terms of actor and stakeholder interaction?** In the targeted literature review a global idea has been formed about the stakeholders in the decision process of healthcare technology procurement globally. In this chapter, stakeholder involvement of the studied process in the Netherlands is analyzed. Later the global picture will be compared with available documentation of the Dutch HT procurement system and data collected in the interviews. By performing an actor network scan, the main characteristics of the actor network and critical actors are defined.

4.2. ACTOR NETWORK SCAN

In order to identify relevant actors and their interrelations we have to consider them in their respective environment. In chapter 1 we have drawn a system boundary conceptual model. This model was based on intuitive assumptions. In this section we will formalize the system boundaries by defining the decision arena within the system of interest in a formal manner. Within the decision arena, the actors have their roles, interrelations, and act by certain rules. Before we can describe the actors formally, two assumptions will be made. The assumption of rationality means that it is assumed that actors choose their actions with objectives in mind. Actions taken by actors are not taken with full system knowledge. The second assumption is the assumed resource dependence. This describes that actors depend on resources controlled by others. All actors considered in this study are assumed to behave by those two set terms and are therefore considered "strategic actors".

Working by the definition of Cunningham and Hermans (2018) we now want to strictly demarcate the decision arena, which is a social space where strategic actors interact and make decisions in order to influence the system or interest, a part of reality that is of interest to actors as shown in figure 4.1 (Cunningham and Hermans, 2018).

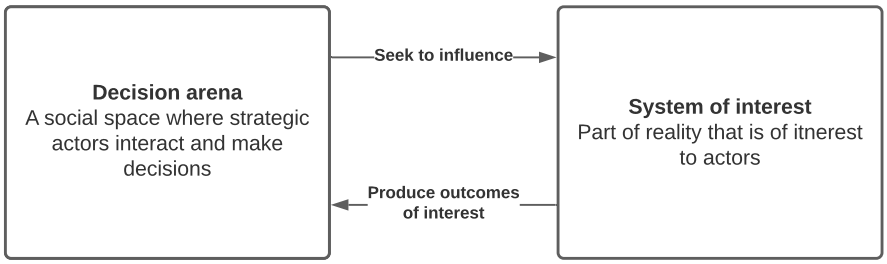

Figure 4.1: Framework for actor and strategy models adapted from Cunningham and Hermans (2018)

4.2.1. MAIN CHARACTERISTICS OF ACTOR NETWORK

The system of interest is everything influencing and influenced by at least one of the actors in relation to the studied process of HT procurement. In figure 4.2 the decision arena of this study is displayed. Figure 4.2 shows the relation as formally identified. In practice more relations exist and all actors can talk to one another when necessary. Also this model is generalized over all participating hospitals.

Figure 4.2 also indicates the representation of actors in this study. The roles hatched red have no direct representation by one to one interviews but are still discussed with other actors and behaviors are extracted from gray literature.

For all the actors three main characteristics can be captured and based on this actor interactions can be explained:

- Values
- Resources
- Perceptions

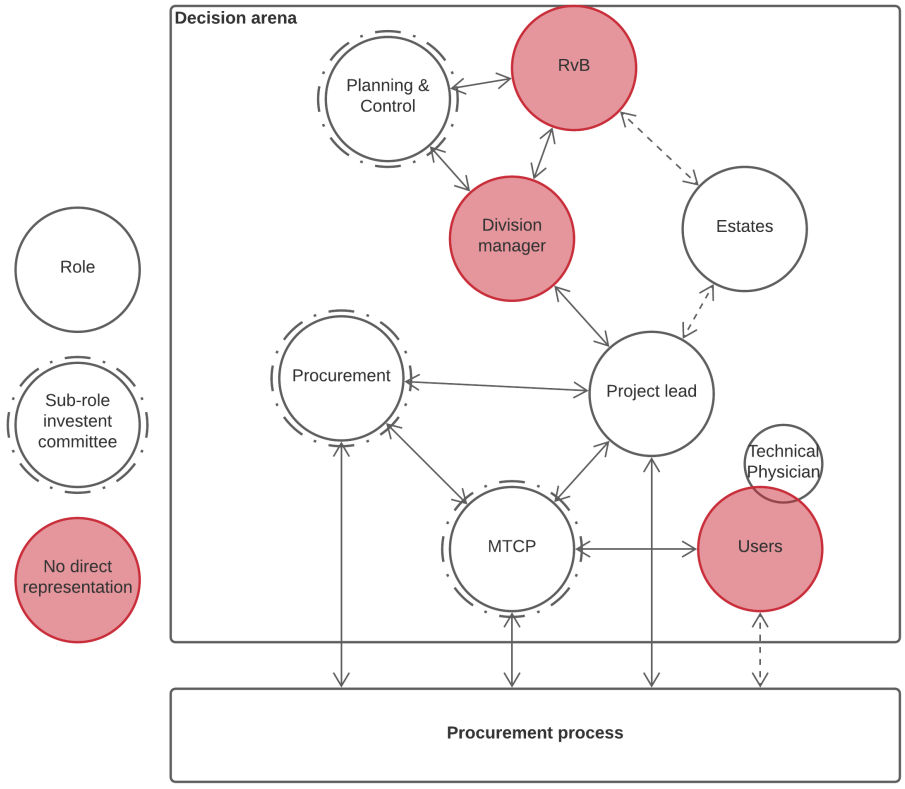

Figure 4.2: Conceptual framework for actor and strategy models. Decision arena showing actors and indicating their involvement in this research. Diagram is generalized for all participating hospitals. Style adapted from Cunningham and Hermans (2018)

The assumption that everyone's goal is to deliver the best care and contribute to the best possible health system performance as stated in chapter 1 still applies. Therefore, in identifying values a lower level of aggregation is chosen in which all values are assumed to contribute to the general goal, at least perceived by the participants. Values can be defined as the specification of goals (Cunningham and Hermans, 2018). In doing this, fifteen values are identified in the interviews:

- Availability equipment,
- Awareness - market,
- Awareness - process,
- Corporate Social Responsibility,
- Decision maker,
- Good contract,
- Objectivity,
- Patient outcome,
- Price/quality,
- Pursue project goal,
- Safety,
- Standardization,

- State of the art,
- Team up physicians, and,
- Value based procurement.

Also, nine resources are identified in the interviews:

- Advise - board,
- Advise - project team,
- Awareness - market,
- Awareness - process,
- Compliance,
- Knowledge - clinical,
- Knowledge - technical,
- Money, and,
- Procurement strategy.

Resources are the practical means which can be used to reach the objective. Resources are not only things like liquidity or time but also knowledge which can be used as leverage for example. Everything which can be used to influence the outcome of the process can be considered a resource (Cunningham and Hermans, 2018). Lastly, 28 perceptions are defined. Perceptions are concepts describing causal beliefs. It helps to understand how the actors think and what their perception of the world is. In appendix B the coded values, resources and perceptions can be found in appendix B and are not elaborated on further in the text as we are at this stage mainly interested in actors values and resources.

Unanimously indicated by the participants is that no project is the same. All participants explained that project groups are ad hoc, specifically specified for every procurement process, depending on the needs. Despite the moldability of the project group there are main actors as shown in the decision arena. Further analysis of the actors is limited to four actors: planning & control, procurement, MTCP and users. Although the project lead fulfills a key role in the process as a connector between operational and business actors as defined in chapter 3, this role is often fulfilled by an unqualified person, and in one case not even fulfilled at all, which obstructs an effective process in several ways. Despite the central role of the project lead, it can be left out as a strategic actor in this analysis as the role is mostly fulfilled by an individual from one of the other roles within the division. The participants were interviewed in the perspective of their original role. Below, the main characteristics of the selected roles are presented briefly.

Planning & Control Planning & Control has two clearly defined resources, advising the board and most importantly, money (4.1). Most hospitals maintain a structure in which division finances are handled decentrally. That is, planning and control defines a year budget for any division in the hospital in consultation with the division manager of the respective division. Hence, the budget within the division is more or less fixed and generally not negotiable after allocation. The investment committee has to watch the spending of the divisions to stay within the set frame. Furthermore planning & control can advise the board from a financial perspective on future directions and investments.

The main value is to increase price quality or to "boost efficiency" (4.2). Participants indicated to try to stimulate divisions and procurement to not pay the list prices and state that when that happens, they budgeted too loosely.

	Clinical end user	MTCP	Planning & Control	Procurement
Advise - board	0	1	1	0
Advise - project team	0	4	0	0
Awareness - market	1	1	0	3
Awareness - process	0	1	0	5
Compliance	0	12	0	1
Knowledge - clinical	1	0	0	0
Knowledge - technical	0	10	0	0
Money	0	6	4	0
Procurement strategy	0	4	0	1

Table 4.1: Resources per role. Results fully based on interviews

Procurement From the interviews, procurement has three main resources to apply, two of which are information based, creating market- and process awareness, and compliance (4.1). Market awareness implies the ability to communicate their strategy to the market, "telling them what is going to be scored on". Participants emphasized that procurement is not the goal but that it is "a means of representing your interests". That way the market can be approached optimally. Meanwhile, process awareness is directed inside the hospital. By defining the tasks, abilities and intentions of procurement as an actor, they create understanding of their value in the hospital. Participants do however indicate that this position has to be defended in some cases. Despite this occasionally suppressed position, compliance creates a foundation for procurement to operate on.

As market- and especially process awareness is not evident in all hospitals, those are not only resources but also goals in most hospitals. By creating more awareness of their value, procurement strategies can be better defined in earlier stages. With early involvement of procurement they can pursue their other values also better. Objectivity, that is a functional based program of requirements, a fair price to quality ratio and a good contract are main values coming forward. Furthermore, the awareness of corporate social responsibility is increasing and is sometimes even captured in contracts already.

Especially in academic hospitals procurement indicates the desire for state of the art equipment, at least a bias to quality as opposed to price. This is in line with values such as availability of equipment and pursuing the project goal. This opposes planning & control trying to defend the budgets:

> in principle, if it has been agreed that we are going to invest this much as a division, this has been determined in the annual discussions with the board of directors and planning and control and a blessing is given to this. In the end, if it's 4 or 4.5 tons, no one is going to oppose anymore, the price is the price. And then the historical budget has not been sufficient, then we will find a way again. - Procurement 2

MTCP MTCP or medical technology and clinical physics is treated as one actor here. It depends on the hospital if MT and CP are derived from separate departments, but they fulfill a similar role.

The main resource of MTCP is its profound technical knowledge. All subcommittees such as for radiation hygiene and for medical substances are left out but consulted ad hoc when necessary for a certain project. Advising the project team and division lead about suitability of equipment and need for replacement gives a strong influence on outcomes. Also compliance supports MTCP as technical accountability is a major topic from regulation and is mostly accounted for by MTCP. Safety laws can be used as an argument to out rule suppliers by setting conditions which exclude untrusted or small suppliers. Partially there is also room to interfere with procurement strategy as this participant describes:

> As an organisation, we have chosen that we as a division earn money by cutting back on contracts and doing more ourselves, in-house knowledge with short lines and a lot of clout, then training is of course also very important for the technicians. - Medical technology 1

This shows that technical knowledge - the ability to maintain equipment - can serve as a direct substitute for money and therefore serves a double role as resource. In line with procurement, objectivity is also for MTCP a major value. Together with objectivity, safety is leading. In many hospitals the legally required safety analysis is accounted for by MTCP or by a committee in which MTCP participates.

	Clinical end user	MTCP	Planning & Control	Procurement
Availability equipment	0	1	0	0
Awareness - market	1	1	0	3
Awareness - process	0	1	0	5
Corporate Social Responsibility	0	1	0	4
Decision maker	0	2	0	1
Good contract	0	1	0	3
Objectivity	0	9	0	1
Patient outcome	0	2	0	2
Price/quality	0	4	2	2
Pursue project goal	0	0	0	1
Safety	1	10	0	0
Standardization	1	2	0	0
State of the art	0	2	0	1
Team up physicians	0	0	0	0
Value based procurement	0	2	0	0

Table 4.2: Values per role. Results fully based on interviews

Clinical end users Clinical end users are the actors who in the end effectively work with the equipment. Regarding their resources, in theory there are few, but in practice resources are strong. Clinical knowledge is something that cannot be left unconsidered in their role in the procurement process. Apart from their clinical knowledge, there is a deep understanding of what is offered on the market. Combining those two resources there is big leverage to pursue their values. Safety and standardization are considered the main values of clinical end users. Safety accommodates patient outcome and standardization is also partly to increase safety.

Double role: investment committee As shown in the conceptual framework in figure 4.1 several roles in the decision arena fulfill a co-role in the investment committee simultaneously. Through this double role the investment committee shares parts of the values and resources of its members. Although it is explicitly indicated that participants are aware of the differing nature of the role, the base of their respective roles in the investment committee is from their original position. So someone from MTCP is effectively there to indicate technical conditions and necessities and limits theirselve to this. Someone from planning & control represents their role to pursue financial efficiency.

In figures 4.3 and 4.4 complete diagrams of values and resources including all participating roles are presented.

4.2.2. ACTOR INTERACTION MODEL

Several ways of modelling actor interaction for strategic actors as defined earlier in this chapter. Following the actor network scan the main characteristics of the involved actors have been described. Here we learned that most values are in line with one another, but several are opposing each other. Besides, there is strong resource dependence between different actors. Figure 4.5 is constructed mainly based on interviews with participants representing academic hospitals but applies to general hospitals too.

As can be seen in the figure, the project manager is of extreme importance in their role of connecting people involved in the project. As indicated, the project manager could be a delegate from the business office of the involved division. Procurement, which is strict in compliance by the nature of its role, sometimes demands this arguing that the business office wants to initiate a process in order to achieve their goal, they are responsible for managing the process. However, in many cases a project manager is lacking or even completely absent. Most hospitals indicate that the effectiveness of the entire project is dependant on who is fulfilling the project manager role. Despite the importance of this role, perceptions about this person appear to be the most scattered. In many occurrences the project manager is not from business office but a delegate from an operational or even clinical role. There is no consensus about who should fulfill this role and often competences are lacking.

External project managers are hired rarely. Although the right competences have the potential to save time and money and increase quality, external managers are often not even considered. Also full time project managers employed by the hospital are exceptional.

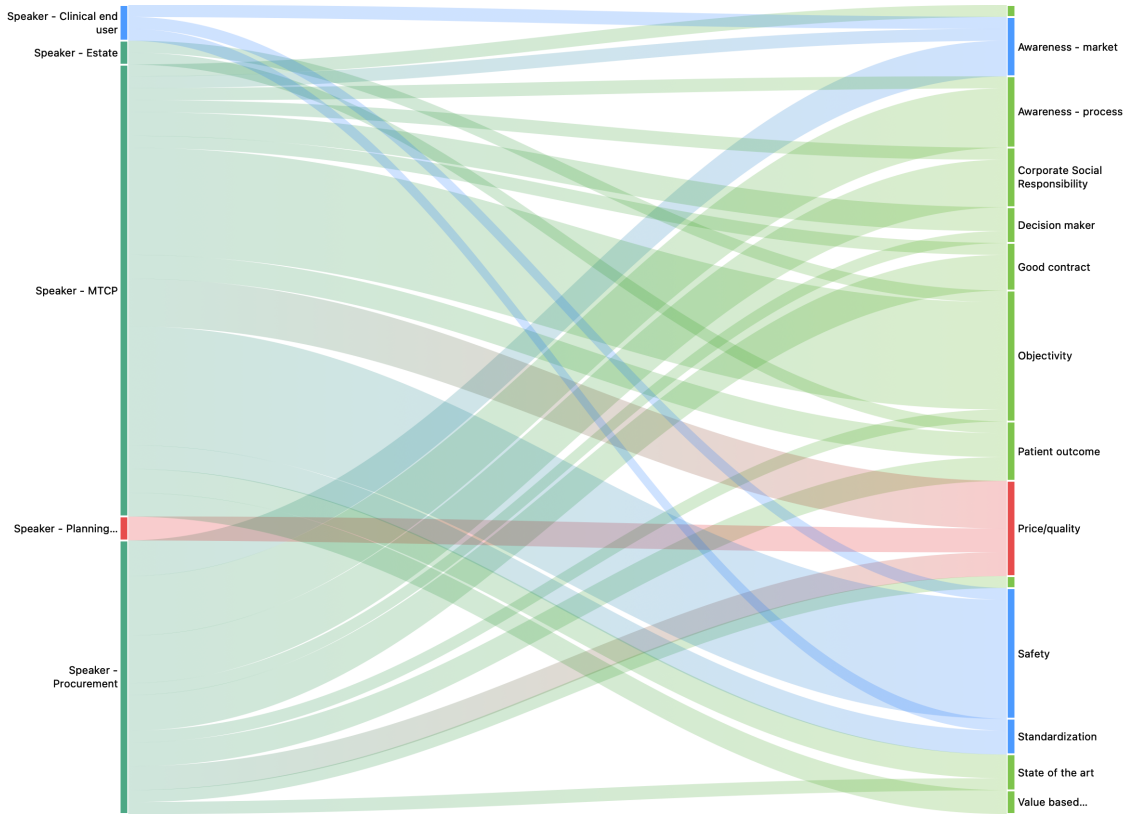

Figure 4.3: Sankey diagram of critical participants values. Only interview data, results may be skewed.

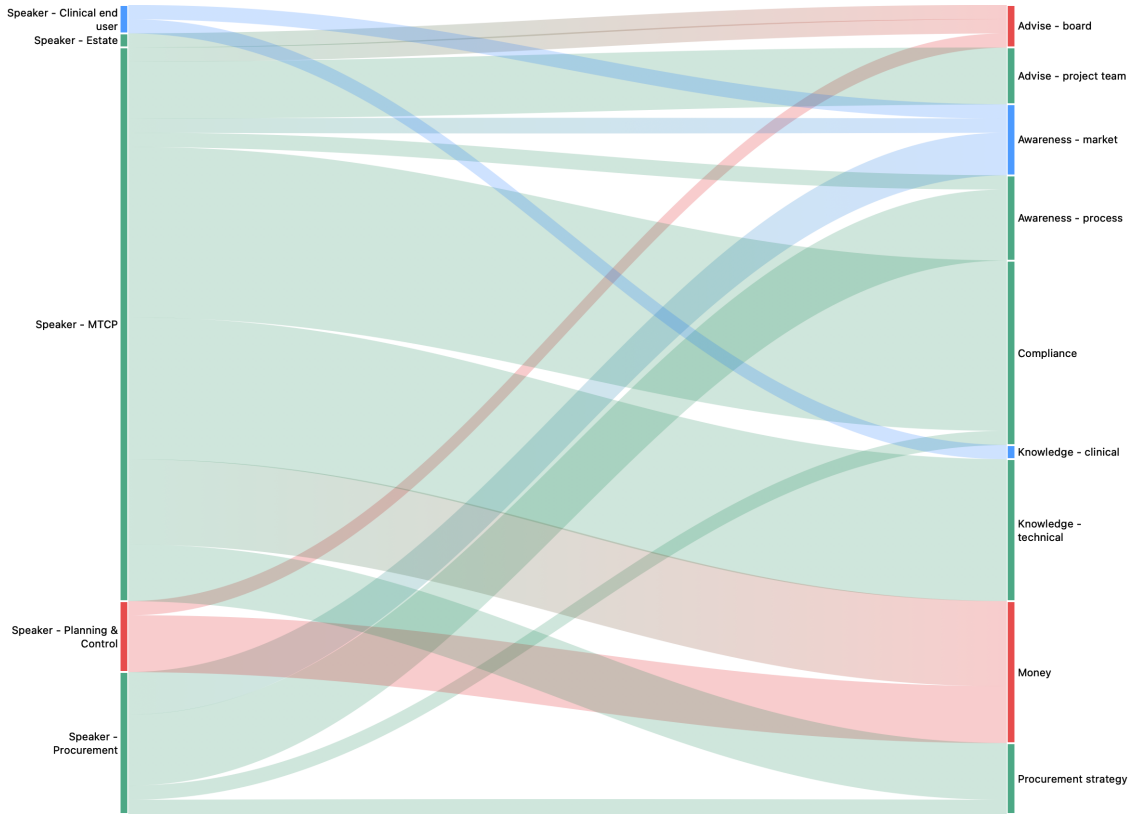

Figure 4.4: Sankey diagram of critical participants resources. Only interview data, results may be skewed.

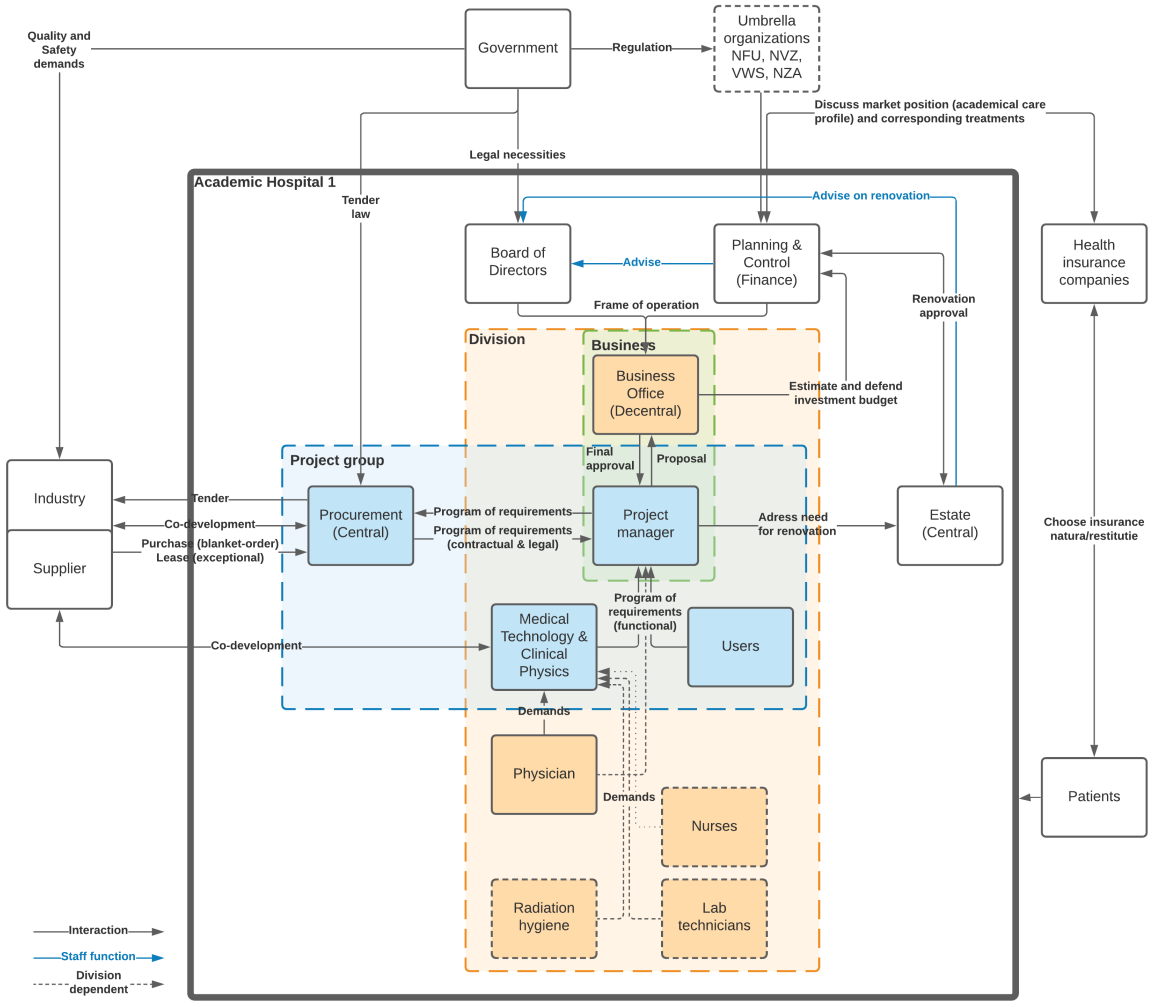

Figure 4.5: Actor diagram displaying actor interactions in Dutch academical hospitals. Differences between hospitals apply

Procurement is crucial as they fulfill a semi role of compliance officers. Regardless of formal roles in specific hospitals, procurement ends up in this role as they are responsible for the actual publishing of either the European tender or RfP/RfI. Before publishing there needs to be certainty that the required regulations have been followed. Although procurement is mostly seen as an implementative role, compliance gives them some power. Despite this, procurement is occasionally involved in a late stage of the procurement process, complicating their task and diminishing their negotiation power. Their role in the process will be discussed in more detail in chapter 6. In terms of actor interaction procurement indicates to feel like an uninvited guest because of their compliance demands. A good established relationship and understanding with other stakeholders is suggested.

As shown in the diagram users are indicated to be either part of the project group, or channel their demands through MTCP. Some hospitals indicate to involve clinical end users in the project group but it is also common that MTCP gauges the demands of users and specifies them with the functional and technical requirements in the program of requirements. Since the introduction of the agreement medical technology, MTCP's responsibility increased which raised their power through compliance. The influence of the agreement medical technology on their role will further be discussed in chapter 5.

Partly independent of the internal structure of the hospital, clinical end users' dominance in the process is reproduced well. Participants indicated that when the doctor wants something, even if everyone else disapproves, they can get it from the board of directors and no one can oppose because of the unique clinical knowledge of doctors.

4.3. ANALYSIS

4.3.1. PERCEPTIONS CONFLICT

Based on the interviews several generalized models have been produced. Refer back to figure 4.5 for the identified actor relations within the procurement process in academic hospitals in an actor diagram.

A clinical physician or medical technologist find themselves in the position of an uninvited guest sometimes. One participant describes:

> *what I find difficult is, as a quality officer or medical technology or clinical physicist you are, so to speak, on your own. The users just want to run production, they just want to continue and you are then seen as a kind of extra burden that has little added value. And adjusting the policy is also said by management; yes, fine, let's do it. But when push comes to shove, we offer the input and it is up to them to get it further in the organization and that is where it sometimes stops. It goes step by step but sometimes you have the idea that you are pulling a dead horse a bit.* - Clinical Physician 7

As shown in the decision arena, several actors serve a double role, apart from their main function they fulfill their part in an investment committee. This may lead to changing values during the process. It happens that fulfilling different roles, an individual is taken along early in the process and later, fulfilling a different role, can still reject a project as indicated by one participant:

> *But at a certain point you get that we change hats from thinking along to advising the board of directors and then you get a different role. It is sometimes seen as difficult by departments that we have to take on a different role at a given moment. That they say in advance okay we took you along and with that we think it is good, and then we can come to a different decision.* - Finance 1

This can also be seen in the sankey in figure 4.4 where MTCP has a significant stream towards money as a resource. However, there exists a resource dependency. Investment committees can only fund money to projects when they got it from planning and control in the first place. Taking figure 4.3 next to this, a conflict becomes visible. Although members of the investment committee share values of Planning Control, there is a value conflict. Procurement and MTCP, as members of the investment committee, handle multiple values next to each other whereas Planning Control solely defends financial efficiency (coded as price/quality).

4.3.2. RESOURCE DEPENDENCY

Money Between actors in the decision arena, a strong resource dependency exists. Resource dependence interferes with the formal power of decision makers is the cause of several actions described in chapter 6. The most obvious resource, of which actors are dependant, is money. As mentioned earlier the sankey in figure 4.4 shows a flow between MTCP and money as a resource. However, this money is only available after it has been

allocated by planning & control. Although planning & control shows willingness to discuss budgets with the separate divisions and indicate to take into account necessities, they receive a multiple-fold of requests and have to divide the yearly investment budget. Next step in the money resource is the investment committee. The investment committee, especially since the introduction of the agreement medical technology, has to approve every investment request as well, while dealing with the budget awarded to invest in technology. The investment committee is responsible for to watch the given budget for a year. They are dealing with the specific requests and assess them on functional, technical, and financial aspects. Only when the request has been approved, money as a resource is available for the project.

Knowledge Not only material resources create dependency between actors. Several types of knowledge also appear to be leading in the actor interaction. The most primary and obvious one is clinical knowledge. Participants describe knowledge as significant leverage for actors to achieve something. Clinical end users have the deepest knowledge about clinical implications of equipment and because of this perception, other actors depend on their fairness in using this resource. Technical knowledge however is also binding but creating less leverage. Radiation experts for example know the boundaries of safe operation of equipment. However, in contrast to clinical knowledge, those are usually limited to technical boundary conditions whereas clinical end users can use more indisputable arguments regarding equipment details. Here it is hard to distinguish between personal preference and factual need for other actors.

4.3.3. POWER

Although attempts can be made at indicating the power and interest of strategic actors, the arena appears to be dynamic and dependant on many conditions. The resource dependencies described above create large power fluctuations of actors. In a general base case actors have different powers but in practice every critical actor included in the diagram has an absolute power to stop the process. This exposes the multi-layered nature of the decision process as touched upon in the introduction in chapter 1. Decisions about technology procurement take place at different levels. Each level maintains their own values but for resources there exists an interdependency.

Every level has its own form of absolute power, although not in every direction and when directions differ, processes experience difficulty. The decision layers can be aggregated to three levels:

1. Year budget
2. Project initiation
3. Specification and selection

On level 1 a yearly budget for a division is set by planning & control, in consultation with the investment committee and the business offices of the respective divisions. This is seen as an absolute power as operational actors are fully resource dependent on the allocated budget to be able to initiate new investments. On level 2 projects are accepted or rejected by the investment committee. The investment committee works within the set frames by planning & control and is only able to accept a fraction of the proposals to stay within budget. The third level represents the final specification and selection process. Many actors are able to voice their requirements and many of them can be binding. Safety standards defended by MTCP for example. Throughout the whole process however there seem to be several loopholes through which power can be exercised too. Clinical end users posses such valuable knowledge as a resource, and interest in the purchased equipment, that high to potentially absolute power is kept on hand. In later chapters 5 and 6 we will discuss how this power originates and effectuates.

4.4. SUMMARY

In the following section the results described in this chapter will be summarized shortly. In the view of actor and stakeholder interaction, the role of the project lead appears most crucial. However, there is often a mismatch between the competencies of individuals fulfilling the role of project lead and competencies actually necessary to lead such a project. Although the assumption is made that all participants intend to contribute to a high functioning health system, which has been confirmed, when perceptions and values are broken down, a slight value conflict becomes visible. Business roles tend to protect the budget more in the perception that this safeguards that the care process can be sustained. Operational roles generally indicate to prefer state of the art equipment and accept unexpected prices easily. Furthermore, despite a value conflict between

business roles and operational roles, the resource dependency between the actor types is in balance. Ad hoc project teams accommodate the necessary amount of flexibility as the projects of this study are commonly deeply specialized. Generally, this brings in the required functional and technical knowledge to carry out the project. Also the double role of operational roles participating in the investment committee provide the necessary technical and functional substance to justify financial decisions. Lastly, the power of most roles is highly variable depending on the situation and phase of the process. A static power interest diagram does not capture the ultimate meaning of the roles participating in this study.

5

EXTERNAL INFLUENCES

Years ago, anthropologist Margaret Mead was asked by a student what she considered to be the first sign of civilization in a culture. The student expected Mead to talk about fishhooks or clay pots or grinding stones.

But no. Mead said that the first sign of civilization in an ancient culture was a femur (thighbone) that had been broken and then healed. Mead explained that in the animal kingdom, if you break your leg, you die. You cannot run from danger, get to the river for a drink or hunt for food. You are meat for prowling beasts. No animal survives a broken leg long enough for the bone to heal.

A broken femur that has healed is evidence that someone has taken time to stay with the one who fell, has bound up the wound, has carried the person to safety and has tended the person through recovery. Helping someone else through difficulty is where civilization starts, Mead said."

We are at our best when we serve others. Be civilized.

Ira Byock

5.1. INTRODUCTION

In this chapter the third sub questions is addressed: What external factors influence the procurement of medical devices for intramural care in the Netherlands? Although the focus of this study is on the intramural decision process of medical device procurement, several external factors influence the outcomes of internal processes. In chapter 2 we formed a system boundary conceptual model which showed already several hypothetical external factors influencing the decision process. In the actor analysis in chapter 4 we have seen that several resources and values have to do with the outside world. We call those environment factors or external influences. We concluded that compliance and market awareness were resources for several actors, and that market awareness on the other hand can also be seen as a value. In this chapter the external factors included in the system boundary conceptual model are tested in relation to analysing the decision process found in Dutch hospitals. Despite the fact that those external factors are considered outside our arena of influence, it is important to be aware of externalities influencing the behavior of actors to be able to understand the studied processes and their consequences.

In chapter 4 the actor diagram in figure 4.5 showed apart from the internal actor network also relations to the environment. External factors are be categorized in two categories: regulation and industry. *Regulation* usually comes from government organs, either European or national, and is captured in binding laws. However, the health care system in the Netherlands is also subject to agreement medical technologys, which will be elaborated on in this chapter as well. Those agreement medical technologys can form an agreement between the government and the healthcare industry, but can also be agreements within the industry itself, usually with the intervention of umbrella organisations.

The *industry* is represented by supplying companies, either directly manufacturer or with the intervention of an importer or distributor, and the health care insurance industry. In the actor diagram in figure 3.7 an actor diagram based on the findings of the ECORYS consultancy report is shown. Here, the role of procurement is identified as the chain director between the internal process and the external relations. In chapter 3 we defined the environment the hospital is functioning in.

5.2. REGULATION

In order to secure safe and fair practice in the Dutch healthcare environment, which operates on the edge of the private and public sector, several legislative acts apply to the procurement process of technology in hospitals. Earlier findings claim the rapid development of medical technology and its increasing presence in the healthcare system. Simultaneously, a growing number of industries become involved in the delivery of healthcare. Because of increasing access to technology, not only on the consuming market but also on the producing one, more companies find the ability produce equipment which was just years to decades ago reserved for top notch technology companies. Also the development of societal openness casts on to the healthcare industry. Companies and hospitals are expected to justify their doings and governments are making a discernible transition back to being a welfare state. In spite of the stripping down of the welfare state in the past ten years, shrinking down to a participation society, the corona crisis gave it a hard push back and the government is expected to protect and serve its citizens [1]. This opening up landscape strengthens the call for controlling mechanisms which not only overlooks the general quality and safety of medical aids, but also creates transparency for healthcare professionals and patients. Recently, several national regulations have been replaced by the European Medical Devices Regulation to create increased standards for safety, transparency and market access. One tool to pursue this transparency is the updated European Databank on Medical Devices (EUDAMED). This is a European database partly accessible to anyone, including patients, manufacturers and healthcare providers.

Below, the most important regulations are discussed and results from the interviews are presented. Figure 5.1 presents a summary of the most dominant regulations mentioned by the participants. The sankey is solely based on the quotes collected from the interviews and presented in appendix and C indicates in green mentions stating that the regulation influences the process, and in orange mentions that the regulation does not influence the process.

[1] Knoop, 18 nov 2020. Retrieved from: https://fd.nl/achtergrond/1363045/na-een-decennium-eigen-verantwoordelijkheid-eerst-is-de-overheid-terug-lze1caQCuBeu

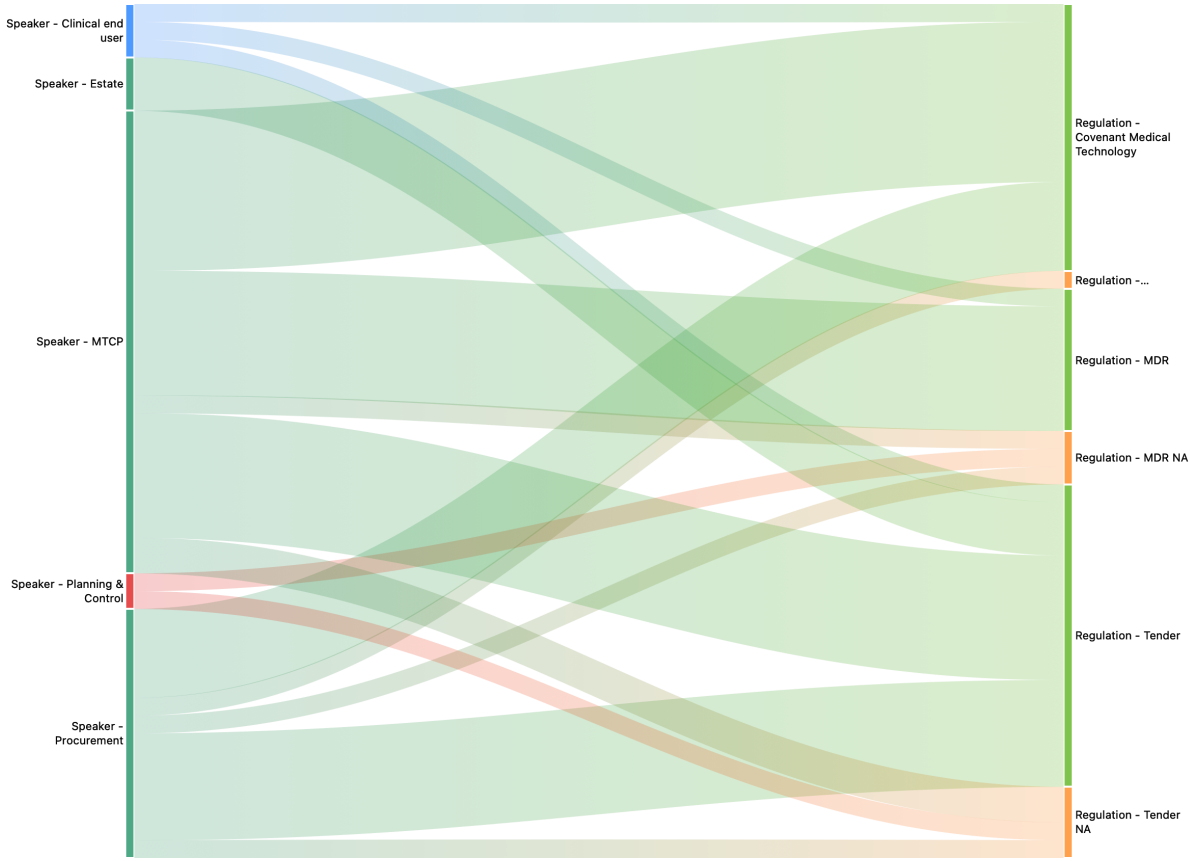

Figure 5.1: Sankey diagram of perceived influence from regulation to the procurement process. On the right hand side, green means a confirming mention, orange is a negating mention.

5.2.1. (EU) 2017/745 MEDICAL DEVICES REGULATION

The Medical Devices Regulation[2] (MDR) is a European act introduced in 2017 and enforced as from the 26th of may 2021 in order to give manufacturers, healthcare institutions and other involved members time to adapt. The MDR is substituting five national acts: medical devices decree, active implants decree, in vitro diagnostics decree, decree on sterilized medical devices in hospitals, and the sterilization companies decree. Compared to earlier applicable legislation in the Netherlands several changes affect manufacturers, importers, distributors and agents. Also personnel of notified bodies might be imposed by stricter qualification requirements. Also medical equipment internally produced in hospitals are subject to stricter requirements[3]. The act is introduced to keep up with the increasing complexity of healthcare and regulate fair international trade in medical devices within the EU[4].

The main focus of the MDR is minimizing risks and increasing clinical safety in the use of medical devices. Because of the nature of a European legislation the MDR is way more compelling than its predecessors. In every way the MDR is stricter, more specific, and has a broader range over equipment, including software. Besides, importers and distributors also need to handle a quality management system.

With the introduction of the MDR manufacturers are required to constantly perform a post-market clinical follow up (PMCF). A PMCF is a procedure in which clinical implications are constantly monitored in order to enhance performance and mitigate risks. This should aid manufacturers in continuous technological, procedural and educational improvements [5]. And when any defects arise, it is clearly defined who is accountable

[2] REGULATION (EU) 2017/745 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2017. Official Journal of the European Union. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0745 on July 9th 2021.

[3] Rijksoverheid. Retrieved from: https://www.rijksoverheid.nl/onderwerpen/medische-hulpmiddelen/nieuwe-wetgeving-medische-hulpmiddelen on may 27th 2021.

[4] Itémedical. Retrieved from: https://www.itemedical.nl/medical-device-regulation/?utm_source=LinkedIn&utm_medium=post&utm_campaign=mdr on may 27th 2021.

[5] Emergo. Retrieved from: https://www.emergobyul.com/resources/post-market-clinical-follow-pmcf-studies-under-eu-mdr on may

and tracability is guaranteed by introducing a unique identification code on every device[6].

Although the MDR is mainly focused towards the manufacturing industry, several aspects of it work out on the internal processes around medical technology too. From the three most mentioned regulations, the MDR is the least represented and has relatively the most mentions of its inapplicability to the procurement process. Registration obligation and duty to report incidents create enforced communication between the health care system and the industry. To be able to comply to the demand of a PMCF manufacturers need to work together with hospitals:

> *Yes manufacturers are getting a bigger role in post market surveillance so they have to see if the product does what it is marketed for. We also try to find each other in this, in cooperation with the manufacturer. To do that properly, they need clinical data. You can't get away with just a log. The device may only be used according to intention for use and it must be properly set up, that is what the CE marking is based on. To guarantee this, to show that things are going well, you need supporting data for this. (...) We will therefore make agreements about how that data will be collected. That's really for a later stage, but that's to be expected.* - Technical Physician 1

Participants indicate that with the introduction of the MDR several documented processes are re-evaluated. However, it appears to be quite a task to effectuate those too. As the following statement from a clinical physician about process adaptation in medical technology indicates:

> *Well you have a post market surveillance and that is an obligation for the suppliers. You have a plan do act cycle terms that you should also use in medical technology, there is a piece of evaluation in it. I do try to ensure that we indeed move towards that a little more, but it is difficult because it is really hard to get through, the added value of that is not often recognized. Then they say: oh yes we did well and we know what went wrong and next time it will be better, in the end it will not go better next time.* - Clinical Physician 7

As discussed in chapter 4, MTCP have a strong focus on safety of equipment. In line with that there is an understanding of the MDR and the corresponding demands and make deliberate choices regarding this regulation:

> *We have chosen not to be regarded as a producer within the framework of the MDR, so we make choices in that regard. We are not going to innovate, adapt to medical technology in such a way that it influences if you are seen as a manufacturer. UMCs do this a little earlier, for example. We do not want to bring this security to ourselves. we don't make things ourselves.* - Medical Technology 1

However, the MDR is also the regulation with the most statements of its inapplicability to the procurement process. Its effect on the process is doubted by several participants and is perceived to be more focused on implants and disposables and most responsibilities regarding the MDR lay at the industries side.

5.2.2. EUDAMED EUROPEAN DATABANK ON MEDICAL DEVICES

As part of the MDR, patients and healthcare professionals are granted access to an international data bank. The European Databank on Medical Devices contains information about medical devices, involved risks and benefits and actual performance since its introduction. To date the data bank was only used for information exchange between EU member states. Transparency is increased by the increased accessibility and patients and healthcare institutions will be able to make more informed choices about their care process [7].

Apart from the required data collection necessary for the data bank, no effects of the introduction of it have been mentioned by the participants.

27th 2021.

[6] Ministerie van Volksgezondheid Welzijn en Sport, Handreiking Medische Hulpmiddelen (no date). Retrieved from: https://www.rijksoverheid.nl/onderwerpen/medische-hulpmiddelen/nieuwe-wetgeving-medische-hulpmiddelen/meer-informatie-nieuwe-medische-hulpmiddelen on May 3rd 2021.

[7] EUDAMED: European Databank on Medical Devices, Ministerie van Volksgezondheid, Wezijn en Sport. Retrieved from: https://www.rijksoverheid.nl/onderwerpen/medische-hulpmiddelen/documenten/publicaties/2018/11/29/eudamed-european-databank-on-medical-devices on July 9th 2021

5.2.3. BWBR0032203 AANBESTEDINGSWET [TENDER LAW]

The tender law applies to the national government, municipalities, provinces and water boards, public law institutions such as universities and schools, and special sector companies, the latter which includes academic hospitals. The law prescribes those bodies to publish a tender for purchases above certain prices. Depending on the amounts, it is a national or European tender. The Dutch tender law is based on the European tender directive. A tender is a construction in which a purchasing body publishes a program of requirements after which the industry has a minimum of 45 days to apply to compete in the tender with their respective solution.

Argumentation concerning the tender law is mixed. Even single participants have mixed feelings about the implications of the law:

> *I also think the tender law is a bit dubious, on the one hand it is very good, for example with ultrasound you can score very good deals by playing parties well against each other and that law also gives the purchasing department a bit more arguments for that, to spend that way. But sometimes, if you already have 10 Siemens ultrasound machines in your department and you are going to buy an 11th, it is really very inconvenient if a Philips comes in between, so that is sometimes a problem.* - Clinical Physician 1

The tender law is a common established law and maintained strictly. Still, the actual performance appears to be debatable. Participants indicate that the despite the law, tender lock in still occurs to a certain extent. Several reasons exist for creating a tender lock in in the program of requirements. Standardization is important in healthcare for safety reasons. Therefore, participants indicate that for this reason a tender is aimed at a certain manufacturer as elaborated on by this participant when discussing the execution of the tender law:

> *If there are already 10 Philips, you want the 11th to be too. This also has to do with patient safety, you have to train and get used to your employees, you can often navigate through the software environment almost blindly, you can no longer operate it so easily, you have to take the induced risk of that procurement law into account. If the 11th becomes a Siemens, the chance that mistakes will be made, for example, increases.* - Medical Technology 2

Apart from standardization, innovation also hinders an open tender process. As also indicated earlier about the MDR, hospitals and manufacturers have several reasons to work together. One of those is performing at the highest possible level of quality and innovation in healthcare. An example of this is given by a technical physician, someone in a role very close to the clinical use of the equipment as well as the technological innovation towards this. They stated that for the design of a new care process in the (academic) hospital, conversations with the predetermined supplier take place to put together the program of requirements which will be published for the tender. Not with the intention to bypass a fair tender but to connect as best as possible to the competences of the future users, who are working with certain equipment in other hospitals already.

> *we had a conversation with [brand] a bit in parallel with drawing up the program of requirements. That's not super objective. (...) there was already a draft of the program of requirements that has already gone through all the people from the committee, the tendering committee, everyone has done their job there, a program of requirements came out that we presented to [brand] in an online meeting in which a few things also ended, these are our wishes and tell us a bit more about your products and software capabilities (...) and yes a dialogue arose about what are our wishes that we could add to the program of requirements and what they can offer (...) so we can align our wishes a bit with their possibilities and then examine the budget to see how far we can get with it.* - Technological Physician 1

Despite those practices around the tender law, many participants, including the previously quoted individuals, also acknowledge the advantages of it. Participants indicate the effect of the tender law on infringement of manufacturers on an effective, functionally oriented process. Assuming the above described situation is not standard, tender law hinders the profitability of industry influence on physicians for example, because the predetermined scoring in the program of requirements makes the award advise binding. The highest ranked solution must be chosen.

General hospitals are not subject to the tender law and indicate to perceive this as a benefit. However, it is also indicated that in some cases the usefulness of a tender is beneficial to such an extent, that is is chosen to execute a tender process voluntarily, also called a commercial tender:

That also provides peace of mind and transparency to the market if you tell me how I am going to do it. It also gives peace of mind if you determine in advance what I will pay attention to, and also the q, how much will I order, so that thinking is self-evident in a European tender and you should actually promote it here. - Procurement 5

For larger procurement processes, we will always invite at least three parties to such a procurement process. It may be that we publish via email, for example, and then say these are our conditions. You could say that it is a tender, but it does not have to meet all the preliminary principles in that law. That gives you a little more freedom. That's nice. We also sometimes use such a tender. We also sometimes put out tenders via Negometrix, for example. We also sometimes publish officially as a kind of tender. - Procurement 4

For a visual representation of participants perception of the tender law, refer to figure 5.1. Although more non-academical hospitals participated than academical, it is observed that more has been said about the applicability of the tender law than inapplicability (suffix NA).

5.2.4. BWBR0008691 MEDEDINGINGSWET [COMPETITION LAW]

The competition law secures the legal right of competing and prohibits the formation of cartels and misuse of economical power. Competition in the Dutch healthcare sector was introduced in 2006 and it does effectuate on the procurement process in hospitals as they are incentivised to increase economic efficiency (Korte, 2012).

In the conducted interviews the competition law was not mentioned as legislation influencing the in-hospital procurement process of medical equipment.

5.2.5. CONVENANT MEDISCHE TECHNOLOGIE [AGREEMENT MEDICAL TECHNOLOGY]

The agreement medical technology is unanimously the most influential piece of regulation on the procurement process in hospitals, according to interviewees. Being just over ten years old and being taken into effect in its most recent version for about five years it is also a fairly recent measure. In contrast to laws, the agreement medical technology does not state specific rules which must be followed and practices which are strictly forbidden. A, agreement medical technology is an agreement between, in this case, the government and the health care industry between themselves. This agreement medical technology is guarded by branch organizations carrying out their own policy making. The agreement medical technology is targeted at the use of medical technology throughout its whole life cycle. In the view of this research, the requirements regarding the implementation of medical technologies is considered, chapter 3 of the agreement medical technology [8]. Here, the agreement medical technology prescribes health care institutions to have established procedures regarding the procurement of technologies, dossier management, replacement, risk analysis and justification for the need of the technology. The whole agreement medical technology can be found (in Dutch) online[9]. All recommendations are established to achieve maximum patient safety and this is recognized by the interview participants.

Our focus is mainly on patient safety. I think this was the underexposed thing before the agreement medical technology. It is good that some speed has been made here. That's what we are for. It is good that we are independent from the purchasing department for quality and safety reasons to provide a little counterbalance to the entire financial system. - Medical Technology 2

What we do have to deal with is the agreement medical technology on the safe application of medical technology, which is important. That we should investigate whether something can also be used safely in our hospital. - Procurement 4

The agreement medical technology is very much focused on quality and content, so that you do not just purchase certain products if you are not sure that they meet the requirements. - Procurement 5

[8] Inspectie gezondheidszorg en jeugd. Retrieved from: https://www.igj.nl/zorgsectoren/medische-technologie/toezicht-op-veilig-gebruik/convenant on may 15th 2021

[9] Convenant medische technologie: https://www.igj.nl/zorgsectoren/medische-technologie/publicaties/convenanten/2016/08/15/veilige-toepassing-van-medische-technologie-in-de-medisch-specialistische-zorg

The most applicable piece of legislation is the agreement medical technology on the safe application of medical technology, which actually states that for all new purchases you must create a product dossier that contains a risk analysis, your program of requirements, your motivation for your purchase and things like that. I think that is the most overarching regulation that we follow. - Clinical Physician 7

5.3. INDUSTRY

External influence from the industry is, in contrast to influence from regulation, more characterized as an interaction. As already indicated in several quotes in the previous section, hospitals and health care industry are dependant on each other. On the one hand this is induced by regulation but as we have seen, also regulated again. Below we examine what participants have said about this. Two kinds of industries are differentiated here, health insurance industry and health technology manufacturing industry.

5.3.1. HEALTH INSURANCE INDUSTRY

Health insurance companies are the main income for hospitals in the Netherlands [10]. As usually "money talks", the insurance industry's influence on healthcare technology procurement is examined here. Although the rational expectation would be that insurance companies do influence where the money goes, their influence appears to be marginal. Most participants indicate that they are not aware of industry influence on the decision arena because of the structure they finance clinical interventions:

I don't know about health insurers, I would be surprised if they say you have to work with Johnson's suture material or you have to work with the ultrasound equipment from Siemens, I can hardly imagine that. They just buy a hip, or open heart surgery. - Procurement 2

One specific case that was mentioned several times in this regard was the introduction of surgery robots. Surgery robots are relatively expensive and provided by a monopolist manufacturer. One participant explained the following:

The influence of health insurers is relatively small in this field. Of course it could be that, of course they have some influence, that is possible with very innovative things. I remember years ago when you had that Da Vinci robot, an surgery robot, quite expensive device. Insurers had an opinion on that, it was an alternative to a laparoscopic procedure, then they said we will not reimburse. Then you saw that they couldn't say that at all, the DBC system is not very suitable for that. they can send a letter very cool telling that they will not reimburse but that is actually not possible at all. Of course you also have several insurers, then 1 can act cool, but the others don't care, so influence is not great. - Procurement 4

Apart from cases like the above, influence from insurers is said to be marginal. The only way of influence which is also acknowledged is volume of production. This does however not influence a procurement process.

5.3.2. HEALTH TECHNOLOGY MANUFACTURING INDUSTRY

The health technology manufacturing industry has to create revenue by selling their product to hospitals. There is a combination of the delicacy of profit in healthcare and the cutting edge technology with a strictly confined sales market. Media create dramatic stories about industry interference and claim unjust influences and transactions to physicians [11] [12].

Based on a report from Gupta Strategists Gupta (2017) a power interest diagram was produced in chapter 2, shown in figure 3.6. Note that in contrast to other figures in this study, attitude is not added as not enough information was available in the source to produce a reliable visualization of this factor. The main conclusion is that actors farthest away from the end customer, the patient, have highest power in the industry measured

[10] Statline: Zorginstellingen; financiën en personeel. Modified on: March 11 2021. Retrieved from: https://opendata.cbs.nl//CBS/nl/dataset/83626NED/table accessed at July 15 2021. Used table can be found in appendix D

[11] Dahl, Ilona. October 7th 2020. Retrieved from: https://www.vpro.nl/argos/lees/onderwerpen/arts-en-industrie/2020/de-schaduwmacht-in-het-ziekenhuis.html on July 15th 2021

[12] Dahl, Ilona. Febuary 22nd 2020. Retrieved from: https://www.vpro.nl/argos/lees/onderwerpen/arts-en-industrie/2020/vreemde-handen-aan-de-operatietafel.html on July 15th 2021

on the ability to make profit. The place on the interest axis is also based on the distance to patient care. This diagram creates insight in the position of the hospital, which is where the decision arena is positioned, relative to physicians, and the industry.

When asking the participants about interference from the industry in the health care technology procurement process, significant disagreement was revealed. Many of the participants indicated that the introduction of the tender law for academic hospitals and the agreement medical technology for other hospitals secures fair competition and laws against bribing are strictly enforced. Although participants indicated several practices when specifically asking for industry interference towards physicians, no more than fair and legal commercial practices were mentioned. One of the participants even brought up a counter example:

> Participant: *I don't think there is really an influence on us and I think that is really very well boarded up, in the past they were allowed to offer a dinner or a candy trip and that is simply not allowed anymore.*
>
> Interviewer: *That doesn't happen anymore?*
>
> Participant: *No. (...) No, I think that we are too small a player in this, I know, of course you can never be 100% sure, but I don't think that somewhere privately between a medical specialist and a Siemens or a Philips once is agreed from hey you will go for us huh. Of course they do try, you will also be invited to the large radiology conferences, where they show the latest gadgets and there is lobbying. (...) We were sometimes invited by a supplier for dinner, also at site visits and such, but that is simply not allowed anymore. When we did go to a number of hospitals with that [project], we also had to pay ourselves. They actually came up with that "we would like to invite you but we are not allowed to because we all have to justify that". I don't believe that there are hidden agreements with us in that.* - Clinical Physician 7

But also the opposite was indicated when asking about the influence from the industry on physicians:

> *Yes. It is very big. they work together, like I said, they can't live without each other. There are entire registers of which doctors work with which companies.* - Procurement 6

This cooperation is necessary for the manufacturing industry as well as for the health care industry. There exists an inter-dependency between them. As mentioned in chapter 4 already, clinical end users provide the necessary clinical knowledge in the procurement process. Also in the development of medical technology this knowledge is crucial. Figure 5.2 displays claims from participants about their beliefs on industry interference on the procurement process. Note that this is based on mentions and therefore nothing can be said about how often interference occurs. Logically, when industry interference was mentioned, more was said about it than when industry interference was denied. This skews the results to positive mentions.

MTCP and procurement reveal mixed beliefs about this interference. Literal quotes can be found in appendix E. Most importantly, the clinical participant indicated strong industry interference by explaining that the program of requirements is composed in consultation with specific manufacturers. Planning & Control is the only participant indicating that there is no industry interference but suggests this has to do with the nature of their function which is not involved in the selection of devices.

Lastly figure 5.3 shows participants statements about industry interference in the procurement process differentiated on hospital type. It is remarkable that there seems to be a clear distinction between academic and non-academic hospitals in respondents statements.

5.4. SUMMARY

Following the analysis, several general observations can be described.

5.4.1. REGULATION

Regarding regulation enacting on the procurement process in the hospital, the tender law and the agreement medical technology are mentioned most dominantly. General hospitals are not subject to the tender law, which is perceived positively. Still, a tender like process and occasionally an official tender is executed in order to create competition and a functional base.

Within the dominant regulation, there is a perceived conflict between standardization and a functional tender, also for general hospitals derived from the agreement medical technology. Standardization is perceived positively as it increases patient safety and improves working comfort for both clinical end users and

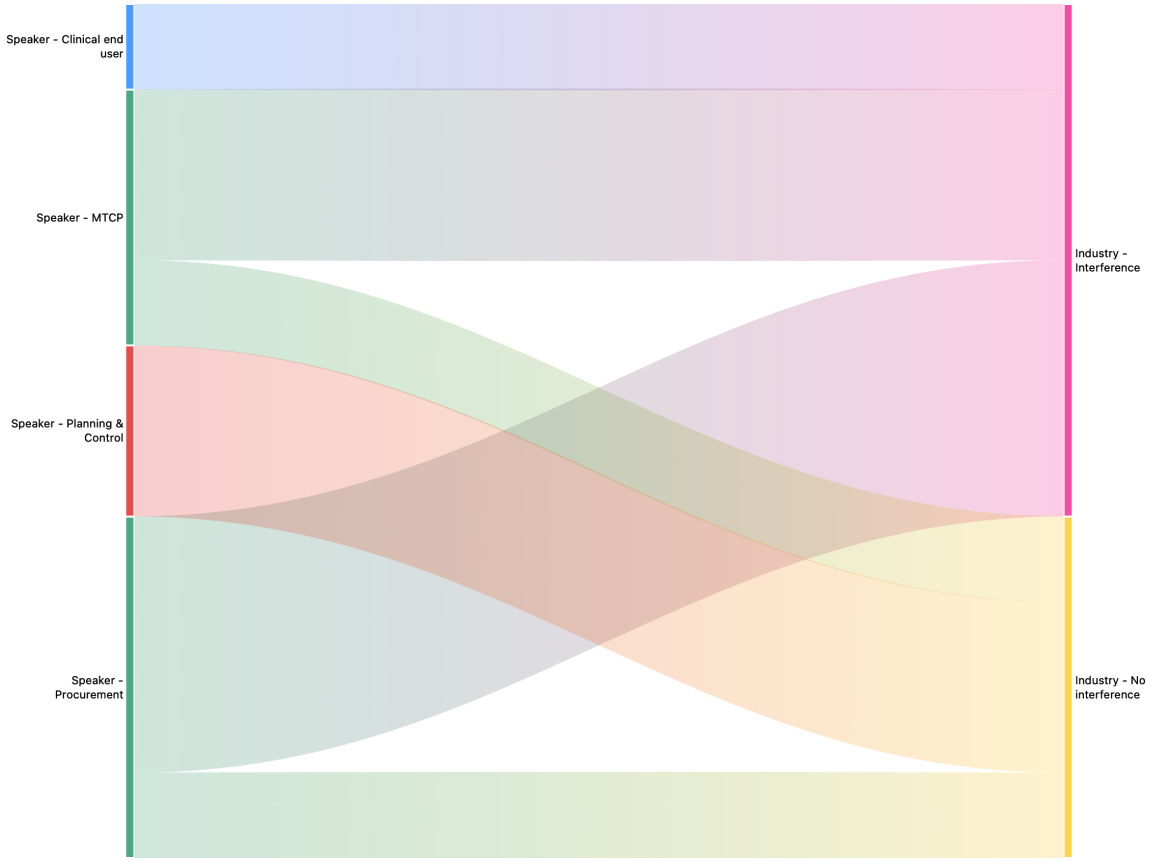

Figure 5.2: Sankey composed from interview results about the influence from industry on the procurement process, differentiated on actor type.

operational staff. Repairs, spare parts and education are easier to manage with increased standardization. On the other hand, the tender law enforces a tender process for every new procurement process in academic hospitals. In general hospitals the agreement medical technology also sends on a functional description and selection of equipment.

5.4.2. INDUSTRY

HEALTH INSURANCE INDUSTRY

No significant interference from the health insurance industry was perceived. This is in conflict with the hypothesis expected in chapter 3, based on the fact that insurance companies finance the hospital. It is however in agreement with the results from Gupta (2017), that there is low power from health insurance companies in the industry. The influence of insurance companies is lower than hypothetically expected. This is likely to be caused by the payment structure from insurance companies to hospitals. In case-mix systems (diagnose-behandelcombinaties) prices are negotiated for specific treatments which are reimbursed. Therefore insurance companies do have influence on whether a treatment is profitable or not but have no direct influence on the technology used. If the hospital decides to purchase a technology and therefore make a loss on a treatment, this is not the insurances' business.

HEALTH TECHNOLOGY MANUFACTURING INDUSTRY

Regarding interference from the healthcare technology manufacturing industry on the procurement processes in hospitals, perceptions conflicted. Many participants downplayed the influence of the industry on the process, arguing that the tender processes out ruled most of the improper interference. On the other end of the spectrum, it became visible that the industry reaches deeply into the hospital. Even in hospitals subject to the tender law, the program of requirements can be composed in cooperation with a manufacturer. Participants indicate that many physicians also maintain contracts with the industry capturing development

Figure 5.3: Sankey composed from interview results about the influence from industry on the procurement process, differentiated on hospital type.

agreements.

There is a predominantly positive perception of the cooperation between the healthcare technology manufacturing industry and hospitals. Physicians and the industry are interdependent on each other in order to contribute most to a high functioning healthcare system. However, this also creates high power at the side of the clinical end users in the procurement process. In chapter 4 we discussed clinical knowledge as a resource within the hospital. Deducing from the interviews, this expertise creates its leverage especially outside of the hospital. In the next chapter 6 the process is analysed and the effect of this power distribution is clarified.

6

PROCESS PROPERTIES

To achieve great things, two things are needed;
a plan, and not quite enough time.

Leonard Bernstein

6.1. INTRODUCTION

After having identified the systems involved actors and relations, internally and externally, and external influences, we can study the process. The observations for the process analysis lead to several similarities and differences between hospitals in the Dutch healthcare system. First, a general description of the process will be given. In this, identified standards and differences between hospitals are presented. Thereafter the results will be discussed according to theoretical frameworks.

6.2. SIX STEPS OF PROCUREMENT

In the following section the main results of the conducted interviews are described according to the themes covered in the outline as shown in chapter 2.

The formal procurement process can be divided in 6 steps. This is based on a procurement protocol obtained from a participating hospital. Figure 6.1 is based on an internal procurement protocol of a Dutch hospital. The 6 steps are clearly defined and used as a starting point.

Initiation In the initiation phase, a project is brought into existence, initiated. This can come forth from different motivations. The most common kind of initiation is replacement. Equipment is replaced when it is depreciated. Equipment depreciation can be either financially or functionally. Preferably and most commonly equipment is replaced when it is declared functionally or technically end of life which is either motivated by an increasing downtime or in other words "when it cannot do anymore what it was bought for". However, some participants also indicated that a financial depreciation is used where the equipment is depreciated over a fixed amount of years:

> *5 years, and we have quite heated discussions about that, because yes, such a professional association then puts that in its requirements and you as a hospital have to deal with that. On the other hand, our experience is that 5 years is not necessarily necessary.* - Clinical Physician 1

The participant argues that equipment can get damaged earlier and should be replaced after four years, or that is easily lasts 6 or 7 years when no malfunctions occur. Either way, most hospitals do not demand a business case when equipment is simply replaced. Alternatively, procurement processes are initiated for expansion or innovation. Then, business cases are always required in order to defend the need for more or other functionalities.

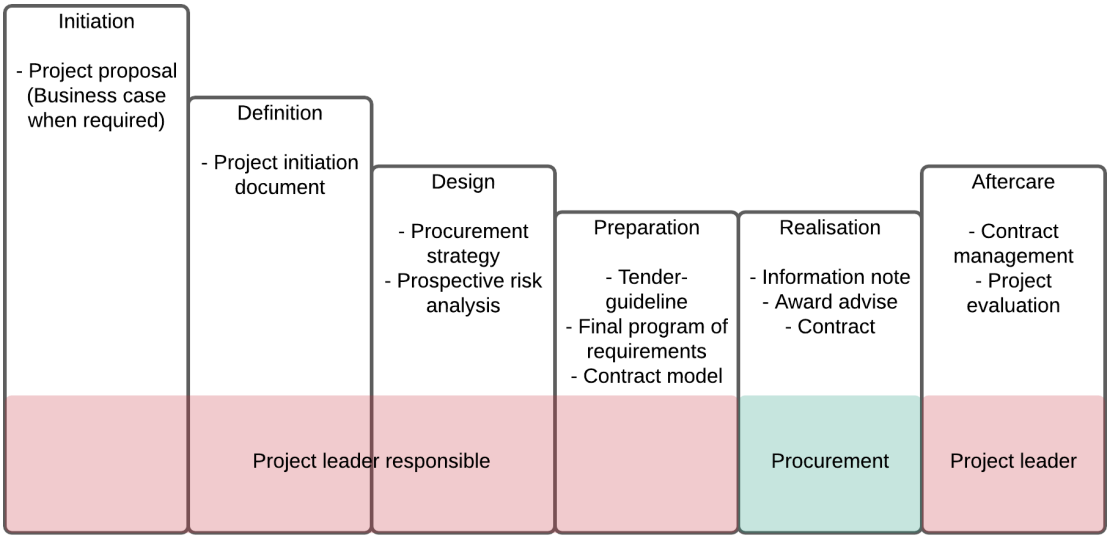

Figure 6.1: Steps as used in an internal procurement protocol in a Dutch hospital. Diagram own creation of author based on an internal hospital protocol.

Definition When a business case or replacement is accepted, the definition phase starts and a project team is compiled. This is an iterative and quasi informal process as necessary inputs are snowballed together. However, the core of the project team is fairly compact as discussed in 4. Also when the business case was not required, several documents are necessary for a project initiation as prescribed by the agreement medical technology discussed in chapter 5. In the project initiation documents the project team, project goal, scope and conditions are captured.

Design In the design phase a prospective risk analysis and justification of the planned purchase are required. Several formats for the risk analysis are applied but it all comes down to a questionnaire of increasing length proportionally to the risk. As a starting point, often the CE risk marking is used but this is not fixed. Also the procurement strategy is captured, although various hospitals indicate that procurement is only involved in a later project stage occasionally. Besides, a draft program of requirements is produced.

Preparation Subsequently, the preparation phase is crucial. When necessary a market orientation is performed to identify the possibilities and shape of the market. When the market is mapped, the final program of requirements is defined and published in the tender process together with the model contract.

Realisation In the realisation phase the award advise is given. All hospitals indicate to use total cost of ownership as a scoring method. However, general hospitals indicate that the decision can be subjective. Academic hospitals are required to follow the award advise because of the tender law as described in chapter 5.

Aftercare Finally in the aftercare phase, implementation and project evaluation takes place.

6.2.1. PROCUREMENT PROCESSES

Figure 6.2 shows a generalization of the procurement process from project initiation to delivery of the participating academic hospitals. In the process as applied in the hospitals, the 6 step race car model process described in chapter 3 can be recognized. In the figure the 6 steps are indicated by the vertically shaded columns. For structural clarity the process will be discussed according to the six steps. The first three steps, representing the tactical phase, represent the matter for this study. The last three steps, the operational phase is touched upon shortly.

SPECIFICATION

The program of requirements is without exceptions, the leading document in the phase of equipment specification. Apart from product functionality, the program of requirements is - in theory - the first communication towards potential suppliers and includes contractual and service requirements too. In the composition of this document a multi-disciplinary team includes their input, their requirements, and weights are assigned.

The program of requirements is always case specific and categories may differ per kind of equipment. The typical program of requirements for large imaging equipment includes:

- general requirements,
- user requirements,
- dosimetry and radiation hygiene,
- technical requirements and after sales,
- training,
- future development,
- environment people and society,

and is according to one of the participating hospitals compiled by clinical physics, radiology, procurement, laboratory technician, technical physician, medical technology and the project lead. This was discussed in the respect of one specific project, because every project is different, but the core is established well in this list.

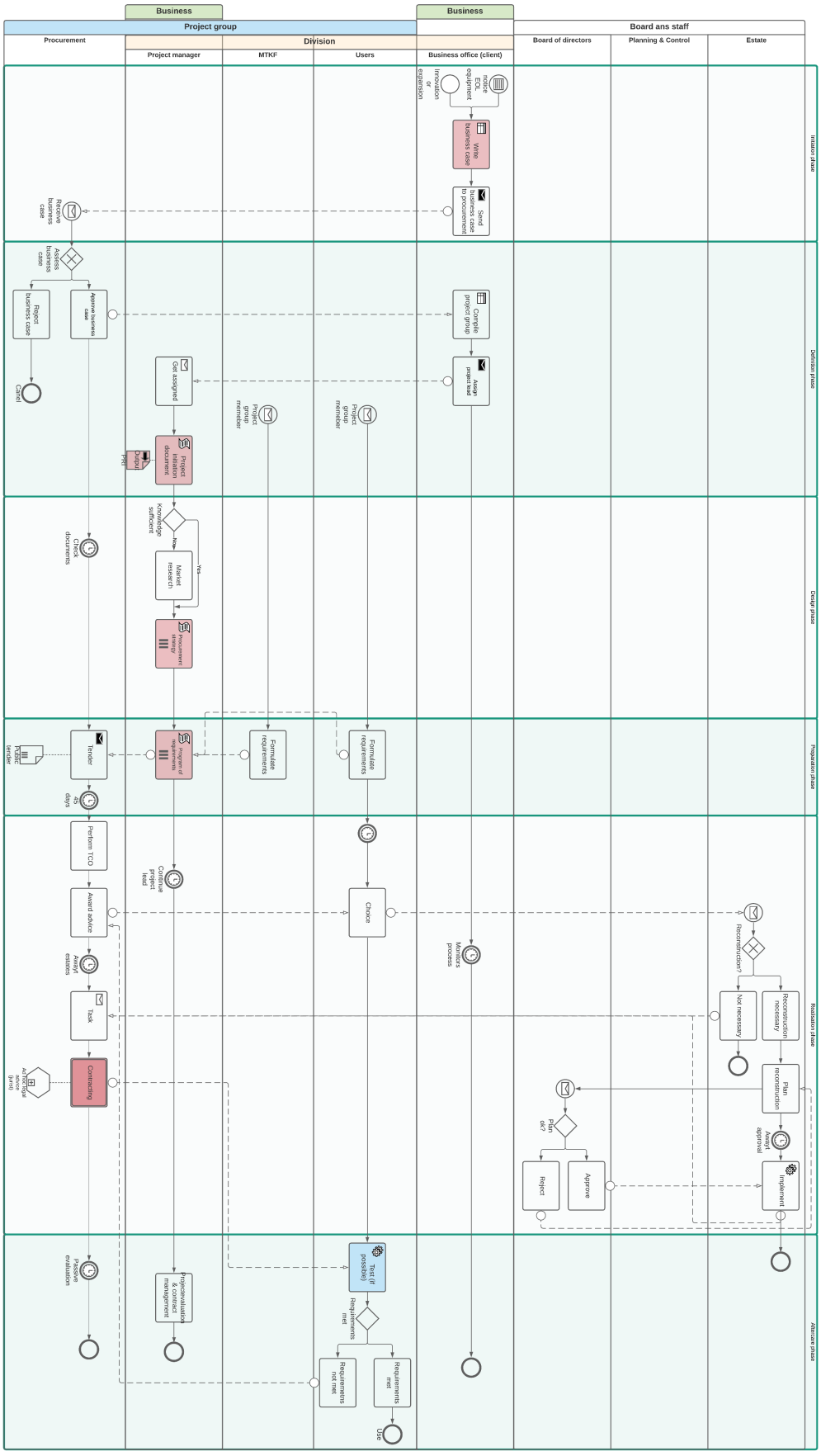

Figure 6.2: BPMN diagram interpreted from interviews with three academic hospitals. Diagram own creation of author.

SELECTION

We just described that the program of requirements is currently the leading document in the specification of equipment. After the specification, there are two main possibilities for the actual selection of devices. Either the program of requirements is followed neatly, which is a binding requirement for academic hospitals, or the selection is made partially subjectively as just mentioned in the previous section. In either case, requirements often get a scoring to be able to formalize the selection process. Determining the weight of all requirements is often a brainstorming process resulting in a poor determination of the real weight of factors. Individuals with higher negotiation power might impose their beliefs and unfounded conclusions are drawn.

In most hospitals TCO is the used method of cost calculations for financial assessment of technology. However, an increasing tendency towards alternative forms is observed as it is indicated that the combination of TCO and the program of requirements is not distinctive enough as a result of overall high quality of equipment available on the market. TCO is used for the cost analysis and combined with the program of requirements to form a final selection. Between the price and requirements participants have indicated to apply a near fifty-fifty scoring distribution but mention the difficulty of true distinctive selection using this method. Below a participant explains this elaborately:

> *(...) if you tender purely on requirements, the package of requirements then has multiple functions, it is both an indication of what you want and a kind of guarantee that everything is included. So it's kind of an agreement document too, except you're trying to differentiate between suppliers, so if you're tendering an ultrasound machine, it probably says "should be able to do ultrasounds", of course it can, but you want those kinds of basic things anyway covered all of them in the program of requirements to be able to fall back on something, but because you then have a program of requirements with 800 questions, of which only 50 are really distinctive between the different brands, it is very difficult to distinguish the right ones really pick out. So with a program of requirements you actually just select the 6 that just gets over the ditch and is the cheapest. So you get the cheapest 6. Because there are so many requirements in the list of requirements, the few points on which people can really distinguish themselves qualitatively have a very low weight, say one in 700 requirements. And typically price and quality are weighted in a kind of 50/50 or 60/40 ratio, but if I want to be distinctive on 1 in 700 requirements, I can of course also deviate 1 in 700 in my price and that does not help. So if I give 30 or 20 percent off, I always win the better quality. So that's why we also try to look at value-based procurement, where you give more space to suppliers to see who has the best quality for a certain price, you say it can cost a maximum of 1 million, who convinces me that they have the best quality? has the best quality, and that certainly has its advantages, but you also notice that you then miss something on the enforcement side because you have not agreed on he can make good echoes, and then when you run into them in practice that they have told a nice story but in the end those echoes are not such good quality at all, then you sometimes have difficult discussions, so it happens little by little.* - Medical Technology 2

General hospitals suffer less from this effect than academic hospitals as they have more freedom in vendor selection. It was mentioned multiple times that unreasonable demands can be put in the program of requirements in order to end up with the desired choice, though some participants indicated, they did not allow knock out criteria. Academic hospitals however, indicate that they are strictly limited to the number one choice resulting from the program of requirements and TCO:

> *In the end, the division manager is the one who slaps it. When we make a proposal to the project group after the tender and it comes up as the best price quality, we call it an award proposal, but in fact they can only say yes because that's just the way it is. For example, at number 1 is Piet and at number 2 is Jan, then they can't say we should do Jan, that's not how it works. But formally it is the division manager who agrees.* - Procurement 2

Best value approach One alternative form of assessment which was mentioned by participants is the best value approach. In the best value approach a description of the desired care result is given on a higher abstract level than the traditional program of requirements. Where in the program of requirements the focus is laid on functional and technical specifications, the best value approach focuses on a situational description in which the manufacturer can make an offer with their expertise. Hence, part of the work that is now being captured in the program of requirements is shifted to the vendor, releasing the beaten track and offering the supplier to ply their creativity and develop the best solution for the request:

> *Suppose we have a current ct where we say we have so many patients per hour, you name it, and one of our spearheads is we want to do more patients. You can then make a program of requirements and say well the scan time should be so and so long (...), but you can also say to the supplier, make sure that we can increase our production, then they can say instead of "our scan time is short" we can also say "the patient's preparation time is shortened because you make a scout image faster", you name it, you don't have to think of all the creativity that lies with the suppliers yourself.* - Clinical Physician 7

Hereby the supplier gets the opportunity to, within a set template, offer different solutions than otherwise possible. By including the demand for a risk analysis and publishing an open request, suppliers are incentivised to offer the best value solution.

The preceding example is considered to play a major role in the outcome of the selection process. The transition from a strict program of requirements to the best value approach is something that should be evaluated cautiously.

A major difference between academic hospitals and general hospitals in the decision process is the fact that academic hospitals are bound to the tender law, whereas general hospitals are only subject to the agreement medical technology which does prescribe a tender-like process including a "request for solutions" to the industry and usually 3 or 4 vendors are invited to present their products, but the final decision needs not be based on a predetermined scoring system. This results in subjective choices for equipment in general hospitals as described by a participant:

> *Ultimately, the user has the deciding vote. Most of the time, I think it's pretty subjective. Price, i.e. TCO, is also looked at (...) and an attempt is made to use an evaluation form with certain criteria. In practice it is really subjective. we recently had a major one that was a combination angio cardio fluoroscopic device, (...) and that's where I think the user-friendliness has been decisive, and a little bit of prejudice, a feeling with the supplier, so to speak, which made the choice. In the end there wasn't much difference in price either, so for me technically all three were sufficient. (...) The user has to work with it, so they must also have the decisive vote, if it meets the preconditions that I and procurement set to the budget.* - Clinical Physician 7

Though it is debatable whether user-friendliness might or might not be a manageable measure for legal tenders for academic hospitals, the preceding quote addresses the fact that especially in general hospitals the specification is not going to be decisive later in the process.

CONTRACTING

As a result of the inapplicability of the tender law to general hospitals, they can rule out vendors when initiating a project, or only select preferred ones in their program of requirements. The agreement medical technology does prescribe a tender like process but is not as compelling as the tender law. Despite this freedom of vendor selection participants indicate to always invite multiple vendors to create a false sense of competition:

> *This is also done by procurement, the moment you let several parties think that they are in the race, you will always get the best offer, so there is just a bit of competition. (...) It may well be that you have already almost made the choice internally beforehand, but that you then leave several parties in the race, especially with the bigger things.* - Clinical Physician 7

On the other hand, many participants also indicate that price is not important to them. It appears that most participants are aware of the price, and sometimes even consider not to buy state of the art technology for certain divisions, but overall the preference is towards "good stuff". Participants from procurement unanimously describe that they prefer their own contracts as defined by the hospital itself, but that the focus is on services and not on the price:

> *I always want to have a good contract, I always use the [hospital] templates for this, I watch out for that. (...) but I'm not a penny-buyer. If I save 10% I like it, if I save 5%, if it's 15%, I don't get any personal gain from it, I'm doing it for the hospital.* - Procurement 2

The majority of the hospitals indicate that buying is the preferred form of ownership. Figure 6.3 shows the current ways of contracting indicated by the interviewees. Non academical hospitals also indicate to make use of alternative methods for contracting, such as leasing and having managed equipment services,

MES contracts. Although leasing is usually a more expensive option than buying due to an extra party that needs to make a profit and 3-5% overhead costs, participants indicate to use this when money for a buying contract is not available. Also leasing is used as a second chance when an investment has been rejected by the investment committee. One participant explains:

> *We also do leases, and that is a trick, in that investment budget a lot is of course rejected, an investment has to be applied for centrally, so an applicant has no influence on that. Because the applicant, which the department often does when the investment is rejected, then I look for some space in my exploitation budget, and then they lease. That is usually the reason that leases are made, because there is no money, it has not been allocated, then you start being creative and I will pay for it myself, not "myself", but I will pay it from the exploitation, decentralized. (...) If I may advise I always say; to buy. but if there is no money, if an investment is rejected, then a team manager says, that's annoying but I want it anyway so I'm going to lease.* - Procurement 6

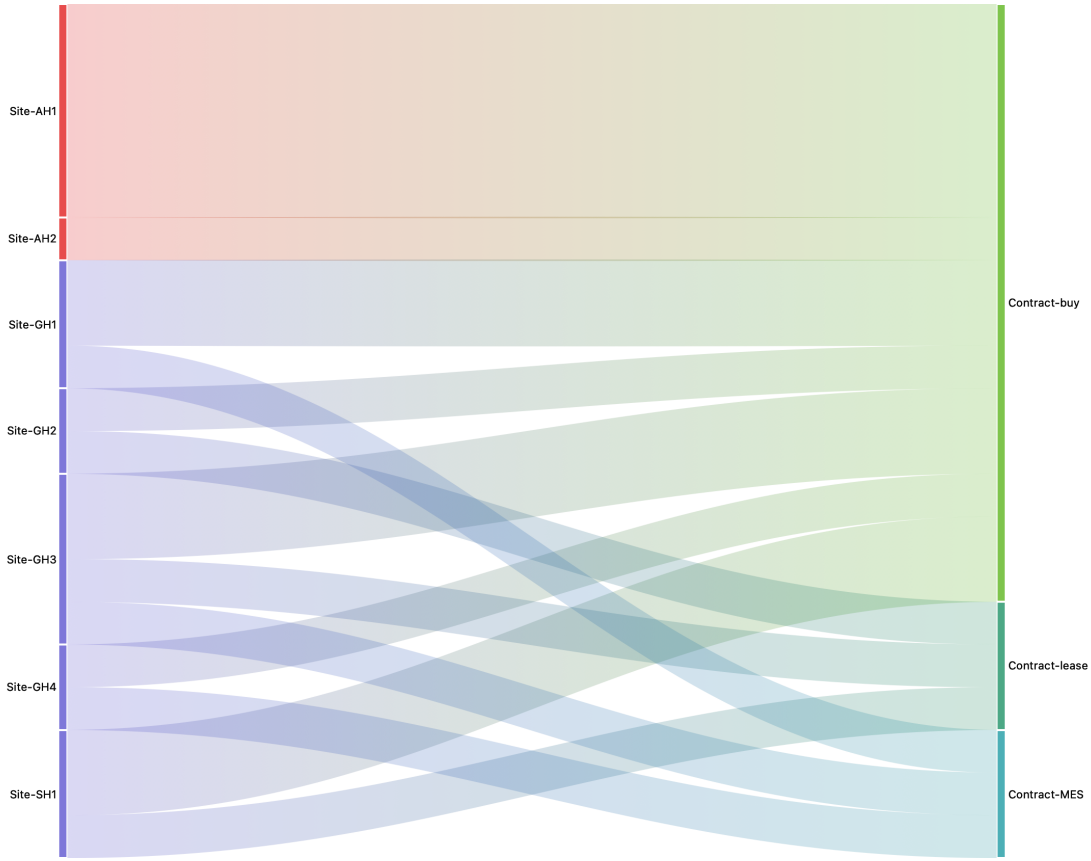

Figure 6.3: Sankey diagram indicating the preferred ways of contracting for purchased equipment differentiated on hospital type.

ORDERING, MONITORING & AFTERCARE

Ordering, monitoring and aftercare take place after the decision process for healthcare equipment and are mostly out of the scope of this research. However, it should still be organised such that a complete effective procurement process is established.

Participants indicate that aftercare is often done passively and there is potential room for improvement in this step too.

ROLES IN THE PROCESS

Generally the core of the procurement project team is composed of 4 main roles including: project manager, medical technology clinical physics, clinical end users and procurement.

Project lead The project manager is the actor leading the project from start to finish and is considered of high importance for the outcome of the project. Interviewees indicated that the success of a procurement process depends on the capability of the project manager.

> *It stands or falls with a good project leader, who really makes the difference. If you have a project leader who does it a bit on the side, you see that it fizzles a bit. If you have a good project leader, you will see that things are going smoothly and that things are going within the time frame.* - Procurement2

However, project managers are often individuals from the division and do not have the expertise, time or interest to lead such a project in a compliant manner. Two hospitals indicate to make use of external project managers when necessary competences are missing in the respective division.

> *(...) what you actually see is that these are sometimes very complex processes to lead. You often see, that is the case in both hospitals, you sometimes have tough department heads who can run large departments very well, but leading such a project is another strength, other things are asked of you there and you do not always have those in-house, in terms of competences. And then it is so important to do it well that you hire someone for a certain period of time. They are used to leading a project with a head and a tail and may also work according to certain project insights, who can organize it tightly.* - Procurement4

And one hospital even indicated that not every project was led by a project manager at all.

> P5: *You have a project group, steering group. sometimes there is a steering group but no real project group, sometimes there is no project leader. Project management is a discipline in itself, which is about efficiency, making clear choices. As a business expert, I still see some challenges here.*
>
> Interviewer: *Can you elaborate?*
>
> P5: *Ownership, you are talking about who is the project leader, you have to make that choice right at the start, but it actually determines the entire course of a project. And if you miss a project leader and if you have a steering group that might function as a project group but again doesn't close things off as a project group or project leader. (...) In the usage phase it is often clear who is responsible and who uses it. (...) in order to get something done, I do miss stable project-oriented choices. And then I'm talking about who is the project leader, who has that mandate. who is the project group, are they broad, organization-wide, are they on behalf of the stakeholders. (...) I miss that sharpness I don't always see. (...)*
>
> P6: *(...) sometimes it's a department manager. It is never a doctor because a doctor is usually not employed by the hospital. Sometimes it's a project manager, sometimes it's a clinical physicist, if it's really a device that involves clinical physics, sometimes the project leader is a clinical physicist, which is crazy because really, a clinical physicist should be a consultant. And sometimes it's a buyer who is the project leader, well that's weird too, but that's just for lack of better. Because in theory a clinical physicist and purchaser can never be a project leader, they are advisors, the purchaser about the project and the clinical physicist about the device and the use and the technology and things like that. He should never be a project leader, but sometimes that is for lack of better.*
>
> Interviewer: *(...) do I even hear an absence of a project leader?*
>
> P6: *Yes, it usually is.*
>
> Interviewer: *How does such a project go?!*
>
> P5: *Yeah, chaotic.*

The role of project leader is the most diverse completed role throughout the hospitals, ranging from a high level of organisation to no organisation. High organisation project leads consciously assess the complexity of the upcoming project and potentially hire a professional externally. Most hospitals designate the requesting division to appoint a project leader which is either from the business office of the division, the division manager or someone from MTCP or even users. Some of those hospitals do offer help to the project leaders in the form of dedicated "HR business partners".

CONTRACTS

Preference is practically always in purchasing equipment above leasing or renting equipment. Partly because of the inapplicability of the tender law to general hospitals several forms of cooperation between suppliers and hospitals arise. One participant described the potential adoption of a so called strategic cooperation between the hospital and supplier. In this construction an agreement between an umbrella organisation such as the stichting algemene ziekenhuizen [foundation for general hospitals] and a supplier prescribes hospitals to commit to that brand in case of a new procurement, in which it would receive a predetermined discount rate.

Another emergent contract form which has been indicated by several participants as a future prospect or already in use in known hospitals are managed equipment services, MES, contracts. In a MES contract a fixed fee per year is agreed between hospital and supplier, for which the supplier takes care of the delivery of up to date innovative technology for the duration of the contract.

6.3. SUMMARY

In the procurement process in Dutch hospitals 6 steps are defined. The six steps cover the process on an individual level from initiation phase up to and including aftercare. It appears that a 7th step preceding the procurement process also influences a process strongly, which is determination of the investment budget.

Given the actor analysis in chapter 4 and external influences discussed in chapter 5, the process shown in figure 6.2 generates several concerns. The most striking one is the responsibility of the project lead, after we learnt in chapter 4 that often no qualified individuals fulfill this role. It is important to take into account that regardless of the competences of an individual in their original role, project management is an unique discipline. Even specialized, competent individuals cannot be expected to fulfill this role without proper education and availability.

Within the process, the program of requirements, or specification, has the most influence on the outcome of the selection process. Currently, the program of requirements is defined on a high level of detail, including the definition of basic functionality. Some participants express a call for a lower level of detail in which the focus shifts to the creativity and ability of the manufacturer. With the high level of detail program of requirements it is hard to differentiate between offers and minor deviations in price out rule requirements easily because all basic functionalities are also ticked.

When a selection is made, academic hospitals are required to fully follow the scoring process defined in the program of requirements, plotted against TCO. General hospitals indicate to be able to set unreasonable requirements and select more subjectively, although visions are diverse. Some general hospitals also claim to safeguard a purely functional program of requirements and select according to the respective score against TCO.

Although not allowed, either by law or by internal protocols, a strong preference for a certain manufacturer already exists before the selection process starts. Also then a regular tender or RfP is published in order to create a false impression of competition between vendors. The detailed specification empowers actors to steer the outcome of the selection process towards a personal preference. Because of the expertise of specific actors, this is hard to prevent.

When contracting, buying is the preferred way of contracting. Academic hospitals even only indicated buying as a manner of contracting for equipment. Non-academic hospitals also indicate to use alternative ways such as lease and MES.

7

Discussion

Once we accept our limits,
we go beyond them.

Albert Einstein

In this research we examined the process of health care equipment procurement in Dutch hospitals in order to identify effective procedures and find out what can be improved. This is done by shedding light on this process from three perspectives, actor and stakeholder interaction, external influences and the process as a whole. In this chapter we combine the results from the three perspectives, discuss their implications and compare it with earlier findings to finally be able to draw conclusions from the data we gathered. Also we reflect on the used methods in this research.

7.1. THE PROJECT LEAD

In the literature review three actor types have been identified, clinical, operational, and business actors. Those categories are sufficient when describing the project team in the real actor analysis. Unsurprisingly, the interviews point out that the actor types do not share the same values, resources and perceptions.

What clearly becomes apparent is that the analysis of actor an stakeholder interaction within the studied problem is an ill structured problem. Between hospitals various perceptions exist about how certain roles are defined and how is dealt with certain relations. What is staggering is that in chapter 5 we learnt that the project lead is responsible for the largest part of the process (6.1). Although business actors have been interviewed in the single research found about the Netherlands, the importance of this role in the process is not discussed there (Lindgreen *et al.*, 2009). In contrast to this, Madhlambudzi and Papanagnou (2019) acknowledge the importance of management from a business perspective in the HT procurement process. This is consistent with our findings.

What seems to be most influential to the success of an effective process is the presence of a capable project lead. However, there exist substantial differences between the fulfillment of this role in different hospitals. In many cases the social environment, the decision arena, demands the respective division to deliver a project lead. In some cases this is someone from the business office of the division but the role can also be fulfilled by any other person in most cases. It is a matter of necessity: "if you want this new device, you have to arrange it yourself". This causes a great variety in the quality of project management. Although this is unanimously acknowledged by most participants, this is still the status quo and projects trajectories are subject to random chance of whom will lead it.

Only some hospitals indicate that the lack of skill is acknowledged to such an extent that external project leads are hired. Although this action brings in important skills to lead a project, comply to all requirements and pursue the necessary deadlines, external project leads are said to lack the desired after care. When external managers are hired there is the feeling that they fulfill the task they are hired for although there is a need for continuous monitoring, especially after the introduction of the PMCF with the MDR.

This could be solved by employing dedicated project leaders within the hospital. Those people would have the time to be educated properly. Hence, they would gain the skills to lead projects and create improved continuity throughout the processes. The reason this is not done is, according to at least one participant indicating they would like to hire full time project leaders, financial. Hospitals seem to be reluctant in employing dedicated project leads. As was discussed with a participant in the role of clinical physician in a general hospital, they indicated that they would prefer to have 3 or 4 full time project leaders. 2 FTE are expected to be earned back by a better defined definition scan which would reduce correction costs. Still 1 or 2 FTE should be earned somewhere to justify the new employees.

This is where the slight value conflicts become visible. The sole purpose of hospitals, and the overall value of most people employed there, is to deliver an improvement to a healthcare system. Here we could argue that the improved quality of procurement processes should not only be measured financially. There arises a conflict. Operational actors, whose main goal is to deliver highest quality, best safety and pursue project goals to support clinical actors. Business actors, whose main goal appears to be financial efficiency, obviously still in combination with delivering good care, but relative to other actors with a slightly different perception of how to accomplish this.

In the introduction we learned from Giacomini *et al.* (2013) that health technology management, of which health technology procurement is still part, cannot me measured in mere numbers and needs more consideration. The absence of a proper project lead can be seen as a significant problem and it is down to viewpoint, interpretation and believed whether it is acceptable or not. The absence results in a lack of coordination and unjust power distributions. As several participants argued, it is important that the project lead can fulfill their role from a neutral perspective. As described, hospitals occasionally assign someone from procurement or a clinical physician as project lead. Formally those roles are intended to fulfill an advisory role and should not make final decisions. It is important to have an independent decision maker, that is, someone without a

significant interest in one specific value.

Also for the mere purpose of project coordination a capable project leader is essential. The majority of participants indicate that the speed and quality of a project is dependent on who the project leader is. Under the high standards of healthcare it is surprising that such important and costly processes are subject to chance. Apart from dealing with the proper initiation and completion of all necessary processes, project leaders are also essential to channel all values and resources of project members. In chapter 4 we concluded that there exist various powers among actors, some of whom know well what they are doing. Without proper mediation and objective coordination unjust practices might occur. Several participants indicated that the outcome of a project is significantly dependent on leading physicians. Despite the protocols hospitals follow and despite the agreement medical technology, participants hinted on an absolute power of physicians achieved through the powerful resource; clinical knowledge. Participants argued that independent of financial frames set by planning & control and other recommendations given by the project team, physicians always have their last power of clinical knowledge. Hints have been captured of their ability to go to the board of directors and still chase their preference. There is a natural dominance in the process and the above example reproduces this well.

In contrast to what we found in relation to the actor powers, literature remains divided on this topic. Madhlambudzi and Papanagnou (2019) portrays a situation, in the UK, where the system is subject to such strict guidelines that any bias in the procurement process would be eliminated. In contrast to this, and in accordance to what we have demonstrated, Korte (2012) found that despite strict guidelines, which are applicable in the Netherlands, ways are found to get around those and force personal preference into the process.

Again it is debatable whether this is something which should be countered or not. Considering the cooperation between physicians and the healthcare technology manufacturing industry however, one could argue that there should be gatekeeper capable of showing resistance. As indicated, those findings are in line with Madhlambudzi and Papanagnou (2019), which also emphasizes the need for managers who are engaged with other stakeholders in the process and have a mutual understanding. Below we continue discussing the relations between the physicians and the tech industry.

7.2. THE HOSPITAL, MANUFACTURER AND PHYSICIAN

We propose part of the frictions described above are caused in part by regulation and how the industry is shaped. Above we concluded with the absolute power of the physician, originating in the natural dominance which has traditionally been there. In this analysis we assume that the health technology manufacturing industry benefits from building relations with physicians. When a relation is maintained there is an information exchange between the healthcare- and technology industry and even more important, physicians are assumed to be more likely to prefer related brands.

What is also the case is that in non-academical hospitals the majority of physicians is not employed by the hospital, they are independent[1]. In academic hospitals all physicians are employed by the hospital. The debate whether independent physicians should be considered to have a positive or negative effect on the health system is out of the scope of this research. Still, one could argue that this system potentially increases the short term power of physicians in the selection process of medical technology. Physicians can potentially create leverage by choosing to run more production in hospitals where they are equipped with their preferred equipment. Of course, employed physicians can also change employer and choose hospitals where they get a more prominent position. However, this is a slower process and hospitals often need the benefit from production.

So how does regulation influence those power relations and positions? Because of the obligation of PMCF by the MDR the industry is ever more in need for cooperation with hospitals and especially clinical end users to perform this follow up. On the one hand this cooperation is always good as already indicated by several participants. This cooperation aids innovation because the real expertise is with the specialists and not in the companies usually, simply because they follow clinical progress daily by performing it themselves, by discovering needs and (technological) flaws themselves. On the other hand, this cooperation can be perceived as negative. Strong bonds between specialists and the industry oppose the tender law such that when specialists are bound to brands, they have strong leverage in the technology selection process and are too entangles in a specific brands technology, making it impossible to switch to other brands for scientific research and making it undesirable to work with other brands in regular production as you want the doctors to be as familiar as possible with the equipment, simply for patient safety. As shown in the quote of a participant earlier, you

[1] In Dutch: artsen zijn vaak "vrijgevestigd". Deze manier van werken is vergelijkmaar met zzp'ers.

do not want the user to have to look for a button at the moment supreme. Our discussion with a technological physician revealed that this entanglement with brands is real. The example was given of a physician employed in two hospitals. In hospital A they were working with CT's from brand X. When in hospital B a tender process was initiated for new CT machines, brand X was already preferred from the beginning as this continuity was crucial for the physicians.

Even though the tender law in theory forbids to create an intentional tender lock in, interviews revealed that also in academic hospitals the program of requirements is sometimes even composed in consultation with manufacturers. However, there seems no bad intention in this. There seems to be an honest belief for the need of this standardization between the hospitals where forces are joined in whatever way. Standardization in hospitals is important. The intention of the tender law is obvious, that public money is spent in a fair way and to prevent unjust relations between public and private companies, and to incentivise cost savings (Miller *et al.*, 2019). The effect of this law is very clear when a road, a building or a train station has to be built. Different providers from the industry can provide this product or service and the result will more or less be the same as contracting company A can build to the standard guidelines of a train station, just like contracting company B can. However, in healthcare technology the technological advancement is so complex and with that it is so important that on a very high level of detail certain results are accomplished, that this intended tender process is hard to follow. And we see that in the results. Two out of three participating academic hospitals indicate that the program of requirements can be directed towards a tender lock in and acknowledge that this happens. On top of that, it is even indicated that the tender construction is taken the other way around by telling the industry there is an intention to buy a specific piece of equipment from a specific manufacturer, and then there is a period in which competitors can oppose. Although this is legal in theory, the contracting hospital intentionally sets up the process such that they know they get what they want.

In chapter 5 a clear distinction between respondents statements about perceptions around industry interference in the decision process was remarkable. Several possible clarifications can be discussed in this regards. First of all, it could be assumed that there is a relation between the applicability of the tender law on academic hospitals and them complying fully to this and ruling out industry relations. Interpreting the tender law such that functional requirements are exclusively allowed and any form of pre-purchase relation and cooperation would be considered unfair competition. The second explanation could relate to the fact that academic hospitals exclusively employ physicians, as opposed to general hospitals where physicians are mostly independent. This in this research no information has been obtained about physicians' contracts with manufacturers. To be able to make any further claims about the causality of this result in relation to employed and independent physicians, further research should be done. A third explanation could relate to holding back information or interviewees not knowing about influential practices themselves. Academic hospitals, in contrast to non-academic hospitals, break the law when they maintain relations with manufacturing companies if they influence the tender process. Therefore it can be assumed that concealing information about such practices protect the hospitals. One participant in the role of an clinical actor type explained how processes could go and this included strong cooperation with a single manufacturing company early in the process.

Considering our results with respect to the effect of the tender law, which seems variable, the findings from Sorenson and Kanavos (2011) implicate that fair competition between vendors would also be variable. As a tender process in necessary to create fair competition but the manufacturers cooperate in hospitals procurement processes behind the screens, there is an information leak toward manufacturers. According to Abdulsalam and Schneller (2020) this potentially results in opportunistic pricing behaviour. This also is suspected from the results of this study. One participant explained that in early conversations with a manufacturer, prices for several equipment were disproportionally high. It could be considered naive that this is not perceived as opportunistic pricing behaviour. The respective participant stated that there might just be a chance that the manufacturer indeed intentionally started with a high price in order to initiate new negotiations within the hospital between planning & control and the applicant and investment committee. Several theories exist to argue about the intentions of the manufacturer here. On the one hand the negative assumption can be made where the manufacturer indeed shows opportunistic pricing behaviour. Because of the information leak towards the manufacturer, they are aware of the fact that they are the preferred choice and also they know the internal procurement structure of hospitals. The absolute power of physicians is played out in order to maximize revenue. On the other hand however, theories suggest a more positive perception of the industry interference. Where Hendry (2002) claim that agents are honest and dutiful. This suggests a willingness of actors to cooperate in order to achieve the best results for both.

What you see with the MDR is a reciprocity between regulation/legislation and behaviour. A procurement

participant stated they just trusted all products on the market because it is assumed that the strict regulation ensures that every single available product (in the researched category) is safe and they can thus buy it. Here it seems that at least the existence of such strict regulation also creates a pressing necessity for increasingly strict regulation as ultimate safety is assumed. Buyers are adapted to absolute safety and a clearly described intended use to such an extent that they consciously turn off thinking and assessing appropriate use. Which is understandable as one is not allowed to divert from intended use.

7.3. PROCESS STEPS

Considering everything that has been learnt about the actor relations and the environment we are working in, we can truly analyse how the process came to be and what implications this brings. We identified six steps in the procurement protocol of one academical hospital and recognized similar phases in all participating hospitals. When comparing the obtained model to the literature described earlier, we see several differences in the steps comparing the six step race car model and the project phases of the hospital procurement protocol. The race car model does not include an initiation step in which the intended purchase is justified. It is good that this is included in the formal procurement process, which is in line with the proposed model by the WHO (2011). Acknowledging the importance of budgeting in the process diagram in the format as found in the internal hospital document would result in the steps displayed in 7.1. Hospitals are often dealing with limited financial resources and as discussed earlier, planning & control and the investment committees need to carry out internal negotiations to distribute the investment budget over the hospital. Requiring the necessity for an investment justification enforces the applicant to reconsider their wishes. Looking back at what regulation prescribes this step is also legally required since the introduction of the agreement medical technology. Although this directive is not as strict as a law, there is surveillance and the inspection can take measures. Therefore an extra step is suggested before the theoretical model which is initiation. The initiation holds the justification for the intended purchase. Apart from this it should be acknowledged that even before that there is a step with significant influence on the potential purchase which is budgeting from planning & control. This is however such an important step for the profile and direction of the hospital that once again, neutral and result-oriented leadership is necessary. The role of planning & control is increasingly important as hospitals are moving towards super-division technology management. There has been a strong movement towards increasingly homogeneous software environments and now this is also happening with technology. Participants indicated that medium imaging equipment is now sourced from op to 10 suppliers. Participants argued to decrease the amount of suppliers to numbers between 1 and 3 with several motivations. The strongest motivation for decreasing the number of suppliers is for standardization which has several advantages. First of all it benefits patient safety.

Earlier we learnt that there is a value and perception conflict between planning & control and operational actors and there is a resource dependency where the operational actors, representing divisions, the project team, or the applicants, are fully dependent on the decisions regarding investment budget. Both additional described steps, the budgeting and initiation phase, take place before the initial step described in the models discussed. As the potential to influence total costs decreases when proceeding through the steps, it can be assumed that the earlier steps are crucial when costs are considered important. Good and conscious cooperation between clinical, operational and business actors is crucial to ensure complete information which is necessary for the best possible decisions.

Subsequently, when a procurement process can actually be initiated, specification starts. From the results we learnt that specification holds more than just product specification, it is also a means of communicating contract requirements including service, education, and more. For specification the whole project team is involved and we learnt that there seems to be a good process regarding specialized advice from all necessary professions in the hospital towards the project team. Participants indicated that MTCP consults for example radiation hygiene specialists, data specialists, and more. However, perceptions from participants differed widely. Where some of the participants indicated an inclusive transparent process, others indicated that by some actors the program of requirements is not respected as a useful tool for device specification. According to operational actors, clinical actors often perceive a written program of requirements as an unnecessary burden, arguing they know what they need and not seeing any relevance in taking the time to write it all down.

Partially, this might even be true to a certain extent. A program of requirements is an extremely detailed program, pointing out all requirements, including the obvious ones. Obvious requirements are put in the

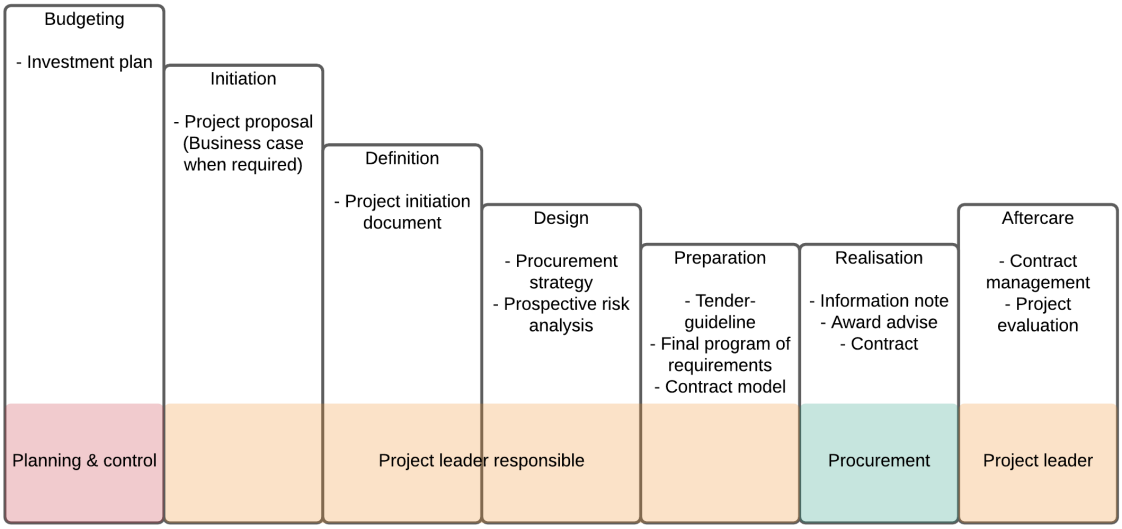

Figure 7.1: Steps as used in an internal procurement protocol in a Dutch hospital. Diagram own creation of author based on an internal hospital protocol.

program of requirements in to create a reference document between the buyer and supplier. Participants for example indicated that for an MRI scanner, requirements such as "must be able to make a scan" are also included in the program of requirements. This results in an enormous list with up to 800 requirements. Also, formal device selection is made through a combination of the met requirements and costs from TCO, usually in a near fifty fifty ratio. It was explained that this creates a situation in which it is hard to distinguish on the real quality of a solution for the specific situation, as one eight hundredth of a price difference, would compensate the absence of one requirement. This enables suppliers to just give a tiny discount to sell their product.

7.4. SYSTEM APPROACH

Combining the three perspectives, the importance of a wider systems approach becomes clear. This can be facilitated by the application of a value based approach, which is increasingly popular. But what does this mean for the program of requirements? The use of a best value approach would shift the specification level from a component/module level to a sub-system/system level of purchasing specification (Hsuan, 1999). According to Hsuan (1999) modularization, the opportunity to adapt equipment to the specific interests of the hospital, potentially decreases when moving down the ladder of purchasing specification, which makes purchasing specification a crucial factor when modularization is important. The best value approach would gravitate towards a system level approach. Less specifications will be fixed in the initiation of the vendor selection process which is likely to result in a wider spread of solutions and corresponding costs.

Linking back to the importance of an independent and competent project leader, it is proposed that they would attend a systems approach. Our results and the literature reveal a call for more collaboration within the hospital as well is with the industry. A project lead should connect between business, operational and clinical actors in order to regulate values and resources. Also, a proper project leader is responsible for communicating the relevance of a structured process towards all stakeholders. Our results revealed that procurement specialists feel responsible for establishing this message but are not fully respected in this role.

When an independent project leader is set, more space is created for the use of the best value approach. In the best value approach the supplier gets more freedom in providing a solution and the purchaser sets a wider frame to operate in instead of specific requirements. Not only do we expect that this method eliminates the issue of provider selection elaborated on in chapter 6, it is also expected to decrease risk as the suppliers expertise is exposed. The best value approach requires a pro-active attitude of the supplier as they are responsible for the design and specification of the solution which reveals their understanding of the problem.

Finally we consider in important to formalize weighting methods. The program of requirements is for-

mally the first contact towards the manufacturing industry addressing which problem needs a solution. Therefore, it is crucial that this document is written with great consideration, aiming for involving the highest level of expertise without giving up objectivity. Literature and our outcomes showed agreement on the lack of formal parameter scoring, be it for the program of requirements or in device selection after the introduction of value based procurement. AHP could provide in this

7.5. WRAP UP

In this specific research a wide variety of cultures within hospitals is noticed. Generally there is a trend towards the protocollizing of the health technology procurement process. In this study it has been demonstrated that different roles and different hospitals perceive the urgency of directives differently and that hospitals are in different phases in the process towards a truly functional based approach to health technology equipment procurement.

This study has been able to identify the current practice of healthcare technology procurement in the Netherlands. This has been done in a way connection actor analysis, buyer supplier relationships, and process models. Those three areas have been connected which created new insights. From a scientific point of view the results should be verified in larger studies and more data must be accumulated to test and prove our claims. Still, the health care industry can already take off with the established results and get along in improving the effectiveness of its internal processes. This study certainly contributes to awareness of procedural shortcomings and we hope to inspire hospital managers with our results.

7.6. LIMITATIONS

We deal with an ill structured problem, involving many actors who can carry out many actions. It is chosen to use an exclusively qualitative method to deal with this problem. Although quantitative methods deliver results which can be interpreted and communicated more unambiguously, qualitative methods enable a research with a wider scope which was preferred in the current state of scientific research. In chapter 3 we learnt a lot about recent research which captures a lot of important and valuable knowledge. In this research we aimed at connecting different areas of research to create insight in how actor and stakeholder interaction, regulation, the industry landscape and the followed protocols are related, how power distributions are formed and what its effects are.

Mainly data collection happened through semi-structured interviews with involved stakeholders from different disciplines. Participants were partly approached using the snowballing method. We are aware that this way of gathering participants could potentially create some form of bias in the professional function and opinion of participants gathered. This is due to the fact that people tend to connect others to people from their network with whom they work well together or like. However, the initial pool of participants is deliberately diverse and in the gathering of participants the diversity of the group is kept in view and when necessary, specific professions were pursued. LinkedIn was used to find extra participants where necessary. This method ensured the elimination of "referral bias" and increased the amount of different hospitals which is beneficial when describing general practice in a country. The semi-structured nature if the interviews created an open environment in which many topics were addressed. However, due to time limitations and the labor intensity of processing the data, only twelve formal interviews have been performed. Respecting the time frame this delivered a lot of data but we are also aware that data collection was not saturated yet. Every new interview kept delivering data on new topics and new perspectives were discussed. This resulted in data points which are often backed by only one participant. Yet, we have been able to discuss the main outcomes in confrontation with the literature. Besides, within the wide scope of this research, aiming at connecting disciplines and creating a foundation for further research, singular data points are not considered to invalidate our results.

This research focused on the procurement process of medical technology from the perspective of the hospital. Although "users" were often indicated to be part of the project team, we had little input from clinical end users. Therefore we have not been able to let them speak for themselves and identify their perceptions thoroughly. However, the majority of physicians in the Netherlands is independent. This causes a triadic structure between hospital, physician and industry. Formally physicians are not part of the hospital perspective then. Therefore it is debatable whether physicians belong in this research considering we take the perspective from the hospital.

This does however raise the matter of transferability. This research focused on hospitals in the Netherlands despite the fact that there exist different hospital set ups, most importantly academic and non-academic.

Because of the difference in legislation for the two types not all results are transferable. Still, most are. The main outcome was the importance of a competent project lead to guide the process and this applies to all kinds of hospitals. What is not transferable is the advice regarding the keeping up of buyer-supplier relationships as it would be against the law for academic hospitals.

Often in (gray) literature industry influence on the procurement process in hospitals is described negatively. During the interviews in this study this perceptions was adopted which created a bias in the questions. The researcher was biased negatively towards industry interference in the decision process. Therefore the questions in the interview were posed suggesting that it was negative. This might have steered participants to negative memories and statements of industry interference. Soon, participants noticed this prepossession and corrected the interviewer explaining that the industries are dependent on each other. In hindsight the question about external influence form manufacturers should have been formulated in a way that the relation was addressed and what this induces. Fortunately, this was instantly corrected by participants and it was a valuable learning moment for the researcher to be reminded that in this area of qualitative research it is hard to obtain reliable data. Part of this research concerned the identification of hidden agendas and information sometimes regarded as sensitive due to strategic business processes. Although we handle the assumption that participants were willing to share their information, actors might unconsciously hold back important processes, interactions, and values.

The data is likely to be biased and incomplete. Especially due to the fact that not all critical actors were interviewed which required us to make assumptions about their resources, perceptions and values, based on the perceptions of participants fulfilling other roles. Still, due to the exploitative nature of the research and the focus on stakeholder experience, this should not discredit the results.

The semi-structured nature of the interviews caused a wide variety of subjects discussed. This resulted in a small evidence base for most topics as they were sometimes discussed with only one or two participants. However, this research is rather exploratory in nature and therefore it has been extremely valuable to identify so many themes busying actors really involved in procurement processes in Dutch hospitals.

8

Conclusion

What is now proved
was once only imagined.

William Blake

In this research we aimed to identify procedures that improve the effectiveness of the decision making process for procurement of high cost-health technology in hospitals in the Netherlands. With a combination of desk research and semi-structured interviews, data about the current procurement process has been gathered. The most important findings are:

- Frequently a project leader lacks the competencies to lead a project properly, there is a mismatch between the skills and the role of this actor. This has major influence on going through the project steps and the project outcome. A project leader should be a neutral actor who has no mediating role towards the project team in terms of content. A competent project leader could increase buyer-supplier relationships which would decrease negative effects from disproportional social capital between physicians and manufacturers. It is suggested to consider full time project leaders with proper education to contribute to an effective purchasing process.
- In the procurement process the ability to save decreases as is proceeded through the steps. Assuming that the added steps of budgeting and initiation are executed well, the specification step is crucial for the outcome of the project. Participants indicate however that the means of specification does not serve the goal. Detailed programs of requirements are the status quo but lack the ability to differentiate between options because too many basic requirements have to be registered. It is suggested to change towards a best value approach where the desired outcome is described.
- A best value approach improves and demands buyer-supplier relationship. The specification and selection step melt together and the specification of solutions happens in cooperation with a manufacturer. Hospitals and the industry are dependent on each other for executing their purpose. Therefore cooperation between the two industries is already perceived as positive but legislation counteracts this. At this moment this is in this form not allowed for academic hospitals as they are subject to the tender law.

We can conclude that the role of the project leader is essential for the procurement process and we relate this to the emphasis on the need for a systems approach. Having proper project lead creates the opportunity to experiment with the best value approach and break loose from the strict program of requirements homogenizing the healthcare technology market. It is suggested to focus more on what production the hospital needs to run instead of over-specifying the program of requirements. Future research could test the potential of this method to increase opportunity for innovation for manufacturers as well as hospitals.

As discussed in the previous chapter 7, the results of this research are based on a relatively small number of participants. Therefore it is advised to continue research on this topic and focus on the suggestions stated above. Despite the small number of participants, new insights are created and should contribute to the improvement of healthcare technology management. Participants in this study fulfilled diverse roles in all three hospital types in the Netherlands. Consequently, the results are general, with its pros and cons. Although the general results do not describe a detailed protocol which can be implemented directly by a hospital, results are transferable throughout the healthcare sector. Hospitals in countries where legislation allows free or semi-free choice of technologies are likely to be able to apply the suggested methods. Future research should validate our findings.

9

BIBLIOGRAPHY

Abdulsalam, Y. J. and Schneller, E. S. (2020). "Of barriers and bridges: Buyer-supplier relationships in health care." In: *Health care management review*.

Bastani, P., Hakimzadeh, S. M., Rezapour, A., Panahi, S., Tahernezhad, A., and Sheikhotayefeh, M. (2020). "Strategic purchasing in the market of advanced medical equipment: an applied model for developing countries". In: *Health Policy and Technology* 9 (3). ISSN: 22118845. DOI: 10.1016/j.hlpt.2020.05.003.

Berenschot (2021). "Een sluis voor toelating van MedTech middelen: een goed idee?" In: *Onderzoek naar de toegevoegde waarde van een sluis voor toelating van (dure) MedTech middelen*.

Billaux, M., Borget, I., Prognon, P., Pineau, J., and Martelli, N. (2016). "Innovative medical devices and hospital decision making: A study comparing the views of hospital pharmacists and physicians". In: *Australian Health Review* 40 (3). ISSN: 14498944. DOI: 10.1071/AH15039.

Blonska, A., Storey, C., Rozemeijer, F., Wetzels, M., and Ruyter, K. de (2013). "Decomposing the effect of supplier development on relationship benefits: The role of relational capital". In: *Industrial Marketing Management* 42 (8). ISSN: 00198501. DOI: 10.1016/j.indmarman.2013.06.007.

Callea, G., Armeni, P., Marsilio, M., Jommi, C., and Tarricone, R. (2017). "The impact of HTA and procurement practices on the selection and prices of medical devices". In: *Social Science and Medicine* 174. ISSN: 18735347. DOI: 10.1016/j.socscimed.2016.11.038.

Cunningham, S. and Hermans, L. (2018). *A Framework for Actor and Strategy Modeling*. DOI: 10.1002/9781119284772.ch2.

David, Y. and Judd, T. (2020). "Evidence-based impact by clinical engineers on global patients outcomes". In: *Health and Technology* 10 (2), pp. 517–535. DOI: 10.1007/s12553-019-00345-0.

ECORYS (2017). "De waarde van zorgtechnologie". In: *NA*.

Fennigkoh, L. (2019). "Trends from HTM performance indicators: Assessing significance and meaningfulness". In: *Biomedical Instrumentation and Technology* 53 (2), pp. 124–127. DOI: 10.2345/0899-8205-53.2.124.

Fermont, J., Douw, K., Vondeling, H., and IJzerman, M. (2016). "Ranking medical innovations according to perceived health benefit". In: *Health Policy and Technology* 5 (2), pp. 156–165. DOI: 10.1016/j.hlpt.2016.02.009.

Filho, R., Martins, J., and Garcia, R. (2020). "Methodology for Defining Ubiquitous Management Indicators in Primary Health Care". In: vol. 75, pp. 1298–1305. ISBN: 9783030306472. DOI: 10.1007/978-3-030-30648-9_167.

Fullman, N. *et al.* (2018). "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: A systematic analysis from the Global Burden of Disease Study 2016". In: *The Lancet* 391 (10136). ISSN: 1474547X. DOI: 10.1016/S0140-6736(18)30994-2.

Gaev, J. (2018). "Implementing a program to share user experience data for medical devices". In: vol. 1. DOI: 10.1177/1541931218621123.

Giacomini, M., Winsor, S., and Abelson, J. (2013). "Ethics in health technology assessment: Understanding health technologies as policies". In: *Healthcare Management Forum* 26 (2), pp. 72–76. DOI: 10.1016/j.hcmf.2013.04.004.

Girginer, N., Uçkun, N., and Çelik, A. E. (2008). "Usage Of Analytıc Hıerarchy Process In Medıcal Equıpment Purchasıng Decısıons: A Unıversıty Hospıtal Case". In: *Electronic Journal of Social Sciences* 7 (26). ISSN: 1304-0278.

Gobbi, C. and Hsuan, J. (2015). "Collaborative purchasing of complex technologies in healthcare: Implications for alignment strategies". In: *International Journal of Operations and Production Management* 35 (3). ISSN: 17586593. DOI: 10.1108/IJOPM-08-2013-0362.

Gupta (2017). "Ezeltje strek je". In: *Een studie naar winst, macht en regulering in de Nederlandse gezondheidszorg*.

Ham, A. van der, Raak, A. van, Ruwaard, D., and Merode, F. van (2021). "Explaining integration and differentiation by identifying the rules and coordination mechanisms in a hospital's logistical system". In: *Journal of Health Organization and Management* 35 (9). ISSN: 14777266. DOI: 10.1108/JHOM-06-2020-0236.

Hatz, M. H., Schreyögg, J., Torbica, A., Boriani, G., and Blankart, C. R. (2017). "Adoption Decisions for Medical Devices in the Field of Cardiology: Results from a European Survey". In: *Health Economics (United Kingdom)* 26. ISSN: 10991050. DOI: 10.1002/hec.3472.

Heijboer, G. J. (2004). "Quantitative analysis of strategic and tactical purchasing decisions." In:

Hendry, J. (2002). *The principal's other problems: Honest incompetence and the specification of objectives*. DOI: 10.5465/AMR.2002.5922406.

Hinrichs, S., Dickerson, T., and Clarkson, J. (2013). "Stakeholder challenges in purchasing medical devices for patient safety". In: *Journal of Patient Safety* 9 (1). ISSN: 15498417. DOI: 10.1097/PTS.0b013e3182773306.

Hospodková, P. and Vochyánová, A. (2019). "The application of the total cost of ownership approach to medical equipment—case study in the Czech Republic". In: vol. 68. DOI: 10.1007/978-981-10-9023-3_65.

Howitt, P. *et al.* (2012). "Technologies for global health". In: *The Lancet* 380 (9840). ISSN: 1474547X. DOI: 10.1016/S0140-6736(12)61127-1.

Hsuan, J. (1999). "Impacts of supplier-buyer relationships on modularization in new product development". In: *European Journal of Purchasing and Supply Management* 5 (3-4). ISSN: 09697012. DOI: 10.1016/S0969-7012(99)00026-X.

Iadanza, E., Gonnelli, V., Satta, F., and Gherardelli, M. (2019). "Evidence-based medical equipment management: a convenient implementation". In: *Medical and Biological Engineering and Computing* 57 (10), pp. 2215–2230. DOI: 10.1007/s11517-019-02021-x.

Ivlev, I., Kneppo, P., and Bartak, M. (2014). "Multicriteria decision analysis: a multifaceted approach to medical equipment management". In: *Technological and Economic Development of Economy* 20 (3). ISSN: 20294921. DOI: 10.3846/20294913.2014.943333.

Ivlev, I., Vacek, J., and Kneppo, P. (2015). "Multi-criteria decision analysis for supporting the selection of medical devices under uncertainty". In: *European Journal of Operational Research* 247 (1). ISSN: 03772217. DOI: 10.1016/j.ejor.2015.05.075.

Jenoui, K. and Abouabdellah, A. (2018). "A decision-making-approach for the purchasing organizational structure in Moroccan health care system". In: *Advances in Science, Technology and Engineering Systems* 3 (2). ISSN: 24156698. DOI: 10.25046/aj030223.

Korte, L. de (2012). "Dutch Competition Law and the Procurement of Medical Devices: A Case Study to the Relevance of Competition Law for Hospitals' Purchasing Process of Medical Devices and the Consequences for Market Development and Consumer Welfare".

Kruk, M. E. *et al.* (2018). *High-quality health systems in the Sustainable Development Goals era: time for a revolution*. DOI: 10.1016/S2214-109X(18)30386-3.

Landaas, E. J., Baird, G. S., Hansen, R. N., Flum, D. R., and Sullivan, S. D. (2020). "Integrating Formal Technology Assessment into an Integrated Healthcare Delivery System: Smart Innovation". In: *International Journal of Technology Assessment in Health Care* 36 (1). ISSN: 14716348. DOI: 10.1017/S0266462319003465.

Lenselink, M. and Telgen, J. (1999). *Inkoopmanagement in de zorgsector*.

Leonard, E., Kock, I. D., and Bam, W. (2019). "Investigating the relationships between health and innovation systems to guide innovation adoption". In: ISBN: 9781728134017. DOI: 10.1109/ICE.2019.8792677.

Lindgreen, A., Antioco, M., Harness, D., and Sloot, R. V. D. (2009). "Purchasing and marketing of social and environmental sustainability for high-tech medical equipment". In: *Journal of Business Ethics* 85 (SUPPL. 2). ISSN: 01674544. DOI: 10.1007/s10551-008-9740-1.

Madhlambudzi, P. and Papanagnou, C. I. (2019). "Stakeholder identification and salience in purchasing: An empirical study from UK hospitals". In: *International Journal of Healthcare Technology and Management* 17 (4). ISSN: 17415144. DOI: 10.1504/IJHTM.2019.104933.

Merton, R. K. (1993). *On the shoulders of giants: The post-Italianate edition*. University of Chicago Press.

Miller, F. A., Lehoux, P., Peacock, S., Rac, V. E., Neukomm, J., Barg, C., Bytautas, J. P., and Krahn, M. (2019). *How Procurement Judges the Value of Medical Technologies: A Review of Healthcare Tenders*. DOI: 10.1017/S0266462318003756.

Mundy, L., Howard, S., Mcqueen, L., Thomson, J., and Hewson, K. (2019). "Fostering healthcare innovation in public hospitals: The Queensland experience". In: *Australian Health Review* 43 (6). ISSN: 14498944. DOI: 10.1071/AH18055.

OECD (2019). *Health at a Glance 2019: OECD Indicators*. Vol. 1.

Pallikarakis, N. (2020). "Medical devices regulations, management and assessment; New trends new needs". In: vol. 77. Springer, pp. 615–619. ISBN: 9783030318659. DOI: 10.1007/978-3-030-31866-6_109.

Ranney, M. L., Griffeth, V., and Jha, A. K. (2020). "Critical Supply Shortages — The Need for Ventilators and Personal Protective Equipment during the Covid-19 Pandemic". In: *New England Journal of Medicine* 382 (18). ISSN: 0028-4793. DOI: 10.1056/nejmp2006141.

Santos, F. A. and Garcia, R. (2010). "Decision process model to the Health Technology incorporation". In: DOI: 10.1109/IEMBS.2010.5627344.

Shishkin, S. and Zasimova, L. (2018). "Adopting new medical technologies in Russian hospitals: What causes inefficiency? (qualitative study)". In: *Health Economics, Policy and Law* 13 (1). ISSN: 1744134X. DOI: 10.1017/S1744133116000347.

Shuren, J. and Califf, R. M. (2016). "Need for a national evaluation system for health technology". In: *JAMA - Journal of the American Medical Association* 316 (11). ISSN: 15383598. DOI: 10.1001/jama.2016.8708.

Smith, P. C., Mossialos, E., Papanicolas, I., and Leatherman, S. (2010). *Performance measurement for health system improvement: Experiences, challenges and prospects*. DOI: 10.1017/CBO9780511711800.

Sorenson, C. and Kanavos, P. (2011). "Medical technology procurement in Europe: A cross-country comparison of current practice and policy". In: *Health Policy* 100 (1). ISSN: 01688510. DOI: 10.1016/j.healthpol.2010.08.001.

Veeke, R. and Gunning, M. (1993). "Inkoopbeleid: basis voor doelgerichte actie". In: *Tijdschrift voor Inkoop & Logistiek* 9.7/8, pp. 14–19.

WHO (2010). *World Heath Statistics: 2010*.

— (2011). "Procurement process resource guide". In:

— (2017). *Global atlas of medical devices*.

Willemé, P. and Dumont, M. (2015). "Machines that Go 'ping': Medical technology and health expenditures in OECD countries". In: *Health Economics (United Kingdom)* 24 (8). ISSN: 10991050. DOI: 10.1002/hec.3089.

Yelton, S. and Schoener, B. (2020). "The evolution of healthcare technology management in leading healthcare delivery organizations". In: *Biomedical Instrumentation and Technology* 54 (2), pp. 119–124. DOI: 10.2345/0899-8205-54.2.119.

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A

INTERVIEW

A.1. INTERVIEW BETROKKENEN INKOOP ZORGTECHNOLOGIE V1.0 NL

Introductie [5min] Persoonlijke introductie en uitleg over het interview. Het interview bestaat uit twee delen. In het eerste deel beantwoordt de deelnemer vragen en ontstaan eventueel vervolgvragen en anekdotes. Verschillende thema's zijn aangegeven als I., II., enz., deelvragen zijn aangegeven als a., b., enz., suggesties om duidelijk te maken wat voor soort antwoorden we zoeken worden aangegeven als i., ii., enz.. In het tweede deel beschouwen de onderzoeker en deelnemer verschillende cases en processen die de deelnemer kent en schetsen de processen in chronologische volgorde, identificeren functiekenmerken, interacties en taken van betrokkenen.

DEEL 0 (Ingevuld door onderzoeker) [0min]

I Deelnemer

(a) Wat voor soort instelling is uw directe werkgever?

(b) Wat is uw officiële professionele functie?

(c) Wat is de levensverwachting van dit specifieke medische hulpmiddel?

DEEL I (Meestal vraag-antwoord, mogelijk vervolgvragen) [25min]

I Deelnemer

(a) Bij de aanschaf van welke medische hulpmiddelen bent u betrokken?

(b) Bij welke stappen bij de aanschaf van medische hulpmiddelen bent u betrokken?

II Andere betrokkenen

(a) Kunt u, op basis van uw kennis of begrip, alle mensen noemen die door het besluitvormingsproces worden beïnvloed?

(b) Kunt u uit deze lijst alle mensen kiezen die volgens uw kennis of begrip betrokken zijn bij het besluitvormingsproces?

(c) Dus de resterende lijst van (a.) wordt beïnvloed door de beslissing, maar heeft geen formele macht of invloed op het besluitvormingsproces?

(d) Wie initieert een aankoopproces?

i. Medisch specialist met wens naar nieuwe / extra apparatuur

ii. Administratieve afdeling die het einde van de levensduur meldt

iii. Zijn er andere startopties?

A

(e) Wie is verantwoordelijk voor de uiteindelijke keuze ("(van een persoon, organisatie of instelling) vereist of wordt verwacht om acties of beslissingen te rechtvaardigen; verantwoordelijk.")? [accountable]

(f) Wie is verantwoordelijk voor de uiteindelijke keuze ("een verplichting hebben om iets te doen, of controle hebben over of voor iemand zorgen, als onderdeel van iemands baan of rol")? [responsible]

III Besluitvormingsprocessen

(a) Door welke regelgeving / wetgeving (Europees en Nederlands) wordt u gestuurd / beïnvloed waarvan u op de hoogte bent?

i. Medical Devices Regulation (MDR)
ii. Aanbestedingswet
iii. Mededingingswet

(b) In hoeverre neemt u bepaalde overwegingen in acht bij het selecteren van apparaten?

i. Financieel
ii. Patientveiligheid
iii. Verkoper
iv. Scholingsvereisten / training

(c) Werk je met ziekenhuisgebaseerde HTA-processen en wat is uw ervaring hiermee?

(d) (Hoe) worden kosten-batenanalyses uitgevoerd?

i. Net monetary benefit (NMB)
ii. Total cost of ownership (TCO)
iii. Analytical hierarchy process (AHP)
iv. Value based procurement

(e) (Hoe) wordt er rekening gehouden met de uitkomsten van de patiënt?

i. QALY
ii. DALY

IV Geldstroom

(a) Wie zorgt voor het budget voor de aanschaf van medische hulpmiddelen?

(b) Hoe wordt het budget voor een aankoop vastgesteld?

(c) Welke speciale stem voegt de financier toe?

(d) Welk financieringssysteem wordt / worden gebruikt en hoe wordt hiertussen gekozen en door wie?

i. Raamcontracten
ii. Groepsaankopen
iii. Lease
iv. Bruikleen
v. Pay-per-view
vi. Ruimte uitbesteden
vii. Financiering via wetenschap

V Externe invloeden

(a) Van welke andere externe invloeden bent u zich bewust?

i. Verzkeringsmaatschappijen
ii. Industrie van medische technologie
iii. Regulatie
iv. Convenant Veilige Toepassing van Medische Technologie in het Ziekenhuis

(b) Komt het voor dat vanwege de complexiteit van apparatuur de bediening ervan wordt uitbesteed?

(c) In hoeverre beïnvloedt het aantal beschikbare leveranciers het proces?

VI Doelen

(a) Wat is uw persoonlijke uiteindelijke doel wanneer u bijdraagt aan het besluitvormingsproces voor de aanschaf van medische hulpmiddelen?

(b) Zou u wijzigingen aanbrengen om uw doel bij de aanschaf van medische hulpmiddelen te bereiken?

(c) Hoe verbetert effectieve inkoop van gezondheidstechnologie de prestaties van het gezondheidssysteem?

DEEL II (dialoog, samen processen in kaart brengen) [30min] In het tweede deel van het interview proberen we het inkoopproces zoals u dat kent te schetsen, inclusief knelpunten en elke opmerking die u wilt opnemen of belangrijk vindt. Ook zullen we de actoren die we zojuist hebben geïdentificeerd in een diagram plaatsen op basis van hun macht / invloed, belang en houding. Wanneer specifiek relevant, zullen we ons concentreren op verschillende specifieke betrokkenen.

A.2. INTERVIEW HEALTHCARE PROCUREMENT STAKEHOLDERS V1.0 ENG

Introduction [5min] Personal introduction and explanation about the interview. The interview consists of two parts. In the first part the participant answers questions and possibly follow up questions and anecdotes arise. Several themes are indicated as I., II., enz., sub questions are indicated as a., b., enz., suggestions to make clear what kind of answers we are looking for are indicated as i., ii., enz.. In the second part the researcher and participant consider several cases and processes known by the participant and sketch the processes in chronological order, identify actor characteristics, relations and tasks.

PART 0 (Filled in by researcher) [0min]

I Actor

(a) What kind of institution is your direct employer?

(b) What is your official professional function?

(c) What is the life expectancy of this specific medical device?

PART I (Mostly question-answer, possibly follow up questions) [25min]

I Participant

(a) In the procurement of what medical devices are you involved?

(b) In which steps of the purchasing of medical devices are you involved?

II Involved people

(a) Can you sum all the people affected by the decision process according to your knowledge or understanding?

(b) Can you pick from this list all people who are people involved in the decision process according to your knowledge or understanding?

(c) So, the remaining list of (a) are affected by the decision but have no power or influence in the decision-making process?

(d) Who initiates a purchasing process?

i. Medical specialist with desire for new/extra equipment

ii. Administrative department notifying end of life

iii. Are there other initiate options?

A

(e) Who is accountable ("(of a person, organization, or institution) required or expected to justify actions or decisions; responsible.")?

(f) Who is responsible ("having an obligation to do something, or having control over or care for someone, as part of one's job or role.")?

III Decision processes

(a) By what regulation/legislation (European Dutch) are you restricted or served and are you aware of?

i. Medical Devices Regulation (MDR)
ii. Tender law
iii. Competition law

(b) To what extent do you take certain considerations when selecting devices?

i. Financial
ii. Patient safety
iii. Vendor
iv. Training requirements

(c) Do you work with hospital based HTA processes and what is your experience with this?

(d) (How) are cost-benefit analysis performed?

i. Net monetary benefit (NMB)
ii. Total cost of ownership (TCO)
iii. Analytical hierarchy process (AHP)
iv. Value based procurement

(e) (How) are patient outcomes taken into consideration?

i. QALY
ii. DALY

IV Money flow

(a) Who provide the budget for purchasing medical devices?

(b) How is the budget for a purchase set?

(c) What special voice does the financer add?

(d) What financing system is/are used?

i. Raamcontracten
ii. Collaborative purchasing
iii. Lease
iv. Bruikleen
v. Pay-per-view
vi. Outsource room
vii. Finance via science

V External influences

(a) What other external influences are you aware of?

i. Insurance companies
ii. Medical device industry
iii. Regulation
iv. Convenant Veilige Toepassing van Medische Technologie in het Ziekenhuis

(b) Does it occur that due to the complexity of equipment, the operating of it is outsourced?

(c) To what extent do the amount of available of vendors affect the process?

VI Goals

(a) What is your personal ultimate goal when contributing to the decision-making process for procuring medical devices?

(b) Would you make any changes to achieve your goal in purchasing medical devices?

(c) How does effective health technology procurement improve health system performance?

PART II (conversation, produce a view together) [30min] In the second part of the interview, we will try to sketch the procurement process as you know it, including bottlenecks and every remark you want to include or consider important. Also, we will place the actors we just identified in a diagram according to their power/influence, interest, and attitude. When specifically relevant we'll focus on several specific actors.

B

ASM CODING

ATLAS.ti Report

Procurement MedTech

Codes grouped by Code groups

Filter:
Filter codes in any of the groups ASM main Perceptions, ASM main Resources, ASM main Values

Report created by Bor Ditewig on 6 Jul 2021

ASM main Perceptions

28 Codes:

- **Business Case**

  Quotations:

  - 7:5 ¶ 11, een business case geschreven door de divisie in Procurement2
  - 8:13 ¶ 9, dus op het moment dat een aanvraag meer dan 10000 euro tco is, dan vinden wij dat het langs de commi… in MedTech2 + ClinPhys1
  - 8:14 ¶ 9, voor de buca ligt een richtlijn een format. die kan vrij geïnterpreteerd worden maar er moeten wat b… in MedTech2 + ClinPhys1
  - 8:15 ¶ 9, hier hebben we wel ook mensen vanuit de financiele tak en in koop en er zitten nog wat meer medici i… in MedTech2 + ClinPhys1
  - 8:16 ¶ 9, is het een mooie aanvraag en dan kunnen we het advies opmaken voor de rvb. in huis en dat zie je mis… in MedTech2 + ClinPhys1
  - 8:19 ¶ 15, op het moment dat die 10k overschreden wordt, ook al is het hun eigen geld, zou kunnen, dan willen w… in MedTech2 + ClinPhys1
  - 10:10 ¶ 11, bijvoorbeeld 8 jaar, in jaar 6 of 7 weet je al lang dat je dat ding een keer moet gaan vervangen, da… in Procurement4

- **Competition suppliers**

  Quotations:

  - 8:23 ¶ 105, KO criteria kunnen van alles zijn maar over het algemeen zijn er altijd wel meerdere partijen die ee… in MedTech1
  - 8:24 ¶ 109, ik kan me voorstellen in academische ziekenhuizen waar heel veel research wordt gedaan dat die echt… in MedTech1
  - 8:131 ¶ 61, heeft het ook z'n voordelen als je een beetje spreidt want dat houdt ze scherp in MedTech2 + ClinPhys1
  - 8:132 ¶ 61, als ze denken nou er zijn nog wel 1 of 2 anderen die dit ok zouden kunnen bieden en misschien scherp… in MedTech2 + ClinPhys1
  - 8:153 ¶ 59, het lijkt van belang om te blijven spreiden in MedTech2 + ClinPhys1
  - 10:11 ¶ 19, dat betekent dat wij nooit zeggen "we denken dat we siemens gaan doen" zo werkt dat niet, je gaat ec… in Procurement4
  - 16:16 ¶ 95, op het moment dat je meerdere partijen laat denken dat ze in de race zijn, zul je altijd de beste aa… in ClinPhys7.txt

- **Covenant**

  Quotations:

  - 8:137 ¶ 3, ik werd daar gehaald om het kwaliteitssysteem op te tuigen rondom het aanvragen medische technologie… in MedTech2 + ClinPhys1
  - 8:145 ¶ 27, ik denk dat dit het onderbelichte ook wel was voor het convenant in

MedTech2 + ClinPhys1
10:17 ¶ 67, waar we wel mee te maken hebben is het convenant veilige toepassing van medische technologie in Procurement4
14:8 ¶ 61, het convenant het beschrijft zit je eigenlijk aan een soort van aanbestedingssystematiek in ClinPhys4
16:10 ¶ 67, het stukje regelgeving wat het meest van toepassing is, is het convenant veilige toepassing medische… in ClinPhys7.txt
18:7 ¶ 79, ik denk dat het convenant niet zo in de weg ligt om het anders te doen als ze denken dat het beter i… in TechPhys1
20:3 ¶ 25, er zijn natuurlijk ontzettend veel relaties tussen artsen die een soort consultant to the Pearl zijn… in Procurement5+6
20:4 ¶ 29, het convenant is meer gericht op kwaliteit, borging van kwaliteit in Procurement5+6
20:31 ¶ 159, ik moet wel zeggen dat het convenant wel helpt in Procurement5+6

- **Financial bias**

Quotations:
8:120 ¶ 31, k denk wel dat in de periferie de focus nog wat meer op de financien ligt dan in de academie in MedTech2 + ClinPhys1
11:10 ¶ 189, ik kan het heel erg onderbouwen ik kan me er heel hard om maken. dan gaat echt het financiële plaatj… in Estate1
12:12 ¶ 75, dat is wel de manier waarop we ermee om moeten gaan want ja de zorg is toch geen vetpot in Finance1
12:13 ¶ 95, met lease wil weer iemand winst maken en de prijs wordt bepaald op economische afschrijving in plaat… in Finance1

- **Financial framework**

Quotations:
12:1 ¶ 7, investeringsverantwoordelijkheid is decentraal neergelegd bij de bedrijfsbureaus in Finance1
12:2 ¶ 7, vanuit centraal geven wij de kaders mee van hoeveel investeringsbudget zij hebben en de afdelingen m… in Finance1
12:6 ¶ 31, in principe moet natuurlijk de divisie zo veel mogelijk zelf opvangen in Finance1
12:10 ¶ 67, dat komt op ons bordje terecht. huisvesting wordt centraal gefinancierd in Finance1
12:11 ¶ 75, eigenlijk is dit wel jaarlijks hetzelfde, je weet natuurlijk hoeveel zorg je levert in Finance1
18:1 ¶ 35, ik geloof dat alles via divisies gaat dus ook geld in TechPhys1

- **Hierarchy**

Quotations:
8:8 ¶ 41, ik kan me niet voorstellen dat elke eigenaar direct iets zou kunnen indienen bij een rvb, daar moet… in MedTech1
11:3 ¶ 47, als de verbouwing een bepaald bedrag overschrijdt, dan moet ook de rvb nog een akkoord geven op de v… in Estate1
11:6 ¶ 91, budgetten worden gewoon toegekend door de financiële afdeling. maar wel in samenspraak met degene di… in Estate1

- **Hospital profile**

Quotations:
8:14 ¶ 59, wij gaan niet innoveren, aanpassen aan medische techniek zodanig dat dat van invloed is op dat als j… in MedTech1
8:16 ¶ 63, kan demografisch en politiek zijn, kan een argument zijn dat een ziekenhuis

zich op een bepaalde man… in MedTech1
8:150 ¶ 59, maar omdat er verder nooit goed overleg geweest is onderling in MedTech2 + ClinPhys1

- **Industry interference**

Quotations:
10:23 ¶ 143, invloed van industrie op dokters ja dat is er natuurlijk, zeker. en daarom is het denk ik ook belang… in Procurement4
11:7 ¶ 123, nou ik denk best dat dat een rol speelt. ik heb er geen zicht op maar ik geloof echt wel dat dat een… in Estate1
14:17 ¶ 127, leveranciers zijn over het algemeen goed op de hoogte van onze vervangingscycli. zeker op de aanscha… in ClinPhys4
20:6 ¶ 43, ij weten soms wat eigenlijk inkoop ook moet faciliteren, dat is markt verkennen, productkennis, inno… in Procurement5+6
20:25 ¶ 131 – 133, invloed vanuit industrie heel veel grip op de artsen. ik heb signalen gekregen dat dit nog groot is… in Procurement5+6

- **Industry interference good**

Quotations:
8:157 ¶ 101, de vraag impliceert dat dat perse slecht is maar als ik bijvoorbeeld een cardioloog ben en pacemaker… in MedTech2 + ClinPhys1
8:158 ¶ 101, maar ik denk ook dat dat bijna niet te doen is. en in mijn optiek is het ook niet wenselijk om het z… in MedTech2 + ClinPhys1
14:15 ¶ 123, de banden met de industrie zijn op zich prima in ClinPhys4
18:4 ¶ 67, dus daarmee een beetje onze wensen op hun mogelijkheden afstemmen en vervolgens het budget tegen het… in TechPhys1
18:5 ¶ 75, het waren echt wel reeele mensen die zich niet ten doel stelde zich uit de markt te prijsen in TechPhys1
20:25 ¶ 131 – 133, invloed vanuit industrie heel veel grip op de artsen. ik heb signalen gekregen dat dit nog groot is… in Procurement5+6

- **Industry relation**

Quotations:
14:20 ¶ 135, die ik vertrouw zover ik ze kan zien, en zelfs dan wil ik het wel heel gedetailleerd kunnen zien in ClinPhys4
14:21 ¶ 135, er zijn leveranciers voor ecg apparatuur eeg apparatuur die we nu vervangen hebben waarvan we zeggen… in ClinPhys4
14:23 ¶ 143, er zijn ook leveranciers die eigenlijk twee gezichten laten zien in ClinPhys4
20:3 ¶ 25, er zijn natuurlijk ontzettend veel relaties tussen artsen die een soort consultant to the Pearl zijn… in Procurement5+6

- **Influence health care insurance industry**

Quotations:
10:22 ¶ 141, invloed van zorgverzekeraars is relatief klein op dit veld in Procurement4
11:8 ¶ 143, ja dat denk ik wel want als je kijkt naar de onderhandelingen die wij jaarlijks voeren met verzekeri… in Estate1
12:14 ¶ 107, kijk bij verzekeraars die staan er nog wat verder vanaf en het zal ze een worst wezen of je een appa… in Finance1

- **Little industry interference**

Quotations:

8:156 ¶ 97, ik denk voor de apparatuur weinig. met die Europese aanbestedingen gaat het redelijk onafhankelijk in MedTech2 + ClinPhys1
16:18 ¶ 119, volgens mij is er niet echt een invloed op ons en volgens mij is dat ook echt heel erg goed dichtget… in ClinPhys7.txt
16:19 ¶ 123, ik geloof niet dat er bij ons daarin verborgen afspraken zijn. in ClinPhys7.txt

- **Mutual trust**

Quotations:
8:15 ¶ 63, als er een echo vervangen gaat worden die komt ter tafel bij de investeringscommissie dan vinden wij… in MedTech1
16:6 ¶ 39, k zou het idealiter gezien fijner vinden als de medisch specialist daar wat meer input heeft maar ik… in ClinPhys7.txt
20:11 ¶ 73, wij moeten ook geaccepteerd worden als een partij die helpt om goeie dingen in Procurement5+6
20:13 ¶ 73, ik denk dat een van de speerpunten van ons is om tussen de oren van iedereen die iets uitgeeft in de… in Procurement5+6
20:15 ¶ 81, ze zien alleen maar dat ze aan de voorkant dingen meoten doen "moet ik dat echt allemaal gaan opschr… in Procurement5+6

- **Participants**

Quotations:
20:27 ¶ 149, ik denk dat wij eerlijker zijn en dat andere inkopers het of niet weten of dat ze het niet vertellen in Procurement5+6

- **Policy stuck**

Quotations:
8:159 ¶ 113, de organisatie is zo groot en bestaande processen die al jaren lopen, om die dan om te buigen dat is… in MedTech2 + ClinPhys1
10:21 ¶ 105, heel vaak krijgen we onze investeringen niet helemaal uitgegeven omdat we gewoon te weinig mensen he… in Procurement4
20:24 ¶ 111, wat de afdeling dus vaak doet, als de investering is afgewezen, dan zoek ik wel wat ruimte in m'n ex… in Procurement5+6

- **Power**

Quotations:
8:27 ¶ 143, zijn wij echt leidend als wij een keurrapport maken op technische grondslag wordt echt ons geen stro… in MedTech1
8:28 ¶ 143, soms denk ik wel eens dat iets teveel macht daarin hebben in MedTech1
8:29 ¶ 145, een belangrijke specialist die hoog in de boom heeft die heel veel in de melk te brokkelen heeft, ja… in MedTech1
8:50 ¶ 53, als iemand een overwicht heeft dan is dat vanuit inkoop, die geeft wel heel duidelijk een kader waar… in MedTech2 + ClinPhys1
14:24 ¶ 143, je ziet alleen dat de macht van de medisch specialist in de laatste jaren best wel wat afneemt in ClinPhys4
14:25 ¶ 147, de voorkeur van de gebruiker een hele zware factor in ClinPhys4
14:27 ¶ 147, is een machtsschaar die je niet heel vaak trekt omdat je er in de meeste gevallen wel uitkomt in ClinPhys4
20:21 ¶ 93, hoe dichter het bij een dokter staat, hoe gevoeliger een product is, hoe minder vaak het wordt aanbe… in Procurement5+6

- **Procedure**

Quotations:

7:15 ¶ 11, Onze eerste start is dat we een projectinitiatiedocument moeten schrijven, wie moeten er meedoen, wa… in Procurement2
7:20 ¶ 55, ja, als je door je oogharen kijkt beschrijft het convenant eigenlijk het aankoopproces zoals we dat… in Procurement2
7:34 ¶ 145, je moet niet achteraan beginne. dat gebeurt soms ook wel eens, dat de keuze al is gemaakt en dat ze… in Procurement2
8:2 ¶ 9, ook vanuit het convenant medische technologie moet dit, elk medisch hulpmiddel hebben wij een rol in… in MedTech1
8:141 ¶ 15, en we baseren dan op de ce klasse eigenlijk in veel gevallen in MedTech2 + ClinPhys1
16:3 ¶ 15, er zijn ook aanschaffen waarbij men eigenlijk al alles uitgewerkt heeft en inkoop aan de gang heeft… in ClinPhys7.txt
18:2 ¶ 43, op basis van de richting van van dat pve wordt een budget opgesteld. voor het budget komt natuurlijk… in TechPhys1
20:2 ¶ 15, dat er aan het einde van het proces wordt gezegd van inkoper ga jij maar lekker onderhandelen. dat i… in Procurement5+6
20:6 ¶ 43, ij weten soms wat eigenlijk inkoop ook moet faciliteren, dat is markt verkennen, productkennis, inno… in Procurement5+6
20:7 ¶ 53, om iets voor elkaar te krijgen naar mis ik wel stabiele projectgerichte keuzes in Procurement5+6
20:14 ¶ 79, heel vaak is de strategie niet ontwikkeld en dan krijg je dus de onrust in Procurement5+6
20:16 ¶ 83, daar hadden ze niet beschreven hoe ze gaan beoordelen en als je dan drie partijen aan tafel hebt wor… in Procurement5+6
20:18 ¶ 87, maar ik merk wel dat het voordeel van die protocollen in de aanbestedingswet, daar kun je ook als in… in Procurement5+6
20:22 ¶ 95, je hebt nog het proportionaliteitsbeginsel, als je een opdracht hebt van 20000 euro ga je niet 5 off… in Procurement5+6
20:30 ¶ 153, in die systeemwereld verschuilen we ons soms achter regels en procedures. terwijl logica veel meer i… in Procurement5+6

- **Program of requirements / RfP**

Quotations:
7:22 ¶ 61, dit is heel moeilijk. soms proberen ze dit wel maar vaak krijgt toch techniek de overhand in het pro… in Procurement2
8:17 ¶ 69 – 71, worden scholingsvereisten ook meegenomen in de keuze? 21:43 P: nee, als je de weegfactoren meeneemt… in MedTech1
8:121 ¶ 41, dat dan wel bij aankoop hoge eisen worden gesteld aan wat er bijvoorbeeld allemaal zichtbaar is, maa… in MedTech2 + ClinPhys1
8:154 ¶ 79, proberen we ook te kijken naar value based procurement waar je dus meer ruimte geeft aan leverancier… in MedTech2 + ClinPhys1
8:155 ¶ 79, dat soort basisdingen wil je dan toch allemaal afdekken in het pve om ergens op terug te kunnen vall… in MedTech2 + ClinPhys1
10:12 ¶ 25, wordt meestal wel redelijk strakke pve's voor opgesteld met alle inhoudsdeskundigen om te kijken waa… in Procurement4
11:4 ¶ 55, je kunt de aanbesteding best wel sturen op het pve in Estate1
16:9 ¶ 51, het is heel moeilijk om daar onderscheidende punten in te zetten die de 1 niet heeft en de ander wel… in ClinPhys7.txt
16:13 ¶ 87, k denk ook zoals ik al noemde, er zijn geen apparaten meer hier op de markt verkrijgbaar die gewoon… in ClinPhys7.txt

- **Project team**

Quotations:
7:10 ¶ 17, het projectteam verschilt per aankoop. de individuen verschillen per keer. in Procurement2

7:11 ¶ 17, er moet een projectleider van de business bij zitten, dit is de trekker van het project. er zitten i… in Procurement2
7:33 ¶ 143, het staat of valt met een goede projectleider, in Procurement2
10:7 ¶ 11, en die zorgen dat er allerlei andere partijen bij aanhaken waaronder inkoop. als ze een buca moeten… in Procurement4
10:8 ¶ 15, ja! wat je vaak ziet in grotere ziekenhuizen is dat ook het management van zo'n eenheid een persoon… in Procurement4
10:13 ¶ 33, meestal weten mensen hierin wel aan te haken die daar redelijkerwijs iets van moet vinden in Procurement4
11:11 ¶ 207, wij kunnen inkoop er bij betrekken aan de voorkant om te kijken wat is nou slim om te doen, wij will… in Estate1
16:3 ¶ 15, er zijn ook aanschaffen waarbij men eigenlijk al alles uitgewerkt heeft en inkoop aan de gang heeft… in ClinPhys7.txt
16:6 ¶ 39, k zou het idealiter gezien fijner vinden als de medisch specialist daar wat meer input heeft maar ik… in ClinPhys7.txt
16:20 ¶ 135, dat wij als medische techniek of ondersteunende of beheerafdeling, toch wat laat aangehaakt worden. in ClinPhys7.txt
20:2 ¶ 15, dat er aan het einde van het proces wordt gezegd van inkoper ga jij maar lekker onderhandelen. dat i… in Procurement5+6
20:7 ¶ 53, om iets voor elkaar te krijgen naar mis ik wel stabiele projectgerichte keuzes in Procurement5+6
20:8 ¶ 55, projectleider soms een KF, wat heel gek is want eigenlijk zou een KF een adviseur moeten zijn. en so… in Procurement5+6
20:20 ¶ 89, er is volgens mij een soort onbewust onbekwaam in Procurement5+6

- **Quality bias**

Quotations:

7:24 ¶ 63, academisch ziekenhuis zijn, willen we wel in de regel state of the art apparatuur hebben. voorbeeld… in Procurement2
7:27 ¶ 85, daar wordt een zegen op gegeven. uiteindelijk als het 4 of 4.5 ton is, gaat niemand meer iets van vi… in Procurement2
7:32 ¶ 139, ik ben geen knaken-inkoper. als ik 10% bespaar vind ik het leuk, als ik 5 bespaar als het 15 is, ik… in Procurement2
8:119 ¶ 31, mijn kijk daarop is wat genuanceerder maar ik ben niet perse de baas. ik denk zeker dat wij af en to… in MedTech2 + ClinPhys1
8:148 ¶ 33, je wil in het academisch ziekenhuis die cutting Edge wel hebben. de vraag is of je dat op alle afdel… in MedTech2 + ClinPhys1
14:5 ¶ 155, over het algemeen kiezen wij tussen mercedes en bmw als we apparatuur kopen, en dat doet iedereen in… in ClinPhys4
14:6 ¶ 155, het is vaak een smaak-keuze, een detail-keuze, maar kwalitatief slecht kiezen wij in Nederlandse zie… in ClinPhys4

- **Regulation perc**

Quotations:

7:2 ¶ 7, voor ct scanners heeft het [redacted] niet echt een voorkeur dus recentelijk hebben we een Europese aanbest… in Procurement2
8:64 ¶ 71, maar op het moment dat je een aanbesteding doet, in die aanbesteding heb je ook een bepaalde prijs k… in MedTech2 + ClinPhys1
8:66 ¶ 75, maar niet als we een aanbesteding doen want [redacted] betaalt dat personeel niet in MedTech2 + ClinPhys1
8:67 ¶ 75, [redacted] wint een aanbesteding op een verhouding tussen de tco en kwaliteitsscore die ze halen, dat i… in MedTech2 + ClinPhys1
8:73 ¶ 89, als wij een Europese aanbesteding doen komt er eigenlijk alleen maar een ce gecertificeerde uitkomst… in MedTech2 + ClinPhys1
8:129 ¶ 57, op die manier vind ik de aanbestedingswet ook een beetje dubbel in

MedTech2 + ClinPhys1
10:16 ¶ 63, wij zijn geen academisch ziekenhuis dus wij zijn niet verplicht europees aan te besteden bijvoorbeel… in Procurement4
10:29 ¶ 171, je zou wel kunnen zeggen dat het een aanbesteding is maar hij hoeft niet te voldoen aan alle voorpri… in Procurement4
11:2 ¶ 31, het gaat vaak om zulke grote bedragen dat het allemaal aanbesteed moet worden in Estate1
11:4 ¶ 55, je kunt de aanbesteding best wel sturen op het pve in Estate1
14:8 ¶ 61, het convenant het beschrijft zit je eigenlijk aan een soort van aanbestedingssystematiek in ClinPhys4

- **Scoring choice**

Quotations:
7:19 ¶ 45, als wij een voorstel doen aan de projectgroep na de aanbesteding en deze komt als beste prijs kwalit… in Procurement2
10:19 ¶ 79, ik denk dat het meest leidend is, de inhoudelijke argumenten om voor een bepaald apparaat te kunnen… in Procurement4
18:8 ¶ 97 – 99, wie bepaalt de scoring? 37:51 P: weet ik niet en daar hebben we het nog niet over gehad, ik denk dat… in TechPhys1

- **Selection bias**

Quotations:
8:126 ¶ 55 – 57, sturing programma van eisen, richting een bepaald apparaat geduwd. in hoeverre speelt dit een rol? 4… in MedTech2 + ClinPhys1
14:18 ¶ 127, uiteraard is de selectie wel iets genuanceerder maar het heeft wel effect. op het moment dat jij zie… in ClinPhys4
14:25 ¶ 147, de voorkeur van de gebruiker een hele zware factor in ClinPhys4
16:11 ¶ 83, daar denk ik dat het stukje gebruikersgemak is geweest en een klein stukje vooroordeel in ClinPhys7.txt
18:6 ¶ 75, werken samen met een zelfde groep uit een ander ziekenhuis en in daar hebben ze nu [redacted] angio sys… in TechPhys1

- **Stick to role**

Quotations:
8:7 ¶ 37, ik zit daar met twee petten op, ik heb een stukje kennis vanuit de medische technologie samen met mi… in MedTech1
8:11 ¶ 45, vind ik dat een inkoop, en een financieel afdeling daar met een financieel bril naar moet kijken in MedTech1
8:12 ¶ 49, het kan natuurlijk best zijn dat ze bepaalde functionele wensen hebben die in hun behandeling heel v… in MedTech1
8:146 ¶ 27, het is goed dat wij vanuit kwaliteit en veiligheid onafhankelijk zijn van inkoopafdeling om een beet… in MedTech2 + ClinPhys1
8:147 ¶ 27, niet dat financien niet belangrijk zijn, als de financiën niet gezond zijn kunnen we de rest ook ver… in MedTech2 + ClinPhys1
11:12 ¶ 203, wij vaak meer objectief kunnen kijken en heb overall plaatje zien en niet alleen maar kijken vanuit… in Estate1
14:3 ¶ 155, mijn rol daarin is heel vaak, zeker in inkooptrajecten, de vervelende vragen stellen, wat hebben we… in ClinPhys4
14:29 ¶ 151, de gebruiker heeft eigenlijk, maakt zijn keuze op basis van functionele dingen, de inhoud, en onders… in ClinPhys4
20:8 ¶ 55, projectleider soms een KF, wat heel gek is want eigenlijk zou een KF een adviseur moeten zijn. en so… in Procurement5+6
20:9 ¶ 67, wat ik dan zie, dan komt er dus heel veel meer op het bordje van de inkoper in Procurement5+6

- **Strategic position**

Quotations:

8:21 ¶ 87, we hebben hier natuurlijk wel een bepaalde visie bij, we streven ernaar bepaalde kennis in huis te h… in MedTech1

8:22 ¶ 101, ik kan me voorstellen dat er nog steeds inkoopvoordelen te behalen vallen met inkoopsamenwerking met… in MedTech1

14:16 ¶ 123, er zijn leveranciers die , dan zitten we met name in de monopolistensfeer, de dominante leveranciers… in ClinPhys4

- **Supplier bias**

Quotations:

7:14 ¶ 9, bij de mri hebben we niet echt een andere inkoopstrategie dan "we willen dezelfde firma. bij ct ben… in Procurement2

8:136 ¶ 109, om die continuïteit in de zorg te kunnen bieden, je raakt gewend aan een bepaald toestel en dan hou… in MedTech2 + ClinPhys1

8:151 ¶ 59, dit heeft ook te maken met patiëntveiligheid, je hebt scholing en gewenning onder medewerkers, je ku… in MedTech2 + ClinPhys1

8:152 ¶ 59, we proberen met die echo groep om het wat kleiner te maken en kijken of we iedereen onder 3-4 aanbie… in MedTech2 + ClinPhys1

14:19 ¶ 135, de leverancier daarvan vertrouw ik in ClinPhys4

18:6 ¶ 75, werken samen met een zelfde groep uit een ander ziekenhuis en in daar hebben ze nu [redacted] angio sys… in TechPhys1

- **Technical devaluation**

Quotations:

7:18 ¶ 41, als een apparaat na 10 jaar nog goed is en voldoet aan wat wij ermee willen doen ga je niet zomaar w… in Procurement2

11:5 ¶ 75, de technische afschrijvingsduur wanneer je aan vervanging toe bent maar op het moment dat zo'n appar… in Estate1

12:4 ¶ 27, je gaat pas vervangen niet bij een economische levensduur maar pas bij de technische levensduur, en… in Finance1

- **Unaware of regulation**

Quotations:

12:7 ¶ 45 – 47, weet jij in hoeverre wetgeving alles beïnvloedt? 11:13 P: nee ik begreep dat je ook met inkoop gaat… in Finance1

ASM main Resources

9 Codes:

- **Advise - board**

Quotations:

8:6 ¶ 33, de investingscommissie is eigenlijk een adviserend orgaan en de rvb is een besluitvormend orgaan in MedTech1

10:14 ¶ 49, opdrachtgever een belangrijke rol heeft. die moet gewoon zorgen dat het proces goed loopt en georgan… in Procurement4

11:1 ¶ 3, maar waar ik met name altijd bij betrokken ben en waar ik ook de raad van bestuur adviseer, is de ve… in Estate1

12:5 ¶ 27, daarin adviseren wij dan de raad van bestuur en die besluit dan op eventuele uitbreidingsinvestering… in Finance1

- **Advise - project team**

Quotations:

8:4 ¶ 29, p basis daarvan adviseren wij de eigenaren of iets vervangen moet gaan worden of niet en wat de urge… in MedTech1

14:22 ¶ 139, k heb een lijstje nu met leveranciers die we graag uit stock willen hebben, en die sluiten we dan ni… in ClinPhys4

16:2 ¶ 11, bij een driekwart heb ik wel enige input, van alles wat er qua apparatuur wordt aangeschaft. in ClinPhys7.txt

16:5 ¶ 23, adviseren wij om het nog een jaar te laten staan of adviseren wij om te vervangen in ClinPhys7.txt

- **Awareness - process**

Quotations:

8:5 ¶ 29, het niet de wens is van de organisatie dat het opeens boven komt drijven, dus wij kijken altijd wel… in MedTech1

20:1 ¶ 11, het is onze missie om inkoop zo ver mogelijk aan de voorkant te betrekken in Procurement5+6

20:13 ¶ 73, ik denk dat een van de speerpunten van ons is om tussen de oren van iedereen die iets uitgeeft in de… in Procurement5+6

20:19 ¶ 89, aan ons de taak om uit te leggen hoe een protocol er goed uit zou moeten zien, maar dat is er niet e… in Procurement5+6

20:26 ¶ 141, waar onze kracht moet zitten is om ook in het hoofd van die specialist te zitten. je wordt beïnvloed… in Procurement5+6

20:29 ¶ 151, maar je kunt er ook gewoon goed gebruik van maken door transparant te zijn, door mee te bewegen, dus… in Procurement5+6

- **Compliance**

Quotations:

7:29 ¶ 139, ik begeleid het proces, ik heb niet het budget en ik schrijf niet het programma van eisen. je moet m… in Procurement2

8:26 ¶ 117, ik zit natuurlijk in het politieke spel soms ook dat als er meer gewenst is dan waar budget voor is… in MedTech1

8:128 ¶ 57, inkoop is daar heel streng in, je mag geen knock out criteria aangeven dat je nog maar 1 aanbieder o… in MedTech2 + ClinPhys1

8:133 ¶ 65, in principe mag dit niet, je mag geen pve samenstellen waar maar 1 leverancier overblijft, dat zegt… in MedTech2 + ClinPhys1

8:135 ¶ 109, waar ik vooral mee zit en wat ik lastig vind is dat het moeilijk is dat je gestandaardiseerd genoeg… in MedTech2 + ClinPhys1

8:139 ¶ 9, dus op het moment dat een aanvraag meer dan 10000 euro tco is, dan vinden wij dat het langs de commi… in MedTech2 + ClinPhys1

8:140 ¶ 15, dan willen we daar toch nog als commissie naar kijken omdat je toch als hele ziekenhuis het risico d… in MedTech2 + ClinPhys1

8:143 ¶ 15, dan moet je wel aantoonbaar kunnen maken dat je aan de voorkant goed hebt nagedacht over bepaalde as… in MedTech2 + ClinPhys1

8:160 ¶ 113, het convenant en de mdr vraagt van ons het voor ieder medisch hulpmiddel het even goed te doen. het… in MedTech2 + ClinPhys1

10:15 ¶ 55 – 57, moet iedereen daarlangs? 13:57 P: ja dat is vanaf een bepaalde grens dat verschilt per ziekenhuis ma… in Procurement4

10:18 ¶ 71, maar je zult er nooit risico's op lopen in die zin, compliance risicos enzo in Procurement4

10:28 ¶ 171, voor grotere aanschaftrajecten, zullen we altijd minimaal drie partijen uitnodigen in zo'n inkooptra… in Procurement4

14:7 ¶ 57, vervolgens ziet de investeringscommissie erop toe dat het selectieproces goed en eerlijk verlopen is in ClinPhys4

14:26 ¶ 147, ondersteundende diensten dus vanuit mij, vanuit veiligheidsaspecten onderhoud en ict dienstverleners… in ClinPhys4
14:28 ¶ 147, we werken hier met een standaar assortiment en je mag niet buiten het standaard assortiment bestelle… in ClinPhys4
16:7 ¶ 39, dan zit er nog een stukje technische kant aan over stralingsdosis, technische eisen, over ict koppel… in ClinPhys7.txt

- **Knowledge - clinical**

Quotations:
18:4 ¶ 67, dus daarmee een beetje onze wensen op hun mogelijkheden afstemmen en vervolgens het budget tegen het… in TechPhys1

- **Knowledge - technical**

Quotations:
8:15 ¶ 63, als er een echo vervangen gaat worden die komt ter tafel bij de investeringscommissie dan vinden wij… in MedTech1
8:18 ¶ 71, wij hebben als organisatie voor gekozen dat wij als afdeling geld verdienen door de contracten wat t… in MedTech1
8:27 ¶ 143, zijn wij echt leidend als wij een keurrapport maken op technische grondslag wordt echt ons geen stro… in MedTech1
8:124 ¶ 53, het vanuit onze beroepsgroep geaccepteerde ruisniveau van soort modaliteiten zijn 10%, dan zal geen… in MedTech2 + ClinPhys1
8:138 ¶ 5, we zijn ongeveer met 8 mensen en dan bespreken we nog eens die prs, even vinger aan de pols wat is h… in MedTech2 + ClinPhys1
8:142 ¶ 15, het kan best zijn dat bijvoorbeeld de ce klasse 2a, maar op basis van ervaring laten we dit toch maa… in MedTech2 + ClinPhys1
16:1 ¶ 7, ik ondersteun daarbij en kijk ook mee naar welke aanvullende eisen daarbij zitten in ClinPhys7.txt
16:2 ¶ 11, bij een driekwart heb ik wel enige input, van alles wat er qua apparatuur wordt aangeschaft. in ClinPhys7.txt
16:5 ¶ 23, adviseren wij om het nog een jaar te laten staan of adviseren wij om te vervangen in ClinPhys7.txt
16:7 ¶ 39, dan zit er nog een stukje technische kant aan over stralingsdosis, technische eisen, over ict koppel… in ClinPhys7.txt

- **Money**

Quotations:
8:3 ¶ 23, dus die doen de aanvraag bij de investeringscommissie die hem wel of niet goedkeuren in MedTech1
8:19 ¶ 79, wij voeren jaargesprekken met onze klanten en daar komt dan uit wat vervangen moet gaan worden, daar… in MedTech1
8:20 ¶ 79, wij reserveren een bedrag voor de te verwachten vervangingen van volgend jaar. in MedTech1
10:9 ¶ 3, ik ben ook lid van een investeringscommissie in Procurement4
12:2 ¶ 7, vanuit centraal geven wij de kaders mee van hoeveel investeringsbudget zij hebben en de afdelingen m… in Finance1
12:3 ¶ 15, binnen dat investeringskader heeft de divisie dan de opdracht om daarbinnen te blijven dan wel maatr… in Finance1
12:5 ¶ 27, daarin adviseren wij dan de raad van bestuur en die besluit dan op eventuele uitbreidingsinvestering… in Finance1
12:9 ¶ 55, natuurlijk ook kosten aan verbonden en die moeten natuurlijk wel door ons goedgekeurd worde in Finance1
14:11 ¶ 91, wat hier gebeurt is dat het budget voor investeringen zowel vervangen of uitbreidingen ligt bij de i… in ClinPhys4

14:13 ¶ 95, investeringscommissie kan ook zeggen, is allemaal leuk en aardig maar als je het op de 1.1 miljoen h… in ClinPhys4
16:4 ¶ 23, de rvb accordeert dit dat en in januari worden die investeringsnummers vrijgegeven in ClinPhys7.txt

- **Procurement strategy**

Quotations:

7:34 ¶ 145, je moet niet achteraan beginne. dat gebeurt soms ook wel eens, dat de keuze al is gemaakt en dat ze… in Procurement2
8:18 ¶ 71, wij hebben als organisatie voor gekozen dat wij als afdeling geld verdienen door de contracten wat t… in MedTech1
8:127 ¶ 57, inkoop is daar handig in. ze moeten minimaal zoveel omzet hebben, in Nederland vertegenwoordigd zijn… in MedTech2 + ClinPhys1
10:30 ¶ 175, ja ligt een beetje aan de strategie die de strategisch inkoper verstandig acht om zijn doelen te ber… in Procurement4
14:4 ¶ 155, als wij zeggen wij willen een bepaalde leverancier vanuit de ondersteundende diensten liever niet h… in ClinPhys4
14:22 ¶ 139, k heb een lijstje nu met leveranciers die we graag uit stock willen hebben, en die sluiten we dan ni… in ClinPhys4

- **Awareness - market**

Quotations:

8:158 ¶ 101, maar ik denk ook dat dat bijna niet te doen is. en in mijn optiek is het ook niet wenselijk om het z… in MedTech2 + ClinPhys1
18:3 ¶ 67, daar kwam een pve uit dat hebben we voorgelegd aan [redacted] in TechPhys1
20:17 ¶ 87, je moet de markt vertellen waar je op gaat letten waar gaat op gescoord worden in Procurement5+6
20:26 ¶ 141, waar onze kracht moet zitten is om ook in het hoofd van die specialist te zitten. je wordt beïnvloed… in Procurement5+6
20:28 ¶ 151, inkoop is geen doel op zich, het is een middel om je belangen te behartigen. en om de markt optimaal… in Procurement5+6

ASM main Values

15 Codes:

- **Awareness - process**

Quotations:

8:5 ¶ 29, het niet de wens is van de organisatie dat het opeens boven komt drijven, dus wij kijken altijd wel… in MedTech1
20:1 ¶ 11, het is onze missie om inkoop zo ver mogelijk aan de voorkant te betrekken in Procurement5+6
20:13 ¶ 73, ik denk dat een van de speerpunten van ons is om tussen de oren van iedereen die iets uitgeeft in de… in Procurement5+6
20:19 ¶ 89, aan ons de taak om uit te leggen hoe een protocol er goed uit zou moeten zien, maar dat is er niet e… in Procurement5+6
20:26 ¶ 141, waar onze kracht moet zitten is om ook in het hoofd van die specialist te zitten. je wordt beïnvloed… in Procurement5+6
20:29 ¶ 151, maar je kunt er ook gewoon goed gebruik van maken door transparant te zijn, door mee te bewegen, dus… in Procurement5+6

- **Availability equipment**

Quotations:

10:25 ¶ 163, vind ik het belangrijk dat het ziekenhuis kan beschikken over z'n spullen, dat ze niet hoeven misgri… in Procurement4
14:1 ¶ 155, ik zie mijn werk als heel erg dienstverlenend naar dokters toe. ik bedien de dokters met de goede te… in ClinPhys4

- **Awareness - market**

Quotations:
8:158 ¶ 101, maar ik denk ook dat dat bijna niet te doen is. en in mijn optiek is het ook niet wenselijk om het z… in MedTech2 + ClinPhys1
18:3 ¶ 67, daar kwam een pve uit dat hebben we voorgelegd aan [redacted] in TechPhys1
20:17 ¶ 87, je moet de markt vertellen waar je op gaat letten waar gaat op gescoord worden in Procurement5+6
20:26 ¶ 141, waar onze kracht moet zitten is om ook in het hoofd van die specialist te zitten. je wordt beïnvloed… in Procurement5+6
20:28 ¶ 151, inkoop is geen doel op zich, het is een middel om je belangen te behartigen. en om de markt optimaal… in Procurement5+6

- **Corporate Social Responsibility**

Quotations:
7:23 ¶ 63, wat wij vanuit inkoop proberen is dat wij mensen willen laten nadenken over maatschappelijk verantwo… in Procurement2
7:31 ¶ 139, vanuit inkoop proberen wij een stukje van maatschappelijk verantwoord inkopen op de agenda te krijge… in Procurement2
7:37 ¶ 63, 22:04 P: wat wij vanuit inkoop proberen is dat wij mensen willen laten nadenken over maatschappelijk… in Procurement2
7:38 ¶ 139, 47:02 P: het ligt natuurlijk een beetje aan de projectdoelstelling. ik wil in het proces bijdragen a… in Procurement2
14:9 ¶ 75, inruilen van apparatuur is min of meer standaard, we willen graag terugleveren aan de leverancier. w… in ClinPhys4

- **Decision maker**

Quotations:
16:12 ¶ 83, uiteindelijk zat er qua prijs ook niet zo heel veel verschil in, dus voor mij technisch gezien volde… in ClinPhys7.txt
16:17 ¶ 111, daar ben ik niet zo'n voorstander van omdat je dan ook die vrije keuze uit handen geeft. in ClinPhys7.txt
20:10 ¶ 67, ik waak er altijd voor dat het niet ook de inkoper is die het besluit gaat nemen in Procurement5+6

- **Good contract**

Quotations:
7:30 ¶ 139, ik wil altijd een goed contract hebben, in Procurement2
7:35 ¶ 149, dan gaan we niet eens zozeer meer over die prijs zitten boeken. we proberen de voorwaarden over aans… in Procurement2
16:15 ¶ 87, wij kijken ook wel een beetje naar de service organisatie maar ook dat is bij de grote spelers als d… in ClinPhys7.txt
20:23 ¶ 111, we proberen natuurlijk zoveel mogelijk ons eigen raamcontract te gebruiken in Procurement5+6

- **Objectivity**

Quotations:

7:21 ¶ 61, wij proberen altijd de gebruikers te bewegen om dingen functioneel te beschrijven in Procurement2
8:44 ¶ 41, ja hier hebben we het zeker over gehad. wat opviel in de discussies is dat dan wel bij aankoop hoge… in MedTech2 + ClinPhys1
8:55 ¶ 57, soms is de functionaliteit wat groter en soms ben je gewoon heel erg gehecht aan bepaalde functional… in MedTech2 + ClinPhys1
8:60 ¶ 67, nee hier heb ik nooit van gehoord en ik vind het een vreemde gang van zaken. mijn gevoel zegt dat je… in MedTech2 + ClinPhys1
8:69 ¶ 79, value based procurement, dit is wel lastig. wij hebben dat gedaan bij onze pacs aanbesteding, en een… in MedTech2 + ClinPhys1
8:79 ¶ 101, de vraag impliceert dat dat perse slecht is maar als ik bijvoorbeeld een cardioloog ben en pacemaker… in MedTech2 + ClinPhys1
8:122 ¶ 41, zouden we eigenlijk wat objectiever in willen staan zodat je kan borgen dat je die resolutie haalt o… in MedTech2 + ClinPhys1
8:123 ¶ 41, je wil gewoon dingen kunnen zien je wil een goede beeldkwaliteit, je zou meer inhoudelijk, ik als fy… in MedTech2 + ClinPhys1
8:148 ¶ 33, je wil in het academisch ziekenhuis die cutting Edge wel hebben. de vraag is of je dat op alle afdel… in MedTech2 + ClinPhys1
11:9 ¶ 157, zorgen dat alle belangen worden gewogen en niet alleen maar kosten en niet alleen maar dat chirurg a… in Estate1
14:2 ¶ 155, je stuurt op een balans tussen prijs kwaliteit veiligheid en functionaliteit in ClinPhys4

- **Patient outcome**

Quotations:

7:25 ¶ 67, patient outcome is veel belangrijker dan andere zaken, we kunnen best wel wat meer geld uitgeven, zo… in Procurement2
10:26 ¶ 163, ik vind het heel belagnrijk om voor het ziekenhuis de zadelijke kant te organiseren. een ziekenhuis… in Procurement4
10:27 ¶ 163, we willen het gewoon goed regelen voor het ziekenhuis. dat dat in stilte loopt en dat gewoon het zie… in Procurement4
11:9 ¶ 157, zorgen dat alle belangen worden gewogen en niet alleen maar kosten en niet alleen maar dat chirurg a… in Estate1
14:1 ¶ 155, ik zie mijn werk als heel erg dienstverlenend naar dokters toe. ik bedien de dokters met de goede te… in ClinPhys4
16:8 ¶ 47, hoe zorg je ervoor dat de uitval geminimaliseerd wordt, dat je de continueiteit van je afdeling, hoe… in ClinPhys7.txt
20:13 ¶ 73, ik denk dat een van de speerpunten van ons is om tussen de oren van iedereen die iets uitgeeft in de… in Procurement5+6

- **Price/quality**

Quotations:

7:19 ¶ 45, als wij een voorstel doen aan de projectgroep na de aanbesteding en deze komt als beste prijs kwalit… in Procurement2
8:25 ¶ 117, de rol van mij en mijn afdeling is vooral in de breedste zin een kenniscentrum zijn voor de organisa… in MedTech1
8:147 ¶ 27, niet dat financien niet belangrijk zijn, als de financiën niet gezond zijn kunnen we de rest ook ver… in MedTech2 + ClinPhys1
8:149 ¶ 33, efficiënt met je resources kan omgaan in MedTech2 + ClinPhys1
12:15 ¶ 153, iedereen goed kan werken maar dat we wel doelmatigheid stimuleren in Finance1
12:16 ¶ 153, afdelingen prikkelen dat zij niet zomaar zeggen we betalen de lijstprijs in Finance1
14:2 ¶ 155, je stuurt op een balans tussen prijs kwaliteit veiligheid en functionaliteit in ClinPhys4

20:12 ¶ 73, de prijs kwaliteit verhouding goed te houden voor ons ziekenhuis in Procurement5+6

- **Pursue project goal**

Quotations:

7:28 ¶ 139, ik wil in het proces bijdragen aan de projectdoelstelling. als deze is wij willen besparen, zal ik d… in Procurement2

10:27 ¶ 163, we willen het gewoon goed regelen voor het ziekenhuis. dat dat in stilte loopt en dat gewoon het zie… in Procurement4

- **Safety**

Quotations:

8:9 ¶ 45, ik zie onze rol als het borgen van het veilig kunnen werken, het omgaan met med tech, en ja die rol… in MedTech1

8:10 ¶ 45, maar wij kijken nu echt met een technische bril, is iets end of service, is iets veelvuldig defect,… in MedTech1

8:13 ¶ 59, ik zit daar wel met een visie op patiëntveiligheid. in MedTech1

8:25 ¶ 117, de rol van mij en mijn afdeling is vooral in de breedste zin een kenniscentrum zijn voor de organisa… in MedTech1

8:125 ¶ 57, je wil niet bij een vage indiaanse leverancier uitkomen di niemand kent in MedTech2 + ClinPhys1

8:144 ¶ 27, de focus van ons ligt met name op patiëntveiligheid in MedTech2 + ClinPhys1

8:147 ¶ 27, niet dat financien niet belangrijk zijn, als de financiën niet gezond zijn kunnen we de rest ook ver… in MedTech2 + ClinPhys1

14:2 ¶ 155, je stuurt op een balans tussen prijs kwaliteit veiligheid en functionaliteit in ClinPhys4

16:8 ¶ 47, hoe zorg je ervoor dat de uitval geminimaliseerd wordt, dat je de continueiteit van je afdeling, hoe… in ClinPhys7.txt

18:6 ¶ 75, werken samen met een zelfde groep uit een ander ziekenhuis en in daar hebben ze nu  angio sys… in TechPhys1

- **Standardization**

Quotations:

8:130 ¶ 57, maar soms heb je, als je op je afdeling al 10 siemens echografietoestellen hebt staan en je gaat een… in MedTech2 + ClinPhys1

8:135 ¶ 109, waar ik vooral mee zit en wat ik lastig vind is dat het moeilijk is dat je gestandaardiseerd genoeg… in MedTech2 + ClinPhys1

18:6 ¶ 75, werken samen met een zelfde groep uit een ander ziekenhuis en in daar hebben ze nu  angio sys… in TechPhys1

- **State of the art**

Quotations:

7:24 ¶ 63, academisch ziekenhuis zijn, willen we wel in de regel state of the art apparatuur hebben. voorbeeld… in Procurement2

8:148 ¶ 33, je wil in het academisch ziekenhuis die cutting Edge wel hebben. de vraag is of je dat op alle afdel… in MedTech2 + ClinPhys1

14:10 ¶ 79, in de basis in heel veel situaties de kwaliteit boven de financiën uit laten gaan in ClinPhys4

- **Team up physicians**

Quotations:

10:24 ¶ 143, wat voor ons ook heel belangrijk is dat we ons ook goed teamen met de dokters in Procurement4

- **Value based procurement**

Quotations:

8:68 ¶ 79, dat gebeurt mondjesmaat wel, value based procurement, dit is wel lastig in MedTech2 + ClinPhys1

8:69 ¶ 79, value based procurement, dit is wel lastig. wij hebben dat gedaan bij onze pacs aanbesteding, en een… in MedTech2 + ClinPhys1

10:20 ¶ 93, ja, wij willen ook in ons inkoopbeleid gaan vastleggen dat we dit soort dingen formeel ook meewegen… in Procurement4

C

REGULATION CODING

ATLAS.ti Report

Procurement MedTech

Codes

Filter:
Filter codes in group External - Regulation

Report created by Bor Ditewig on 15 Jul 2021

Regulation - Covenant Medical Technology

Quotations:

7:47 ¶51, en wat al jaren een belangrijk item is is het convenant medische technologie waar je duidelijk als p… in Procurement2

7:48 ¶55, ja, als je door je oogharen kijkt beschrijft het convenant eigenlijk het aankoopproces zoals we dat… in Procurement2

8:35 ¶9, ook vanuit het convenant medische technologie moet dit, elk medisch hulpmiddel hebben wij een rol in… in MedTech1

8:36 ¶147, wij richten alles in volgens het convenant. wij laten ons ook auditen op basis van het convenant. in MedTech1

8:168 ¶113, het convenant en de mdr vraagt van ons het voor ieder medisch hulpmiddel het even goed te doen. het… in MedTech2 + ClinPhys1

8:174 ¶3, in het kader van het convenant medische technologie, daar begon het voor ons en voor mij. toen zijn… in MedTech2 + ClinPhys1

8:175 ¶25, destijds naar aanleiding van het convenant hebben we toenadering gezocht met andere [redacted] soortgenot… in MedTech2 + ClinPhys1

8:176 ¶27, de focus van ons ligt met name op patiëntveiligheid. ik denk dat dit het onderbelichte ook wel was v… in MedTech2 + ClinPhys1

10:38 ¶67, waar we wel mee te maken hebben is het convenant veilige toepassing van medische technologie, dat is… in Procurement4

14:33 ¶61, in het aanschaftraject moeten we ons ook conformeren aan het convenant medische technologie als ziek… in ClinPhys4

14:34 ¶61, en daarbij hinkt het convenant ook een beetje op twee gedachten, aan de ene kant moet je met pve's,… in ClinPhys4

16:29 ¶67, het stukje regelgeving wat het meest van toepassing is, is het convenant veilige toepassing medische… in ClinPhys7.txt

18:14 ¶79, ja dat klopt. voor zover ik weet. tegelijk ben je ook helemaal vrij om een ander apparaat... kijk di… in TechPhys1

20:36 ¶25, ja minder ja. minder maar ook wel een beetje. dan praat ik even als inkoper van mijn vorige baan wan… in Procurement5+6

20:37 ¶27, het convenant is heel erg erg gericht op kwaliteit en inhoud dus dat je bepaalde producten niet zoma… in Procurement5+6

20:38 ¶159, ik moet wel zeggen dat het convenant wel helpt. het convenant is er nog niet zo lang en wordt ook no… in Procurement5+6

Regulation - Covenant Medical Technology NA

Quotations:

20:35 ¶23, dat convenant, is volgens mij heel erg ingestoken op betrouwbaarheid, garantie, keurmerken, ce dat s… in Procurement5+6

Regulation - MDR

Quotations:

8:33 ¶57, mdr, toen ze nog intended use en de rol van leveranciers en fabrikanten en het zelf wel of geen ding… in MedTech1

8:34 ¶59, wij hebben ervoor gekozen om niet als producent aangemerkt te kunnen worden in het kader van de mdr… in MedTech1

8:165 ¶21, ja, in zoverre, we hebben het proces helemaal. as we speak zijn we daar nog mee bezig, we hebben dat… in MedTech2 + ClinPhys1

8:166 ¶25, ja dat hebben we, sterker nog, eigenlijk zijn CP en ik ooit met leiden begonnen. destijds naar aanle… in MedTech2 + ClinPhys1

8:167 ¶83, formeel kijken we er wel buiten. als je wil afwijken. onder de mdr hebben we dat nader bekeken. afwi… in MedTech2 + ClinPhys1

8:168 ¶113, het convenant en de mdr vraagt van ons het voor ieder medisch hulpmiddel het even goed te doen. het… in MedTech2 + ClinPhys1

16:26 ¶143, nou je hebt een post market surveillance en dat is een verplichting voor de leveranciers. je hebt ee… in ClinPhys7.txt

18:12 ¶111, daar zullen we dus afspraken over gaan maken, hoe die data vergaard wordt. dat is wel echt voor een… in TechPhys1

Regulation - MDR NA

Quotations:

7:39 ¶49, nou of de MDR specifiek invloed heeft op de keuze dat denk ik niet. zoals wij het vanuit inkoop zien… in Procurement2

10:35 ¶65, de mdr hebben we zeker wel mee te maken maar voor apparatuur aanschaf heeft dat niet heel veel impac… in Procurement4

12:20 ¶47, nee ik begreep dat je ook met inkoop gaat praten, die hebben daar natuurlijk veel meer mee te maken.… in Finance1

16:27 ¶67, de mdr zit er bij ons met name meer in de verbruiksartikelen omdat in de mdr ook echt staat dat als… in ClinPhys7.txt

Regulation - Tender

Quotations:

7:41 ¶7, voor ct scanners heeft het [redacted] niet echt een voorkeur dus recentelijk hebben we een Europese aanbest… in Procurement2

7:42 ¶45, a de projectleider trekt het project dus die moet dat team in goede banen leiden. uiteindelijk is de… in Procurement2

7:43 ¶51, er zijn natuurlijk wel andere wet en regelgeving waar we rekening mee moeten houden. ik heb natuurli… in Procurement2

7:44 ¶97, nou wat we dan doen is dat wij, dat doen we open en transparant, je hebt een Europese aanbesteding t… in Procurement2

7:45 ¶161, er zit een heel verhaal bij als je een aanbesteding doet. projectintiatiedocuemnt, marktonderzoek, P… in Procurement2

7:46 ¶181, testen, nog een stap hiertussen. als je de aanbesteding doet heb je eerst de beoordeling, dit gebeur… in Procurement2

8:133 ¶65, in principe mag dit niet, je mag geen pve samenstellen waar maar 1 leverancier overblijft, dat zegt… in MedTech2 + ClinPhys1

8:162 ¶97, met die Europese aanbestedingen gaat het redelijk onafhankelijk. in MedTech2 + ClinPhys1

8:169 ¶109, zodat je niet een soort van tender lock in situatie krijgt. in MedTech2 + ClinPhys1

8:170 ¶57, p die manier vind ik de aanbestedingswet ook een beetje dubbel, aan de ene kant is het heel goed, bi… in MedTech2 + ClinPhys1

8:171 ¶71, , maar op het moment dat je een aanbesteding doet, in die aanbesteding heb je ook een bepaalde prijs… in MedTech2 + ClinPhys1

8:172 ¶89, als wij een Europese aanbesteding doen komt er eigenlijk alleen maar een ce gecertificeerde uitkomst… in MedTech2 + ClinPhys1

8:173 ¶101, ik snap dat de aanbestedingswet dat niet beoogt. in MedTech2 + ClinPhys1

11:16 ¶55, a vaak heb je al een een soort van raamcontract afgesloten en vallen bepaalde apparatuur vallen binn… in Estate1

11:17 ¶55, is dat elektrisch gekoeld of watergekoeld. en op het moment dat jij in je pve zegt, ik wil elektrisc… in Estate1

11:18 ¶59, aanbestedingswet ja in Estate1

18:13 ¶67, nou nee er was al een opzet van het pve dat is al een keer langs alle mensen uit de commissie, aanbe… in TechPhys1

Regulation - Tender NA

Quotations:

10:36 ¶63, aanbestedingswet wil ik wel wat over zeggen. wij zijn geen academisch ziekenhuis dus wij zijn niet v… in Procurement4

10:37 ¶171, voor grotere aanschaftrajecten, zullen we altijd minimaal drie partijen uitnodigen in zo'n inkooptra… in Procurement4

12:21 ¶145, dit gaat toch een beetje buiten financiën om. wij stellen de financiële kaders en daar komt uit van… in Finance1

14:32 ¶61, ja je wordt natuurlijk door een aantal, het is een beetje hoe ver je gaat. je hebt natuurlijk een ho… in ClinPhys4

16:28 ¶91, precies, wij hebben geen aanbestedingsplicht, dus wij kunnen ook als we zouden willen vooraf partije… in ClinPhys7.txt

20:34 ¶19, we zijn niet aanbestedingsplichtig in de zin van de europese aanbestedingswet. in Procurement5+6

D

HOSPITAL FINANCES BY CBS

Datum: 15-07-2021 / 15:34

Zorginstellingen; financiën en personeel

: **Gewijzigd op: 11 maart 2021**

Perioden: 2019*

Onderwerp		Bedrijfstakken/branches (SBI 2008)		
		86101 Universitair medisch centra	86102 Algemene ziekenhuizen	86103 Categorale ziekenhuizen
Middelgrote en grote ondernemingen				
Aantal middelgr. en grote ondernemingen	**aantal**	8	57	17
Verlies- en winstrekening				
Bedrijfsopbrengsten	**mln**			
Totaal bedrijfsopbrengsten	**euro**	9 544	19 398	1 509
Netto omzet	**mln**			
Totaal netto omzet	**euro**	6 336	17 980	1 282
Opbrengsten Wlz	**mln**			
	euro	0	542	3
Opbrengsten Zvw	**mln**			
Totaal opbrengsten Zvw	**euro**	5 265	16 764	1 181
Opbrengsten DBC's	**mln**			
	euro	.	.	.
Opbrengsten overige Zvw-zorg	**mln**			
	euro	.	.	.
Opbrengsten Wmo	**mln**			
	euro	0	31	2
Opbrengsten Jeugdwet	**mln**			
	euro	20	4	1
Overige netto omzet	**mln**			
Totaal overige netto omzet	**euro**	1 051	639	94
Overige zorgprestaties	**mln**			
	euro	179	398	10
Overige dienstverlening	**mln**			
	euro	872	241	84
Overige bedrijfsopbrengsten	**mln**			
Totaal overige bedrijfsopbrengsten	**euro**	3 208	1 418	227
Subsidies (excl. Wmo en Jeugdwet)	**mln**			
	euro	2 598	768	148
Niet eerder genoemde bedrijfsopbrengsten	**mln**			
	euro	611	650	79
Bedrijfskosten	**mln**			
Totaal bedrijfskosten	**euro**	9 360	18 839	1 462
Arbeidskosten	**mln**			

Totaal arbeidskosten	**euro**	5 107	8 738	821
Lonen en salarissen	**mln euro**	4 034	7 058	665
Pensioenlasten en sociale lasten	**mln euro**	1 072	1 680	156
Honorariumkosten vrijgev. med. spec.	**mln euro**	31	2 201	11
Afschrijvingen op vaste activa	**mln euro**	522	1 161	79
Bijzondere waardeverminderingen	**mln euro**	3	1	1
Overige bedrijfskosten	**mln**			
Totaal overige bedrijfskosten	**euro**	3 697	6 738	549
Overige personeelskosten	**mln**			
Totaal overige personeelskosten	**euro**	534	868	98
Kosten uitzendkrachten en overige inleen	**mln euro**	331	478	59
Niet eerder genoemde personeelskosten	**mln euro**	203	390	39
Niet eerder genoemde bedrijfskosten	**mln**			
Totaal niet eerder genoemde bedr.kosten	**euro**	3 162	5 870	450
Voeding en hotelmatige kosten	**mln euro**	170	472	30
Algemene kosten	**mln euro**	590	1 014	108
Cliënt- en bewonersgebonden kosten	**mln euro**	2 075	3 924	275
Onderhouds- en energiekosten	**mln euro**	198	327	26
Huur/operationele leasing kap.goederen	**mln euro**	58	92	12
Andere bedrijfskosten	**mln euro**	72	42	-1
Bedrijfsresultaat	**mln euro**	184	559	47
Financieel resultaat	**mln**			
Financiële baten	**euro**	6	9	1
Financiële lasten	**mln euro**	101	271	17
Financieel resultaat	**mln euro**	-95	-262	-16
Buitengewone resultaat	**mln**			
Buitengewone baten	**euro**			
Buitengewone lasten	**mln euro**			
Buitengewoon resultaat	**mln euro**			
Resultaat voor belastingen	**mln euro**	90	298	32

Balans				
Balans activa eindstand	**mln**			
Totaal activa	**euro**	8 850	16 198	1 398
Immateriële vaste activa	**mln**			
	euro	159	318	5
Materiële vaste activa	**mln**			
	euro	4 847	10 255	863
Financiële vaste activa	**mln**			
Totaal financiële vaste activa	**euro**	240	133	4
Deelnemingen	**mln**			
	euro	47	74	0
Overige langlopende vorderingen	**mln**			
	euro	193	58	4
Voorraden en onderhanden werk	**mln**			
Totaal voorraden en onderhanden werk	**euro**	337	541	50
Voorraden	**mln**			
	euro	114	280	17
Onderhanden werk DBC's	**mln**			
	euro	222	261	34
Kortlopende vorderingen	**mln**			
Totaal kortlopende vorderingen	**euro**	1 973	3 281	253
Vorderingen op debiteuren	**mln**			
	euro	510	1 526	99
Vorderingen u.h.v. bekostiging	**mln**			
	euro	1	11	0
Overige kortlopende vorderingen	**mln**			
	euro	1 462	1 744	154
Effecten	**mln**			
	euro	0	22	10
Liquide middelen	**mln**			
	euro	1 295	1 648	212
Balans passiva eindstand	**mln**			
Totaal passiva	**euro**	8 850	16 198	1 398
Eigen vermogen	**mln**			
	euro	2 980	4 795	432
Voorzieningen	**mln**			
	euro	496	739	28
Langlopende schulden	**mln**			
	euro	3 146	6 237	466
Kortlopende schulden	**mln**			
Totaal kortlopende schulden	**euro**	2 228	4 428	473
Schulden aan kredietinstellingen	**mln**			
	euro	4	48	0
Crediteuren	**mln**			
	euro	314	703	68
Aflossingsverplichting langlop. lening	**mln**			
	euro	179	644	38
Schulden u.h.v. bekostiging	**mln**			
	euro	1	74	4

Overige kortlopende schulden	**mln euro**	1 729	2 959	363
Materiële vaste activa (mutaties)	**mln**			
Boekwaarde per 1 januari	**euro**	4 827	10 251	829
Investeringen	**mln**			
	euro	549	1 160	117
Herwaarderingen	**mln**			
	euro	0	0	0
Desinvesteringen	**mln**			
	euro	10	52	2
Afschrijvingen	**mln**			
	euro	515	1 094	80
Bijzondere waardeverminderingen	**mln**			
	euro	3	-1	1
Terugname afgeschreven activa	**mln**			
	euro	0	11	0
Boekwaarde per 31 december	**mln**			
	euro	4 847	10 255	863
Spec. financieringsverschil verslagjaar	**mln**			
Wettelijk budget verslagjaar	**euro**	0	528	2
Opbrengsten ter dekking wettelijk budg.	**mln**			
	euro	0	517	2
Financieringsverschil budget-opbrengsten	**mln**			
	euro	0	10	0
Personeel				
Banen werknemers	**aantal**	84 050	194 100	16 200
Arbeidsjaren werknemers	**aantal**	68 050	142 850	12 250
Lonen (incl. bijz. beloning en overw.)	**mln**			
	euro	4 635	7 929	739
Kleine ondernemingen				
Aantal kleine ondernemingen	**aantal**	0	0	0
Personeel				
Banen werknemers kleine ond.	**aantal**			
Arbeidsjaren werknemers kleine ond.	**aantal**			
Lonen kleine ond. (inc. bijz. en overw.)	**mln**			
	euro			
Zelfstandigen				
Aantal zelfstandigen kleine ond.	**aantal**			
Winst zelfstandigen kleine ond.	**mln**			
	euro			

Bron: CBS

E

EXTERNAL INFLUENCE

ATLAS.ti Report

Procurement MedTech

Codes (selection)

Report created by Bor Ditewig on 15 Jul 2021

○ Industry - Insurance

Quotations:

7:49 ¶113, van zorgverzekeraars weet ik het niet, het zou me trouwens verbazen als die zeggen je moet werken me… in Procurement2

8:37 ¶91, het kan best zijn dat de rvb bepaalde samenwerkingen aangaat met andere partijen of dat de rvb met d… in MedTech1

8:38 ¶91, net zoals een verzekeringsmaatschappij kan zeggen hee wij stoppen met het vergoeden van die behandel… in MedTech1

8:79 ¶101, de vraag impliceert dat dat perse slecht is maar als ik bijvoorbeeld een cardioloog ben en pacemaker… in MedTech2 + ClinPhys1

8:177 ¶97, verzekeringen merk ik niks van. ik heb nog nooit gehoord dat bepaalde scanners of implantaten niet v… in MedTech2 + ClinPhys1

10:39 ¶141, invloed van zorgverzekeraars is relatief klein op dit veld. het kan natuurlijk zo zijn dat, ze hebbe… in Procurement4

11:19 ¶87, weet je de zorgverzekeraar heeft daar ook wel een beetje de vinger in de pap he. in Estate1

11:20 ¶123, nou ik denk best dat dat een rol speelt. ik heb er geen zicht op maar ik geloof echt wel dat dat een… in Estate1

11:21 ¶135, ik kan me zo voorstelen dat op het moment dat jij 100 ct's draait en jij krijgt er maar 60 vergoed v… in Estate1

11:22 ¶143, ja dat denk ik wel want als je kijkt naar de onderhandelingen die wij jaarlijks voeren met verzekeri… in Estate1

12:22 ¶107, kijk bij verzekeraars die staan er nog wat verder vanaf en het zal ze een worst wezen of je een appa… in Finance1

12:23 ¶119, laten we het zo zeggen, de gesprekken gaan vooral over de hoogte daarvan en wat is academisch en wat… in Finance1

12:24 ¶141, extern natuurlijk vanuit regelgeving of afspraken die daarvoor gemaakt worden door de koepels. dus d… in Finance1

16:30 ¶119, verzekeringsmaatschappijen voor zover ik het weet niet. net zoals elk ziekenhuis zitten wij jaarlijk… in ClinPhys7.txt

20:39 ¶123, die da vinci robot dat weet ik wel, heb ik ook over gelezen, dat het eigenlijk omdat het veel aanges… in Procurement5+6

Industry - Interference

Quotations:

10:40 ¶151, wat er eigenlijk in die gedragscode staat is dat de rvb op de hoogte is van alle lijntjes tussen ind… in Procurement4

10:41 ¶143, invloed van industrie op dokters ja dat is er natuurlijk, zeker. en daarom is het denk ik ook belang… in Procurement4

14:35 ¶123, de banden met de industrie zijn op zich prima. met heel veel leveranciers hebben we gewoon goede wer… in ClinPhys4

18:15 ¶67, daar kwam een pve uit dat hebben we voorgelegd aan [redacted] in een online vergadering waarin ook een… in TechPhys1

20:40 ¶149, ik denk dat wij eerlijker zijn en dat andere inkopers het of niet weten of dat ze het niet vertellen… in Procurement5+6

20:41 ¶133, ja. die is heel groot. ze werken met elkaar samen he, zoals ik zei, ze kunnen niet zonder elkaar. er… in Procurement5+6

20:42 ¶15, in de zin van dat artsen en de industrie elkaar heel hard nodig hebben. dat is een soort, de industr… in Procurement5+6

Industry - No interference

Quotations:

7:50 ¶113, vanuit fabrikanten zullen zij misschien wel mensen willen beïnvloeden van kijk eens wat een mooi app… in Procurement2

8:178 ¶97, ik denk voor de apparatuur weinig. met die Europese aanbestedingen gaat het redelijk onafhankelijk.… in MedTech2 + ClinPhys1

12:25 ¶137, dat is niet bij ons nee. wij maken dat besluit ook niet. in Finance1

12:26 ¶145, dit gaat toch een beetje buiten financiën om. wij stellen de financiële kaders en daar komt uit van… in Finance1

16:31 ¶119, en vanuit de industrie ook niet echt, we hebben dat toch nog steeds zelf allemaal in eigen hand. tuu… in ClinPhys7.txt

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CONTRACT TYPE

ATLAS.ti Report

Procurement MedTech

Codes (selection)

Report created by Bor Ditewig on 9 Aug 2021

• Contract-buy

Quotations:

7:51 ¶89, voor de medische apparaten is koop in 99% in Procurement2
8:39 ¶87, ja we hebben hier natuurlijk wel een bepaalde visie bij, we streven ernaar bepaalde kennis in huis t… in MedTech1
8:41 ¶79, wij reserveren als organisatie niets. in mijn vorige organisatie ben ik gewend dat als je bijvoorbee… in MedTech1
8:179 ¶93, ik denk dat het allemaal wel voorkomt maar heel weinig. wij hebben de voorkeur om dingen gewoon aan… in MedTech2 + ClinPhys1
10:43 ¶121, als je best wel veel cash hebt, dat kost geld tegenwoordig, dan is het niet vreemd om dat in de aans… in Procurement4
11:23 ¶103, het is echt wel allemaal eigendom. alles aankoop in Estate1
12:27 ¶79, maar over het algemeen wordt er wel veel gekocht. in Finance1
12:28 ¶87, nee die leasen we niet, die kopen we gewoon. ja maar kijk voor zo'n mri bijvoorbeeld, kijk die kunne… in Finance1
12:29 ¶95, ja volgens mij hebben we wel veel in eigen bezit ja. in Finance1
14:37 ¶103, we hebben te maken met aankoop, dus wij kopen gewoon aan en over 10 jaar doen we hetzelfde trucje we… in ClinPhys4
14:38 ¶107, wat het is, met koop, dan neem je een risico maar het punt is dat als je een leaseconstructie aangaa… in ClinPhys4
16:32 ¶115, ij ons is de voorkeur echt wel aankopen. in ClinPhys7.txt
20:44 ¶111, we proberen natuurlijk zoveel mogelijk ons eigen raamcontract te gebruiken maar soms (onverstaanbaar… in Procurement5+6
20:45 ¶115, als ik mag adviseren zeg ik altijd; kopen. maar als er geen geld, is, als een investering is afgekeu… in Procurement5+6

• Contract-lease

Quotations:

10:42 ¶121, nou we hebben niet perse een voorkeurscontract het gebeurt allemaal eigenlijk. dus je ziet wel iets… in Procurement4
14:36 ¶103, even vluchtig doorheen. we hebben een nes otp contract dat is een simpele financial lease constructi… in ClinPhys4
20:43 ¶111, lease doen we ook wel, en dat is een trucje, die investeringsbegroting wordt natuurlijk veel afgewez… in Procurement5+6

Contract-MES

Quotations:

8:40 ¶87, stel je voor over 8 jaar zitten wij in heel zwaar weer qua financiën maar we willen toch stappen kun… in MedTech1

14:39 ¶115, ja, dat is 'm ja. het is een mes contract maar onder een mes contract ligt over het algemeen een lea… in ClinPhys4

16:33 ¶111, ik weet van bijv het ziekenhuis in plaats x, dat heet dan een MES contract in ClinPhys7.txt