



Structuring CANS and WANTS

*A multiple case study on the pros and cons
of clinical laboratory organization models
in The Netherlands.*

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Summary

Background and objectives

Nowadays, hospital laboratories are searching for modes of cooperation with other clinical chemistry and haematology laboratories in order to overcome enforced savings while preserving quality levels. In this thesis the pros and cons of different organizational structures of clinical laboratory cooperation are described. On the basis of the available theory expectations on the effects of organizational structures can be drawn. This thesis contributes to the scientific pool of knowledge by describing the efficiency and quality features of different organizational structures of laboratories. In the context of optimizing the delivery of care and the allocation of resources, this study is not only scientifically relevant, but also socially relevant.

One can perceive a trend towards centralization and cooperation concepts for organizing laboratory services. Decision making on organizational structures is part of a broader theorem of transaction cost economics. Williamson (1985) defines transaction costs as all costs involved with arranging and executing a contract. Organizations have to examine so called 'make or buy decisions'. The theory of Coles & Hesterly (1998) assumes that make or buy decisions are based on the extent of asset specificity of a service, the uncertainty of predicting situations affecting planning and adaptation of a transaction, and the quality of a service.

Methods

A multiple case study has been performed on the basis of three clinical laboratory organizations in The Netherlands. Based on a centralization-ownership continuum, three typical organizational structures were selected: **1.** Outsourcing – *Stichting Atal-Medial* and *Kennemer Gasthuis*, **2.** Integration – *Deventer Ziekenhuis*, *Slingeland Ziekenhuis Doetinchem* and *Streekziekenhuis Koningin Beatrix Winterswijk*, **3.** Hybrid form (outsourcing & integration) – *Lab West B.V.*, *Medisch Centrum Haaglanden* and *HagaZiekenhuis*

The cases were studied by conducting interviews with three groups of key informants ($N= 15$), and by analyzing quantitative data derived from year reports.

Results and conclusions

The data gathering process was hindered by the lack of willingness of hospitals to share quantitative data for this study. Additionally, in interviews specialists within the hospitals were asked to indicate their level of satisfaction with laboratory services. However, the actual service level in the hospitals studied was not known, which makes comparing results more difficult. Keeping this in the back of the mind, it is concluded that the rational choice for an organizational structure is influenced by both the environmental and organizational circumstances (**CANS**) and the strategy of the executive boards of the hospitals (**WANTS**). The chosen structure of organizing laboratory services can be justified in all cases against the background of their specific 'CANS' and 'WANTS'. Hospitals that think about cooperation concepts for laboratory services need to reflect about what level of quality they want to deliver at what cost.

The relationship of laboratory organization and the efficiency and quality of laboratories remains uncertain.

Preface

This thesis is written as part of the Health Sciences (MSc.) programme at the University of Twente. With a background in Public Administration, my wish was to combine the knowledge on organizational aspects of public sector, with the new organizational dynamics that comes from a regulated health care market.

Having seen this wish, I discussed the developments in diagnostics, specifically on clinical laboratories with Prof. Dr. Ron Kusters, professor economic effects of laboratory diagnostics. Based on the uncertainties and pressures in the field, it seems a good idea to make an overview of the organizational models used in clinical laboratory organization in The Netherlands, and to describe the strengths and weaknesses of the modes of organization.

Confronted with the new dynamics in puzzling and powering within the framework of the regulated health care market an overview of the pros and cons in clinical laboratory organization are examined in this thesis.

Writing this thesis was not possible without the aid, advises and energy of certain persons, and I would like to thank them here. My supervisors from the University of Twente, Prof. Dr. Ron Kusters and Dr. Percivil Carrera, both bound to the department Health Technology and Services Research (HTSR) of the School of Management and Governance of the University of Twente. The personnel of the clinical laboratory of the *Jeroen Bosch Ziekenhuis* located in 's-Hertogenbosch because of their flexibility to introduce me in the practice of laboratory activities. Finally I will thank all respondents who were willing to discuss the developments in clinical laboratory organization and the implications of organizational structures.

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Chapter 1: Introduction

The perspective in The Netherlands on health and health care is changing. The country is faced with a mix of four 'concerns'. In the first place health care costs are rising while budgetary constraints linked with the economic crisis demand a containment of health care costs. Secondly, the demand for health care is increasing and changing due to issues such as the ageing population and the relative and absolute increase in the number of patients with chronic diseases. Thirdly, new technologies for diagnosis, treatment and care are more widely available and demanded by citizens. Finally, a substantial shortage of staff is expected (Raad voor de Volksgezondheid en Zorg, 2010).

E.I. Schippers MSc., Minister of Health, Welfare & Sports signals an increase in health care costs as a result of increasing demand for health care and increased possibilities for diagnostics, treatment and care as a result of medical innovation. In the '*Beleidsagenda 2012*' the Minister states that the costs of health care are rising more rapidly than the economic growth. Therefore the health care costs put an increasing pressure on the national budget. In addition to greater control over health expenditures, equal access, and increase in quality, are leading policy focuses (Ministerie van Volksgezondheid, Welzijn & Sport, 2012). To achieve such an agenda, action is needed to alter the structure, purchasing and financing of health care. Firstly, patients should only be referred to a specialist if necessary. Secondly, selective purchasing should consider both performance and specialization. Finally, a high complex but low volume health care should be provided in fewer hospitals (Ministerie van Volksgezondheid, Welzijn & Sport, 2012).

More recently, in an implementation analysis requested by the Minister, the *Nederlandse Zorgautoriteit (NZa)* proposed to follow the direction of performance based financing for primary care diagnostics. The Minister signaled, in line with her statement that the current structure of primary and secondary care does not respond to the demand for health care, that it is of public interest to stimulate a more general and integrated view in order to achieve general diagnostics. Adequate primary care diagnostics can prevent unnecessary referrals to the specialist and unnecessary diagnostics in the hospitals (Kamerstukken 2011/2012, 33000-XVI VWS-begroting 2012 Lijst van vragen, p. 83). The *NZa* advises a performance-related financing for the primary care diagnostics. Primary care diagnostics purchasing, they argue, should be designed in a way similar to the current practice in the more specialist health care branches, in which health care insurers are able to purchase care on the basis of price-quality ratios. This is possible because the good supplied has a substitutive character. Furthermore the *NZa* proposes the implementation of a function directed performance model with integrated tariffs (Nederlandse Zorgautoriteit, 2011). This is supposed to be an incentive for hospitals to save costs on their hospital laboratory services. By introducing free tariffs or maximum tariffs hospitals have an incentive to save costs within the organization by purchasing externally.

Efficient operational arrangements in hospital diagnostics are crucial given today's more competitive market. To an increasing extent there is attention for efficient operational management. As a result, cooperation and the scaling-up of laboratories are explored. Costs of the service package are compared to the other providers outside the own hospital organization or work area. The quality and costs of services have to map out. Insight in efficiency of operational management and costs

becomes still more crucial when performance based financing is introduced, as proposed in the advice of the *NZa* for primary care diagnostics (School, Lems, & Kortlandt, 2010). Laboratories could develop a value-added strategy and a price compression / product innovation strategy in order to be prepared for future threats and opportunities. The core competency of laboratory professionals must be refocused towards providing additional knowledge services related to in vitro diagnostic services in order to add value (Bossuyt, Verweire, & Blanckaert, 2007). To enhance efficiency and reduce costs Bossuyt et al (2007) suggest to consolidate, integrate or outsource, and to form alliances and networks of medical laboratories. Most importantly, additional value needs to be created by providing knowledge services related to in vitro diagnostics. This is based on the analysis that in most European countries laboratory business models suffers from fragmentation, redundancy and excess capacity (Bossuyt, Verweire, & Blanckaert, 2007).

The pursuit of cost savings and the enhancement of quality have led to changing hospital laboratory structures as illustrated by the following examples.

1. In the southern part of The Netherlands, in the Eindhoven region, the hospitals *Máxima Medisch Centrum (MMC)*, *Catharina Ziekenhuis Eindhoven (CZE)* and the laboratory *Synergos* studied the possibility of a cooperation in 2008. Based on this study further feasibility studies were executed. In the 2008 annual report of the *Máxima Medisch Centrum*, department clinical laboratory, the reference point is the foundation of a new juridical entity. However in the 2009 annual report of the *Máxima Medisch Centrum*, department clinical laboratory, is stated that a merger in the short term is no option since the financial advantages are insufficient according to the corporation *Synergos*. The laboratories of *Máxima Medisch Centrum* and *Catharina Ziekenhuis Eindhoven* explore to what extent their objectives can be achieved through intensive cooperation. From the 2010 annual report of the *Máxima Medisch Centrum*, department clinical laboratory, can be derived that *Synergos* is no longer intensively involved in the merger process. In this annual report an intended **merger** with the laboratory of the *Catharina Ziekenhuis Eindhoven* is elaborated. In the end of April 2010 the “*Businessplan gezamenlijk klinisch laboratorium Catharina-Ziekenhuis en Máxima Medisch Centrum*” was presented. This research showed the costs of exploitation could decrease with 11 % in case of a merger. However half the saved costs could be achieved through the **harmonization** of both core laboratories in a collective tender. The executive boards – *Raad van Bestuur* – of both hospitals decided to harmonize both core laboratories and stop further merger (*Máxima Medisch Centrum afdeling klinisch laboratorium*, 2008; *Máxima Medisch Centrum afdeling klinisch laboratorium*, 2009; *Máxima Medisch Centrum afdeling klinisch laboratorium*, 2010).
2. Another initiative that deserves particular attention is the *Santeon* concept. *Santeon* is a cooperation between six top-clinical hospitals in The Netherlands. By cooperation in the fields of purchasing, human resource management, automation, and responsibility for the buildings expenditures can be saved. The *Santeon* cooperation differs from the example mentioned above. The main difference is that the hospitals do not compete with each other in their service area, in contrast to what was the case in the other example. The *Santeon* concept is not tied up to the scale of a hospital level, but can be applied too on the clinical laboratory level in terms of the mentioned cooperative elements.

Nowadays, hospital laboratories are searching for modes of cooperation with other clinical chemistry and haematology laboratories in order to overcome enforced savings while preserving quality levels. The field of study of clinical chemistry deals with medical laboratory research of blood and other bodily fluids. The origin of the discipline is the biochemistry, which aims to show or exclude diseases by searching for materials like salt, protein, and metabolic products in bodily fluids (NVKC, 2012).

This paper takes the organizational arrangements directed at cooperation as central notion. The aim is to describe pros and cons of organizational structures such as integration, partnerships and outsourcing by reviewing efficiency and quality. The thesis focuses on laboratories that recently changed their organization within the framework of cooperation structures. Per selected organizational structure, the strengths and weaknesses are described. According to results of the proposed analysis it is possible to examine whether or not there is a relationship between the organizational structure and the retrieved values on the criteria of study, and what characterizes this relationship in terms of efficiency and quality. Finally, based on the results, recommendations are formulated.

The goal of this paper is to describe the pros and cons of several organizational structures in the field of laboratory diagnostics. On the basis of the available theory, expectations on the effects of organizational structures can be drawn. This thesis contributes to the scientific pool of knowledge by describing the efficiency and quality as perceived by several stakeholders of different organizational structures of laboratories. In the context of optimizing the delivery of care and allocation of resources, this study is not only scientifically relevant, but also socially relevant. This thesis refers to the situation of 2012. Data is collected in the summer of 2012. However, the selected organizational arrangements have been in place for different periods of time. The specific time frames are indicated in the chapters 4, 5, and 6.

Given this introduction the following research question is formulated:

What are the strengths and weaknesses of different organizational structures in hospital laboratory health care in terms of efficiency and quality?

The study is structured around three sub questions. First the organizational structures are described and outlined into detail according to theory:

1) What are the characteristics of different organizational structures in hospital laboratories and what are their expected strengths and weaknesses according to theory?

Cases of hospital laboratories are selected based on their organizational structure. Based on the empirical findings derived from interviews and year reports, an examination of the nature of organizational structures in terms of efficiency and quality is made. As a result the organizational structure of the hospital laboratory and their scores on the dimensions (efficiency and quality) of study are compared with respect to the strengths and weaknesses of each approach.

2) What are the results of different organizational structures in hospital laboratories in The Netherlands in terms of efficiency and quality?

3) Is there a relation between the way hospital laboratory services are organized in hospitals in The Netherlands, and the efficiency and quality of hospital laboratories?

In the **first** chapter a background is provided to indicate the developments and challenges in today's healthcare. Examples are given of new approaches in hospital laboratory health care. These new approaches can be found in the sphere of organizational structures with a focus on cooperation.

In the **second** chapter theoretical concepts are explained. A broad theorem of make and buy decisions is provided as a framework for organizational structures. Then the organizational structures directed towards cooperation are described: outsourcing, integration and the hybrid form is distinguished. Furthermore, the expected effects on efficiency and quality as well as potential disadvantages are considered based on theory. Hypotheses are then formulated based on the expected effects. In the end, sub question one is answered.

In the **third** chapter the research methodology is elaborated. The design is described as well as the case selection process. An operationalization of concepts is given and the link to the conceptualization is explained. In the remaining part the methods of data collection and data networking are described.

In the **fourth, fifth and sixth** chapters the cases '*Atal-Medial and Kennemer Gasthuis*', '*Deventer Ziekenhuis, Slingeland Ziekenhuis Doetinchem, and Streekziekenhuis Koningin Beatrix Winterswijk*' and '*Lab West B.V. – Medisch Centrum Haaglanden and HagaZiekenhuis*' are discussed. The results on the indicators are described and an analysis is made of the effects on goal attainment of efficiency and quality measures. In each of these chapters an answer is formulated, per organizational structure, on sub question two.

In the **seventh** chapter a comparison of the responses of key informants interviewed is made.

In the final chapter, an answer is given to sub question three. Then, conclusions are drawn based on the results and analyses of the three cases and the observations of the key respondents comparing as well as the additional materials. As a result, the main research question of this thesis is answered. Furthermore recommendations are described and limitations of the findings are discussed.

Chapter 2: Organizational structures of hospital laboratory health care

In this chapter a specification of organizational structures is given. Then, a model is elaborated and its elements for evaluating laboratory organization are discussed. To put the arrangements into a broader perspective, an overview of the characteristics of laboratory health care in The Netherlands is given. This is an important discussion, as barriers for organizational embedding are identified.

2.1 Organizational structures of medical laboratories

A trend towards a more centralized organization and cooperation of medical laboratories is observed. In this section, the possibilities for decreasing costs and while simultaneously maintaining or even improving quality are elaborated and its implications for the organizational structure are analyzed. An overview is given of the broader theorem the organizational structures are embedded in. Then, a specification is made of the several options that exist within the framework of the centralization-ownership grid of medical laboratories can be organized in today's practice. Finally, a model is given that is used for framing the answers to the research question.

2.1.1 Make or buy decisions

Following Williamson (1985), transaction costs are 'the costs of drafting, negotiating, and safeguarding an agreement'. Transaction costs thus are the costs for arranging, monitoring and enforcing a contract, and are opposed to production costs (Genugten van, 2008). Transaction costs can be used as basis for this analysis that examines make or buy decisions, since empirical evidence shows that integration decisions consistently support transaction cost explanations including asset specificity and uncertainty. Asset specificity refers to a situation where assets are specially designed use in a single organizational (physical asset specificity) or to a situation where individuals are less valuable to other firms as they have very firm-specific knowledge and skills. Uncertainty is the degree to which decision makers are able to predict situations of planning and adaptation of a transaction. The relationship between asset specificity and uncertainty, transaction costs, and vertical integration is less clear when economies of scale are considered simultaneously. Larger firms (hospitals) are better able to realize scale effects in service production than smaller firms (Coles & Hesterly, 1998).

In addition, the quality of goods seems a particularly important issue in industries where quality is a very competitive distinction for the firm – as it is for laboratory services. When the potential harm as a result of poor supplier performance is high and performance is costly and / or difficult to measure, then firms will use vertical integration to ensure an acceptable level of quality. For example, the responsibility for a mistake in the emergency room (ER) may be assigned to the ER, although it is a result of bad performance of other services like radiology or laboratory services. Even if it is unclear who is to blame and / or when the ER was not clearly involved in it, the hospital's reputation providing high quality services is likely to suffer. However, some parts of an organization, such as the laundry contractor, are unlikely to cause such serious consequences, when making mistakes (Coles & Hesterly, 1998).

Based on this line of reasoning, hospitals are expected to integrate those services that significantly impact quality and, in case of poor supplier performance, could cause serious harm to patients. This

is confirmed by the results of an empirical study of 196 hospitals in the United States, where the level of integration of services on a scale of 0-1, where 0 represents appropriate for outsourcing and 1 represents appropriate for integration, is 0.51 for laundry services and 0.95 for laboratory services (Coles & Hesterly, 1998). Of course the health sector in the United States significantly differs from the Dutch, however, quality impacts of services can be considered to be generalizable. After all, the quality of laboratory testing needs to be constant, no matter where it is performed. Based on this data the assumption can be made that integration principles (**make**) are more focussed on quality, whereas outsourcing principles (**buy**) more refer to an economically efficient approach.

2.1.2 Organizational structures

The discussion of make or buy decisions is part of a broader theorem which is described above. If the costs for producing a good or service by the organization itself are lower than buying it from the market, transactions will be organized by the organization itself, as Coase (1937) suggested. In addition, Coase argued that the costs of constant recontracting are high compared to long-term contracts with an organization's own employees. To lower costs and increase transactions organizations tend to be larger. Therefore, organizations make use of the concepts **combination** and **integration**. A combination is when transactions are organized by one organization, when they previously were organized by two or more organizations. A combination becomes integration when the organization of transactions is involved, when this was previously carried out between organizations on the market. Organizations can expand in either or both of these two ways (Coase, 1937).

The degree of **centralization** refers to the locus of authority for making decisions that affect the organization. In the literature two types of authority are distinguished, formal and personal authority. This thesis focuses on the formal authority stemming from ownership, since this study is concerned with laboratory services, which can be provided in-house or be purchased on the market. In contrast, personal authority focuses on knowledge and expertise (Pugh, Hickson, Hinings, Macdonald, Turner, & Lupton, 1963). In comparing centralization relative to decentralization the typology of Sah & Stiglitz is helpful. These authors separate polyarchies and hierarchies. In polyarchies there are several decision makers who can undertake projects independently of one another. In hierarchies, decision making is concentrated. Only a few individuals (or just one individual) are able to undertake projects while others in the organization provide support in decision making (Sah & Stiglitz, 1986).

A categorization of the organizational structures can be made, based on the degree of centralization and ownership of an organization. The organizational structures distinguished here reflect the continuum of centralization and ownership. The characteristics of the structures on this continuum result in some expectations on efficiency and quality. The continuum is visualized below in figure 2.2 which indicates the landscape of centralization (towards decentralization or centralization) and whether or not an hospital is owner / shareholder.

<i>Centralization</i>			
		<i>Centralized</i>	<i>Decentralized</i>
<i>Owner</i>	<i>Yes</i>	<i>Integration</i>	<i>Hybrid</i>
	<i>No</i>	<i>Hybrid</i>	<i>Outsourcing</i>

Figure 2.1 The centralization – ownership landscape.

The necessity to specialize and more integrated health care as indicated by the policy intentions of the Dutch government, and the literature review suggest that these models will achieve both a decrease of costs and an increase of quality based on rationalization principles. In the succeeding sub sections the organizational models are elaborated.

2.1.3 Outsourcing

In a decentralized mode the responsibility for day-to-day operations within an organization is downwards or outwards diffused. As a special category of decentralization outsourcing is mentioned. By outsourcing arrangements outside vendors are hired. In its most extreme form the total control is turned over to an outside contractor (Friedman & Mitchell, 1993). In the figure below the idea of outsourcing is performed. The laboratory is no longer part of the hospital and is applied by responsibility of an actor outside the hospital organization.

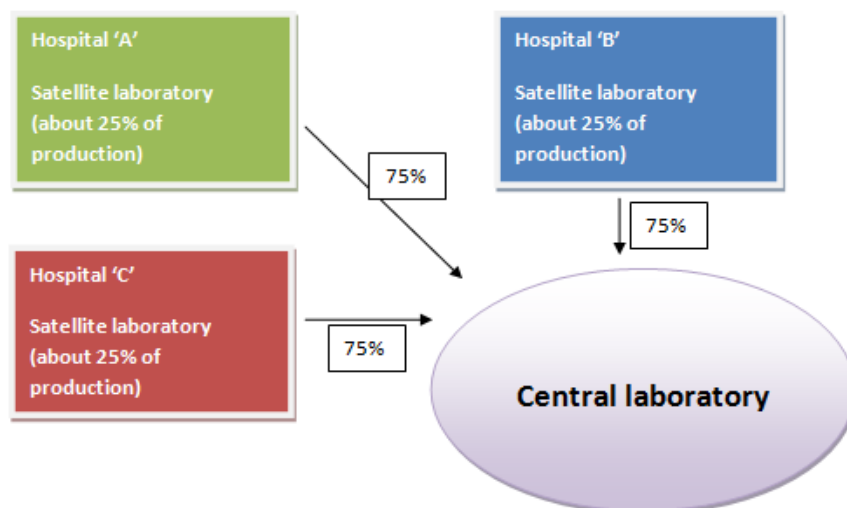


Figure 2.2: A schematic illustration of outsourcing the laboratory in a hospital organization in which satellite laboratories remain in the participating hospitals for emergency tests. The rest of the tests (about 75% of production) is applied in a central laboratory.

As an option to achieve rationalization effects and / or decrease fixed costs effects, large parts or the whole work area of the hospital laboratory can be outsourced to a separate medical laboratory. Outsourcing could increase the number of patient samples handled (Henker, et al., 2005). At present there are some examples of outsourced laboratories with the motivation that a specific test can be

done better, more often, at lower cost by an external organization. Due to higher level of expertise, the external organization could be more efficient and is therefore expected to take advantage of greater economies of scale (Bossuyt, Verweire, & Blanckaert, 2007). The risk of a virtual organization – an extreme level of outsourcing – is degeneration into a ‘hollow organization’ that cannot adapt to changing circumstances. The more core products are outsourced, the greater the potential for erosion of core competencies, if these core competences are embodied in core products (Bossuyt, Verweire, & Blanckaert, 2007).

In terms of efficiency, therefore, the cost price on laboratory tests is expected to decrease. Due to larger series of patient samples the core laboratory is able to achieve economies of scale. The total costs are expected to decrease with the fall of fixed costs (overhead, infrastructure). In addition savings can be made in the number of staff (labour costs), since the 24hour service is applied with a higher number of patient samples. Outsourcing structures are expected to gain stronger effects from economies of scale compared with integration forms due to the commercial service of laboratory activities. Due to the centralized organization of quality management and a more specialized orientation of both centralized and decentralized laboratories on tests to apply, should increase the specialist satisfaction. The laboratory staff applies the tests more often and become better with it. However, this effect can be decreased if the operation led to a higher turn-around time of patient samples. Patient samples need to be transported to commercial laboratories.

There are some disadvantages that fall beyond the operationalization of the concepts, but deserve attention here. These factors mostly do not reflect efficiency and / or quality issues, but are effects of the new organizational structures that executive boards have to realize. With the outsourcing of laboratory activities the autonomy of the hospital is expected to decrease as well as the possibilities to vary with the supplied services. Furthermore the cost savings are uncertain. It is assumed to achieve economies of scale, but short term effects seem to differ from long term effects. Finally as already referred to, the satisfaction of specialists is uncertain and depends on a quick and reliable delivery.

2.1.4 Regional networks – integration

The idea of integration is to create a regional value-added laboratory network, which can integrate diagnostics generated in decentralized testing sites (Friedman & Mitchell, 1993). This type of organizational structure is, according to theory, faced with a number of advantages. Consolidation and integration of laboratory services could decrease excess capacity, fragmentation and redundancy, while simultaneously the exploitation of process expertise knowledge is facilitated. Furthermore existing fixed costs of plants and equipment are spread over a larger base. Higher analysis volume lowers unit costs and the turn-around time (TAT) improves, allowing more rapid diagnosis (Bossuyt, Verweire, & Blanckaert, 2007).

Establishment of integrated networks can enhance efficiency by exploiting economies of scale, optimal capacity utilization, optimal process design and reduced input costs. Likewise, integrated networks could create additional value by harmonization of test results within the network (Bossuyt, Verweire, & Blanckaert, 2007). However integrated health care is a necessary but not sufficient requirement to determine the success of integrated vertical meta-networks. A large part of explaining the success lays in (1) market forces, (2) the organization and management of those

collaborative networks and (3) whether the network is able to offer higher quality testing services at lower costs (Friedman, 2001).

As an example the cooperation between the hospital laboratories of *Deventer Ziekenhuis*, *Slingeland Ziekenhuis Doetinchem* and *Streekziekenhuis Koningin Beatrix Winterswijk* are operating on behalf of the (regionally defined) health care providers mentioned above by collecting larger numbers of patient samples in order to achieve economies of scale. By organizing this way the cooperation of Deventer, Doetinchem and Winterswijk is not an outsourced structure, because the health care providers are part of their hospital organizations. The central idea is the exchange of tests. For instance all tests in the field of virology are applied in Deventer, whereas the tests in the field of allergy are applied in Doetinchem.

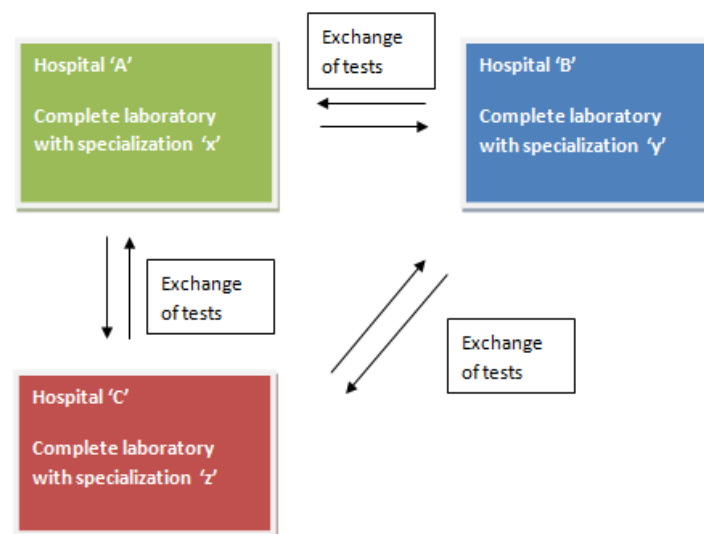


Figure 2.3: A schematic illustration of integrating the laboratory in an hospital organization in which complete laboratories over the hospitals remain with specializations on certain laboratory disciplines. The specialized tests are exchanged between the hospitals.

Based on a higher analysis volume (economies of scale) and larger spreading of investment costs as the specified advantages the efficiency is expected to improve in terms of cost price. Labour costs of laboratory tests also decreases, since each hospital has its own specializations. Therefore not every hospital need to have a specialist for each type of diagnostics and time intensive analyses can now be done with a higher number of tests. Furthermore, production analyses are expected to increase because of larger series. Every participant in the network focuses on its core competency to add value to the network. For the indicator quality more specialized organization of processes could result to an increase in specialist satisfaction. As a result specialist satisfaction is expected to increase more than in the outsourcing arrangement, since the service level remains the same instead of being less. As for outsourcing, again some disadvantages need to be acknowledged. With specialization as necessary factor for integration the decrease of flexibility and autonomy of the hospital is again applicable. When working in (regional) networks with integrated laboratory activities, agreements have to be made with the other partners in the cooperation. Therefore a mode of governance has to be chosen, which encounters more deliberation in comparison to outsourcing in which only contracting is sufficient. Furthermore the interests of different stakeholders need to be harmonized

if the cooperation is intended to be successful in terms of efficiency and quality. As a consequence the organizational structure **integration** like the outsourcing structure shows evident positive expectations in terms of all criteria investigated. However this organizational structure is focussed more on quality issues compared to outsourcing.

2.1.5 Hybrid: Outsourcing & Integration

To differentiate from the make or buy decision problem, hybrid forms can be distinguished. Mainly cooperation and competition are referred to as opposite models. However balancing cooperation and competition in inter-organizational relationships can result to positive effects as studies in private sector suggest. Typically in competition many organizations are producing the same or related products and compete for consumers and suppliers. In cooperation frequent exchanges among partners appear, including business, information and social exchange. Based on these typical principles a mixture of competition and cooperation is introduced: **co-opetition** (Barretta, 2008).

This hybrid tries to obtain greater advantages compared with competition or cooperation solely for every organization involved in inter-organizational relationships by producing the positive effects of both competition and cooperation. More concrete imagine a pie that is distributed. Co-opetition allows for a redistribution of the pie by which a greater portion can be dedicated to patient care rather than to negative externalities of competition and / or cooperation. Apart from economic advantages, also – among other things – improvements in the effectiveness of health-care services can be achieved (Barretta, 2008).

In the most common hybrid organizations of laboratory activities the clinical laboratories are formally decentralized from the hospital organization and become therefore an autonomous organization. Simultaneously, however, the participating hospitals are shareholders of the created laboratory organizations. An example is the Limited (Ltd. / B.V.) like the *Medlon* organization, a result of cooperation between *Medisch Spectrum Twente* and the *Ziekenhuisgroep Twente*. This Ltd. is 100% subsidiary company of the supporting hospitals.

However organizations involved in inter-organizational relationships need a coordination system in which planning, coordination, monitoring and appraising are regulated. Good governance of inter-organizational relationships is one of the success factors for this kind of model. The hybrid organizations are expected to feel more freedom of action. The laboratory organizations can follow their own policies and strategies according to their own interests instead of being an integral part of the hospital in which it is a business applied according to the interests of the hospital. In the figure 2.4 below the hybrid organization is visualized:

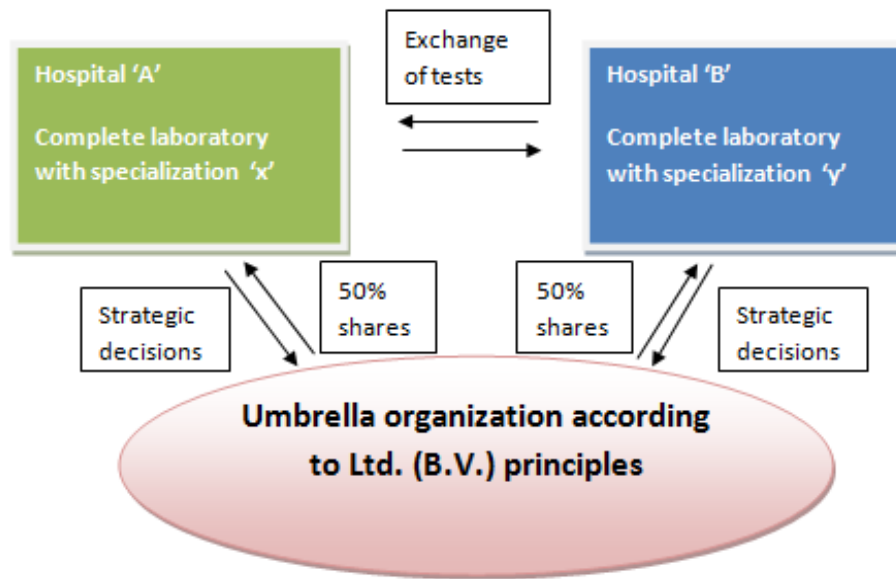


Figure 2.4: A schematic illustration of hybrid (outsourcing & integration) laboratory organization in a hospital organization in which complete laboratories within the hospitals remain with specializations on certain laboratory disciplines. The specialized tests are exchanged between the hospitals. The strategic decision making on what specializations and centralization of activities is delegated to an umbrella organization. An organization according to Ltd. principles by shareholder status of Hospital 'A' (50%) and Hospital 'B' (50%)

Having seen the characteristics of the hybrid form, the effects in terms of efficiency may be expected positive. In terms of cost efficient production effects are expected since economies of scale can be achieved by a larger sample base and exchange of tests. Also labour can be charged more optimally by working with larger amounts of patient samples. However the freedom to act is uncertain due to the fully shareholder ship of the hospitals. Therefore the largest effects in terms of efficiency are expected for outsourcing separately. For the indicator quality the specialization on core competencies of the network participants and the centralization of quality management the specialist satisfaction is – as an effect of the consequences of the outsourcing principle – due to the loss of autonomy expected to increase less strongly compared to integration and more strongly compared to outsourcing. The disadvantages of the hybrid form of outsourcing and integration are a cross-over of the disadvantages mentioned in the organizational structures of outsourcing and integration separately. Again drawbacks lay in the sphere of less flexibility and autonomy, the creation of deliberation structures and interdependency between stakeholders. The **hybrid** form may be the most balanced organizational change in terms of efficiency and quality, it is also faced with most disadvantages.

2.1.6 Comparative overview of organizational structures

In this paragraph an overview is given of the expectations derived from theory on the indicators efficiency and quality as well as the disadvantages of the distinguished organizational structures. Based on this overview it is possible to distillate the main focus of the organizational structures. In table 2.1 an overview is given with the help of pros and cons (--, -, +-, +, ++) of the organizational structures on the distinguished indicators according to theory. Furthermore with a green background the main pros of the organizational structure are given, whereas the red background shows the most cons.

Organization types Variables	Outsourcing <i>No ownership/ Decentralized</i>	Integration <i>Ownership/Centralized</i>	Hybrid (Outsourcing & Integration) <i>Ownership/Decentralized</i>
Efficiency			
<i>Criterion 1: Means for cost efficient production</i>	++	+	+
<i>Criterion 2: Labour costs (FTE) of laboratory work</i>	++	+	+
Quality			
<i>Criterion: Specialist satisfaction</i>	+/-	++	+
Disadvantages			
Disadvantages	<ul style="list-style-type: none"> ➤ Decrease of flexibility ➤ Decrease of autonomy ➤ Uncertainty about cost savings ➤ Uncertainty about specialist satisfaction 	<ul style="list-style-type: none"> ➤ Decrease of flexibility ➤ Decrease of autonomy ➤ Creation of deliberation structures ➤ Interdependency of stakeholders 	<ul style="list-style-type: none"> ➤ Decrease of flexibility ➤ Decrease of autonomy ➤ Moderate uncertainty about cost savings ➤ Creation of deliberation structures ➤ Interdependency of stakeholders ➤ Moderate uncertainty about specialist satisfaction

Table 2.1: An overview of expected effects of organizational structures derived from theory on efficiency and quality. As well as the disadvantages of the type of organization.

2.2 Dutch laboratory system

The following section describes the situation of hospital laboratory health care in The Netherlands to put the mentioned organizational arrangements in a perspective. This is of importance since the organization of laboratory health care is logically partially determined by the organization of the Dutch health care system. Therefore before referring to organizational structures it is good to give insight in some characteristics of the Dutch laboratory health care situation. According to the NVKC there are 90 laboratory organizations of which eight are academic laboratories, 24 are general practitioner laboratories and 27 laboratories are in top clinical hospitals. The rest is arranged in

general hospitals. Total costs of in vitro diagnostics are approximately € 298 million, which is 0,5% of the total health care expenditure ($289 \cdot 10^6 / 55.484 \cdot 10^6$) (Nederlandse Vereniging voor Klinische Chemie, 2011). The costs of diagnostic resources are low relative to other western European countries. The year reports of the *European Diagnostic Manufacturers Association (EDMA)* provide a comparative overview of European countries in the field of diagnostics. Note that numbers are for all in vitro diagnostics (clinical chemistry and micro biology together) and only reflect the reagents, variable resources, and equipment (EDMA, 2011).

Countries	Population 10	GDP	GDP / capita	THE	THE / capita	THE as % GDP	IVD mkt. 10	IVD mkt. growth rate 09-10	IVD mkt. / THE	IVD mkt. / capita	
	000	Mio €	€	Mio €	€	%	Mio €	%	%	€	
	Source OECD 2009						Source EDMA				
Germany	82,834	2,397,100	29,268	278,345	3,399	11.6%	2,157.91	-0.1%	0.8%	26.1	
France	62,451	1,907,145	30,448	224,699	3,587	11.8%	1,773.00	4.2%	0.8%	28.4	
UK*	61,349	1,626,627	26,696	159,095	2,611	9.8%	773.85	6.2%	0.5%	12.6	
Italy	59,018	1,519,702	25,781	143,998	2,443	9.5%	1,702.50	1.1%	1.2%	28.8	
Spain	46,073	1,503,974	32,746	100,231	2,182	6.7%	1,093.70	0.5%	1.1%	23.7	
Netherlands	16,448	571,979	34,839	68,413	4,167	12.0%	315.80	2.2%	0.5%	19.2	
Greece	11,284	235,017	20,829	21,893	1,940	9.3%	190.00	-13.6%	0.9%	16.8	
Portugal	10,665	168,610	15,862	17,287	1,626	10.3%	258.00	-0.8%	1.5%	24.2	
Belgium	10,556	339,162	31,416	36,886	3,417	10.9%	340.00	1.8%	0.9%	32.2	
Sweden	9,385	320,685	34,479	32,458	3,490	10.1%	177.28	4.0%	0.5%	18.9	
Austria	8,388	274,320	32,802	30,308	3,624	11.0%	249.00	2.0%	0.8%	29.7	
Denmark	5,544	222,634	40,339	25,649	4,647	11.5%	134.29	2.6%	0.5%	24.2	
Finland	5,363	171,193	32,065	15,674	2,936	9.2%	99.96	2.0%	0.6%	18.6	
Ireland	4,470	159,645	35,803	15,222	3,414	9.5%	80.00	-3.6%	0.5%	17.9	
Luxembourg	502	38,072	77,225	2,957	5,998	7.8%					
EU-15	394,330	11,455,865		1,173,114	2,985	10.24%	9,345.29	1.5%	0.8%	23.7	

Figure 2.5 Costs of In Vitro Diagnostics (IVD) with the share of IVD costs against the Total Health Expenditure (THE) based on data of the European Diagnostic Manufacturers Association (EDMA) (Source: EDMA, 2011)

In the Dutch health system primary care diagnostics and secondary care diagnostics are distinguished. Primary care diagnostics are applied on behalf of a primary health practitioner, mostly the general practitioner or obstetrician. Several groups of providers can request those tests: general practitioners, obstetricians, primary health care diagnostic centres, hospitals, production co-operators, independent private clinics, care groups and foreign laboratories. In primary care diagnostics main problems are signalled by the *NZa* in (1) the deviant funding over the several groups of providers, (2) the superseded performance and tariffs, (3) the interrelation of primary care en secondary care diagnostics (Nederlandse Zorgautoriteit, 2011). The secondary care diagnostics are diagnostics that are applied within the framework of Diagnosis Related Group (*Diagnose Behandel Combinatie, DBC*) in the secondary health care (Nederlandse Zorgautoriteit, 2011). Diagnostics have a supporting role (in different forms) in the health care process of medical decision making. 60-70% of all medical decisions are partially based on laboratory results. However, due to the competition, the desire for efficient production and to overcome overcapacity, providers are entering each other's region. This lead hospitals to outsource laboratory service, to cooperate with other hospitals or both (School, Lems, Kortlandt, 2010).

Product characteristics

In this section the characteristics of laboratory testing are elaborated. The type of product to investigate is of importance when investigating the most appropriate organizational structure, since the characteristics determine partially the barriers and possibilities of organizational models. Technology is a fundamental part in today's laboratory work but does not assure analytical quality. Therefore analytical quality is still a major issue for clinical laboratories (Plebani, 2007). The tests can be divided roughly into two groups, the high volume low complex tests and the low volume high complex tests. The high volume low complex tests (about 75% of all tests) are easily to apply and can be applied as mass production, whereas the low volume high complex tests are difficult to apply and require less time between sample and analysis.

Furthermore laboratory organizations are bounded by strictly set time norms for particular tests. All laboratory organizations agree that all hospitals need to have a laboratory itself to apply the emergency tests. In terms of organizational structures this means that hospitals always need to have a laboratory within their hospital due to the 24 hours, 7 days a week service. Furthermore hospitals try to cooperate to increase the volume of both low volume high complex tests (specialization) and the mass production to achieve efficiency and quality improvements.

Centralization

For both economic and quality opportunities outsourcing plans for centralization are developed worldwide. This results in newly integrated healthcare delivery systems that encompass laboratory networks and centralized core laboratory facilities (Guidi & Lippi, 2006). The tendency towards centralization is led by the principle of economies of scale. Some economies of scale result to payment of lower prices for **inputs**. Products or services are bought in large amounts, finance costs are lower, and lower wages can be paid if the firm develops monopoly power in the labour market. Otherwise economies of scale are a consequence of changes in the level of output are translated into changes in the cost of **output**. This is justified since total costs, average costs and marginal costs are all related to the level of output, that is ' $C = C(Q)$ ' where C is cost and Q is quantity (Morris, Devlin, & Parkin, 2007).

2.2.1 Comprehensive perspective

In this paragraph a more comprehensive perspective is described in order to show that the organizational models need to be embedded in a broader context. Panteghini (2004) argues that costs aspects should be reviewed in a wider overall context of health economics. The true impact of diagnostic testing can only be achieved if not only the costs per test but also the value outside the scope of the laboratory practice should be taken into account (Panteghini, 2004). This comprehensive perspective is not only demanded in terms of costs, but in terms of the value for patients too. Here commoditization, outsourcing and the establishment of 'megalaboratories' that simply focus on analytical results are observed as risk factors for the effective governance of the total testing process and therewith the errors in laboratory medicine. Administrators need to focus more on effective modes of action in the clinical context in which tests are required and used rather than focusing on the cost reduction per test and other efficiency indicators (Plebani, 2007).

2.3 Final remarks

In chapter two the specified characteristics of laboratory services were discussed in order to get some insight on the barriers and facilitators of laboratory services related to organizational structures. A specification was then made on several organizational structures in laboratory testing. The concepts of outsourcing, integration separately and a hybrid of outsourcing and integration were described and based on the literature review, expectations were formulated on the examined criteria of research here. We are thus able to answer the first sub question of the study:

What are the characteristics of different organizational structures in hospital laboratories and what are their expected strengths and weaknesses according to theory?

All three models are expected to achieve efficient management and increase quality albeit by different magnitudes. Those are the strengths of the forms that achieve results by rationalization principles and economies of scale. Outsourcing is more concentrated on efficiency whereas integration focuses more on quality. The hybrid form shows balanced positive effects by combining rationalization principles from both outsourcing and integration. Weaknesses in the diverse approaches lay in the field of loss of autonomy in terms of the ability to make decisions, and the necessity to specialize and therefore the loss of applications within the hospital organization. The hybrid form seems to have most disadvantages. In the end special attention is given to comprehensiveness of laboratory services. Central argument here is a broader view on laboratory testing focussing on the patient, quality and effectiveness, rather than focussing on efficiency only. This part is included to reflect on the major concern that hospitals only focus on costs when deciding on organizational models. The specific expected effects of organizational structures on efficiency and quality according to theory, are in line with the broader theorem of make and buy decisions that is used in this thesis. It is argued that integration principles are more focussed on quality, whereas outsourcing principles more refer to an economically efficient approach.

Chapter 3: Research Methodology

In this chapter methods and procedures employed in this mixed methods research are described. In consideration of the nature of the thesis questions, a multiple case study design using a qualitative approach is employed.

3.1 Design

In this paper a multiple case study design using a qualitative approach is employed. Qualitative analysis is a method for examining and interpreting social research data non numerically. This type of research aims to discover underlying meanings and patterns of relationships (Babbie, 2007). This thesis uses individual interviews as qualitative data. The purpose of the interviews is to indicate the ideas of respondents about the phenomena of interest (Trochim, 2006). Interviews are an appropriate method here, to gain insight in the core ideas of the organizational arrangements. In order to get a comprehensive overview of pros and cons of laboratory arrangements, three groups of key informants are distinguished.

If possible a mixed method approach of quantitative and qualitative procedures is employed. A mixed methods research is a design that aims to collect, analyse and mix both quantitative and qualitative data in (here) a series of studies to understand the research problem (Creswell & Plano Clark, 2007). This is of importance to verify the statements done in the interviews, and provide an overview of actual data of manpower and production.

A case study design is an empirical inquiry which focuses on the contemporary phenomenon within the real-life context. Boundaries between the context and the phenomenon are not clearly evident. The theoretical framework is a template in case study research and in terms of generalization its purpose is to generalize to the theoretical propositions and not to the population as it is in statistical research (Yin, 1994). In this thesis a multiple case study design is used to reveal support by replication logic for theoretically contrasting results for predictable reasons. The theoretical framework identifies the conditions, if a particular phenomenon is likely to be found or not. This type of design provides an in depth study of complex situations. The phenomenon cannot be isolated from the context. The arrangement of clinical laboratories is such a complex phenomenon, since it deals with efficiency and quality effects, that cannot be excluded from consequences for the rest of the patient process. Results of case studies describe the phenomenon rather than predicting future behaviour. This is appropriate for the goal of writing a descriptive overview of pros and cons. The unit of analysis is the major entity analyzed in the study. The arrangement of laboratory organization is the unit of analysis here. The unit of observation is the unit upon which data are analyzed. The interviews with key informants and the quantitative data from year reports are unit of observation here.

The replication of a multiple design enables to explore differences within and between cases. This is of importance since the goal of this thesis is to make a comparative description of pros and cons of different arrangements. In terms of reliability, a measure is considered to be reliable if the result pops up over and over again. The use of structured interviews in this thesis is helpful for consistent measurement, since the same questions can be posed to the key informants again and again. Of course, the availability of quantitative data used in this thesis is limited. However, one can easily

measure the same criteria of production and manpower, as mentioned in year reports of laboratories. However, it is of importance to describe the changes in setting in further research. The validity refers to the accuracy of the instrument. Does it actually measure the intervention you want to measure. The operationalization of indicators efficiency and quality refers specifically to a hospital setting. Constructs seem well operationalized, since the results reflect on the indicators we want to be measured. An often mentioned weakness of multiple case studies is the limited possibility to generalize. However, the purpose of generalization is to generalize to theoretical propositions. The lack of rigor in collection, construction and analysis of empirical materials is observed as limitation of case study research. In the following paragraphs however an extensive explanation is given to validate this process.

3.2 Case selection

Cases in the multiple design are purposefully selected based on organizational structures as described in chapter two in order to describe strengths and weaknesses of particular arrangements. Cases are selected based on their correspondence with the typical organizational structures. The organizational arrangements are categorized, according to a centralization – ownership landscape. Centralization refers to a concentration of decision making power, without the ability to undertake projects independently of one another. Ownership refers to the fact whether or not the hospital is owner of the laboratory organization. This categorization is helpful, to create an overview of the typical forms of organization according to theory and the situations of the selected cases. In the paragraphs below an explanation is given for the locations of the selected cases.

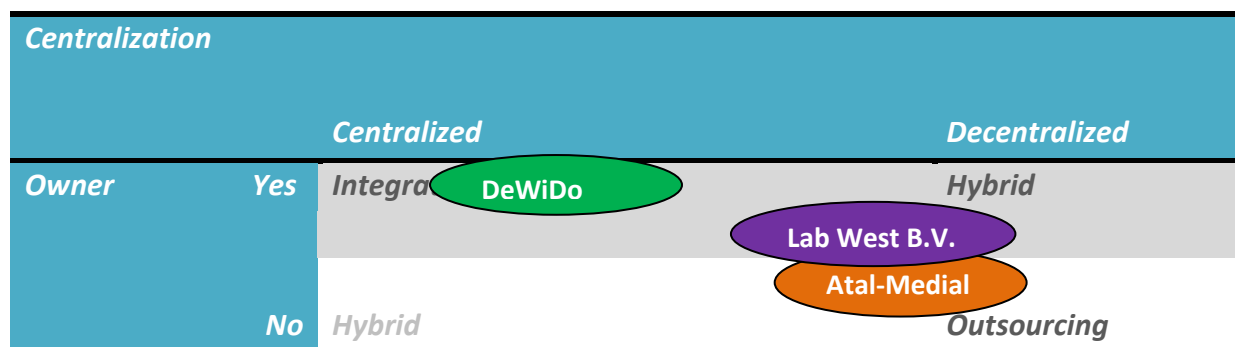


Figure 3.1 The centralization – ownership landscape with the locations of the selected cases.

1. For outsourcing the cooperation between *Atal-Medial* and *Kennemer Gasthuis* is selected. The tests of *Kennemer Gasthuis* are applied by the independent organization *Stichting Atal-Medial*, with the restrictions that still hospital managers are represented in the supervisory board of *Atal-Medial* and the application of all tests is situated in a centralized location within the hospital. Therefore this example is most similar to the typical situation of the outsourcing model.

2. For the regional organized network of integration the cooperation between *Deventer Ziekenhuis*, *Slingeland Ziekenhuis Doetinchem*, and *Streekziekenhuis Koningin Beatrix Winterswijk* is chosen. Integration of their laboratory activities is a result of working in a regional network, where the production is fully applied in house in one of these three hospitals. Therefore this is an example of integration principles.

3. For the hybrid of outsourcing and integration the organization of *LabWest BV* is taken. In this cooperation *Medisch Centrum Haaglanden* and *HagaZiekenhuis* are joint shareholders of *LabWest* both hospitals are shareholder for both 50% of *LabWest*. This is typical for a regional organized network of integration and outsourced since hospital boards opt for a Limited (Ltd. – B.V.). However the application of all tests is still situated within the participating hospitals.

In selecting the cases, a laboratory organization was selected if the arrangement characteristics are most similar to the typical form of organization according to theory. Next to it, the will to cooperate with this thesis was important in the case selection process. Only one laboratory organization refused cooperation.

3.3 Operationalization

The variables examined in the study are specified by a number of criteria. In the section below the variables are conceptualized first and consequently the criteria are operationalized by reflecting the elements of the conceptualization and objects of the study.

Success:

Success is observed here as goal attainment. In case of increasing efficiency and increasing quality the goals of the organizational structure are achieved and is consequently indicated as successful. Respondents are asked for the expected effects on indicators efficiency and quality and only limited underlining of the expectations by quantitative data is given. As a consequence the extent of success is referred to as an expectation of success.

To provide a comprehensive overview of success disadvantages outside the scope of efficiency and quality, such as governance issues, have a prominent role in the interviews by asking respondents for (potential) disadvantages of own and alternative organizational structures. In addition expectations are formulated to provide a complete overview.

Efficiency:

In measuring efficiency this thesis refers to organizational efficiency, which is defined as the ratio of input and output. It shows the ratio of the resources and their mix within an organization that result to products and / or services and how much is absorbed by the economic system of the hospital. Often a distinction is made between human resources and materials as inputs, and the use of materials as supplies and as equipment (Katz & Kahn, 1978).

Efficiency has to do with an optimal division of resources (inputs) in order to achieve the largest possible output considering the amount of resources. Therefore in the operationalization a comparison of inputs and outputs of the laboratory's productivity ratios needs to be covered. Respondents are asked for financial advantages observed and the means by which cost efficient production is achieved. If available the production (number of analyses) and the labour costs of the laboratory (number of FTE) are analyzed.

Quality:

In the conceptualization of quality, the satisfaction of requesting specialists is explored. As written in the introduction the primary goal of hospital laboratory specialists is to provide high-quality

laboratory services. According to Cowan (2005) the elements high quality laboratory services include: (1) accurate and precise analysis, (2) timely, clearly and concise reporting, and (3) delivery of service most valuable to the user of the service. The criteria of Cowan (2005) for high-quality laboratory services are fully covered with the inclusion of specialist satisfaction and the effects argued by heads of laboratories and members of executive boards.

Specialists are asked what is specifically important from their discipline and satisfied specialists are with the current service level of the clinical laboratory. In addition heads of laboratories and members of executive boards are asked for the effects of their perspective of organizational structures. At the same time, the effects on quality the heads of the laboratories argue to show up, are checked for current experience by asking specialists.

Disadvantages:

In chapter two the schedule was expanded with the disadvantage category to reflect on the effects that fall outside the scope of efficiency and quality. Respondents are asked for the (potential) effects of the selected organizational structures and their expectations about prospective organization of laboratory activities.

Types:

To determine the organizational structure of the cases the following indicators are used. In the first place it is observed whether or not the model is that of decentralization. According to Friedman & Mitchell (1993) in outsourcing arrangements (the most extreme form of decentralization) outside vendors are hired. Secondly Friedman & Mitchell (1993) argue that the idea of integration is to create a regional value-added laboratory network, which can integrate diagnostics generated in decentralized testing sites. Cases are reflected as to whether or not the hospital is owner / shareholder of the laboratory organization. In order to indicate what type can be distinguished for both criteria the agreements of hospitals and the expression of relationships in year reports are analyzed to make a categorization.

3.4 Sources of data

In order to analyze the efficiency and quality of hospital laboratories interviews with stakeholders will be conducted in order to gain information about the choice for the laboratory organization, the intended effects on efficiency and quality, as well as reflecting on the satisfaction of specialists and the expectations in laboratory arrangements. In addition, year reports of the period 2008-2011 are only used to retrieve quantitative data of the number of analyses and the number of manpower (FTE).

Description of interview and protocol

In this thesis interviews are used as method of data collection. As main advantages interviews can provide in-depth information and are a good instrument for measuring attitudes. However interviews are time consuming and may produce reactive effects such as socially desirable answers. To avoid bias the interviewer should be non-judgmental to the responses of the interviewee (Tashakkori & Teddlie, 2003).

Interviews are appropriate for this study since the different opinions of various stakeholders are explored. Specialist satisfaction is observed and this fits since one of the main strengths of interviews is the measurement of attitudes. In addition potential differences over groups are made transparent by interviewing in a standardized open way. This means that written out questions in advance are asked among respondents. The purpose is to reduce interviewer effects during the interview. Furthermore the interview is highly focused on the purpose of the interview (Patton, 1990). The questionnaires of the distinguished groups of respondents are shown in appendix A, B, and C.

Key Informants

For a description of the advantages and disadvantages of organizational structures it is necessary to interview different groups within the constructions. Therefore interviews are applied with the following groups: the head of the laboratory, member of the executive board of hospital, specialist within the hospital. In the section below the groups of respondents are introduced and the choice of selected groups is elaborated.

The head of the laboratory department as well as the member of the executive board will be asked to review, among other things, the central idea behind the choice of laboratory organization, the effects on efficiency and quality, the disadvantages of the current organization and its alternatives in order to create insight in the effects of an organizational structure. Requesting specialists within the hospital will be asked about their satisfaction of laboratory services and their ideas about laboratory organization.

The participants are selected by the position they have and / or randomly selected from the disciplines within the hospital. In order to get a representative sample from the group of specialists outside the laboratory a stratified random sample is chosen. Under a stratified random sample, disciplines are divided into two strata and then specialists are randomly sampled separately from each stratum (Shadish, Cook, & Campbell, 2002). Stratification is used here since differences between disciplines are expected. Based on data of the year report of the *Jeroen Bosch Ziekenhuis* laboratory an overview is made of the ten specialism's that require most tests. There are differences in both the number and the kind of tests required by the specialism. Therefore, the numbers one, two and ten of the specialism's that require most tests are selected. These are internal medicine (*interne geneeskunde*), cardiology (*cardiologie*), and neurology (*neurologie*) respectively. Per discipline ideally two specialists are randomly invited for the key-informant interview. This is justified since the selected disciplines are different in characteristics that the potential differences over disciplines are included within this data collection. Furthermore the potential differences in types of tests per discipline and / or number of tests, and its effects on the quality from a specialist perspective, can clarify an issue by the selection of most different disciplines.

Data gathering

In total 15 interviews have been conducted. Distinguished over the groups, 5 interviews are conducted with a head of the laboratory (response rate: 5/6), 3 interviews are conducted with a member of the executive board (response rate: 3/5), and 7 interviews are conducted with specialists within the hospital (response rate: 7/12). Distinguished over the cases, 6 interviews are conducted in the *Atal-Medial* case (response rate: 6/10), 6 interviews are conducted in the *Deventer-Doetinchem*

Winterswijk case (response rate: 6/7), and 3 interviews are conducted in the *LabWest B.V.* case (response rate: 3/6). In addition one extra interview is conducted, with a respondent that report oneself to participate in this thesis. The case was most similar to the *Atal-Medial* case. This was interesting since it could strengthen or weaken the observations done in the *Atal-Medial* case. The results of the extra interview are described in paragraph 4.3. The interviews conducted with the head of the laboratories and the members of the executive board of the hospitals have a length of about one hour. The interviews with the specialists have a duration of approximately a quarter of an hour. The difference in time is caused by the fact, that specialists want to spend minimum of their time to the questionnaire. All interviews are held in the period 26th of July up to and including 27th of September. The interviews are conducted in Dutch. This may have resulted in translation issues in describing the results.

3.5 Data analysis

To process the data resulting from the interviews, a qualitative data analysis (QDA) software programme '*Atlas Ti, version 6.2*' is used. The operationalization of the concepts in this thesis was used in order to code the interviews. The codes used to categorize the quotations are the following:

English	Nederlands
Means	Middelen
Goals: 1. Efficiency 2. Quality 3. Governance	Doelen: 1. Efficiëntie 2. Kwaliteit 3. Bestuur
Expectations	Verwachtingen

All statements that respondents made, are classified in categories, such as efficiency. The author categorized statements over the codes. As a result, the programme allows us to pop up all comments related to for instance 'efficiency'. Then a structured description of (intended) effects in the result sections was possible and statements are described in the result chapters. The coding process was applied for the different cases and for the groups of specialists separately. Additionally, the software is used to count the number of comments related to efficiency or quality. As a consequence, this could give reason to indicate or strengthen perspectives per case. The programme is not used to reveal relationships. This was hardly possible since intended effects could not be checked for real effects. Furthermore transcriptions are sent back to respondents to make some comments on the transcription. Respondents sent back the transcriptions with some remarks in the period 3rd of August up to and including 29th of September. These versions are used as basis for the results in this thesis. Respondents that gave permission to publish their name are in the result chapters mentioned with their names.

Chapter 4: Case ‘Atal-Medial & Kennemer Gasthuis’

In the next chapter a description of the first case of this thesis, ‘Atal-Medial & Kennemer Gasthuis’ is given. In the first part the background of the case is described. Subsequently the nature of the case with regard to organizational structures in hospital laboratories is elaborated. Then the scores of the organizational structure on the indicators efficiency and quality are analyzed. In the end a comparison is made between the expected scores and the actual scores.

4.1 Background of the case

Atal-Medial is one of the largest diagnostic centers of The Netherlands with approximately 4000 patient contacts per day, 536 employees and a turnover of 32 billion euro’s. Atal-Medial was founded in 2001 as a combination of the laboratories of Spaarne Ziekenhuis, Kennemer Gasthuis, Trombosedienst Haarlem, and Huisartsenlaboratorium Haarlem. The cooperation Atal-Medial medisch-diagnostische laboratoria is a laboratory with locations in Haarlem, Heemstede and Hoofddorp.

Atal-Medial contains four technologically high-quality laboratories and has a CCKL (Coördinatie Commissie ter bevordering van de Kwaliteitsbeheersing van het Laboratoriumonderzoek op het gebied van de Gezondheidszorg) quality mark. Furthermore Atal-Medial has its own thrombosis service (trombosedienst) and an extensive network of locations for blood sampling. Atal-Medial performs laboratory and diagnostic services for general practitioners, mental health care institutions (GGZ instellingen) and large hospitals in the regions Kennemerland, Haarlemmermeer, Bollenstreek, and the Groene Hart in the regions Leiden, Alphen aan den Rijn and Gouda (SMD Atal-Medial, 2011).

According to the vision statement of Atal-Medial centralization of laboratory production increases both efficiency and quality. Approximately 75% of laboratory diagnostics on behalf of a health care institution can be provided on a central location outside the institute. Production that coheres with the health care for ambulant patients and clients as well as a part of the clinical production are available for such a structure. Concentration of laboratory work in combination with automation and robotization enables efficient processes, bundling of experience and expertise, and effects a decisive and flexible organization (SMD Atal-Medial, 2011).

This thesis focuses on the cooperation Atal-Medial with hospital Kennemer Gasthuis situated in Haarlem. Atal-Medial performs the services in the field of clinical chemistry and hematology for the hospital. Atal-Medial has locations for blood sampling in both locations of the hospital (Kennemer Gasthuis, 2012). The Kennemer Gasthuis physically retains laboratories for emergency and / or high complex samples within their hospital organization, where the actual laboratory work is done by Atal-Medial. Additionally the non emergency samples are applied by Atal-Medial at a central location. Atal-Medial plans to put up a central laboratory outside the hospital organization.

Recently Atal-Medial merged with a ‘eerstelijns’ diagnostic centre Atal. This contains a juridical merger, in which one cooperation remained. Internally a model with an executive board and a supervisory board is used, with the condition that a general practitioner at the side of Atal and a hospital manager at the side of Atal-Medial are part of the supervisory board of the new cooperation Atal-Medial. Atal-Medial would like to phase out these managers in the supervisory board and

become a completely independent laboratory organization. *Atal-Medial* argues this is founded on the governance code, with regard to competing interests.

Atal-Medial still conducts a large amount of tests from a centralized location within one of the hospitals *Atal-Medial* cooperates with, such that it is not fully decentralized. In addition, hospital managers are represented in the supervisory board. The organization is still faced with ownership from the participating hospitals in the cooperation.

This type of organizational arrangement is most similar to the outsourcing structure. In the first place, *Atal-Medial* is primarily responsible for the laboratory work. Secondly, *Atal-Medial*, rather than the hospital, has the primacy for integration of different hospital laboratory activities, and the plans for a prospective organization are directed towards a fully independent organization. In the spectrum of centralization and ownership the *Atal-Medial* organization is situated as indicated below:

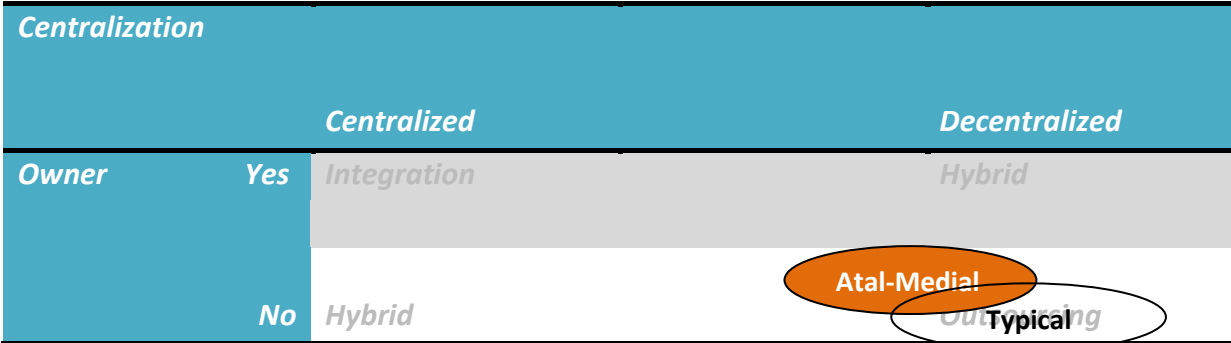


Figure 4.1 The location of the *Atal-Medial* & *Kennemer Gasthuis* cooperation in the centralization-ownership landscape, which is not completely outsourced but most similar to the outsourcing structure.

4.2 Analysis

This subsection expounds on the results of the interviews. The categorization of the indicators efficiency, quality and disadvantages is taken as a framework to explain the results here in a systematic manner. To put it in a comprehensive perspective the strategy and expectations of the respondents’ model are described. For this case six persons were interviewed. This group consists of two executive board members of *Atal-Medial*, Mrs. Pronk-Admiraal and Mr. Dijkman, an organizational head of *Kennemer Gasthuis*, and three specialists within the hospital of which two are internists and one is a neurologist. Before referring to the statements of the respondents, the number of quotations related to whether efficiency or quality is counted. In the case *Atal-Medial*, respondents (specialists excluded) refer fourteen times to efficiency and nine times to quality. This may indicate a more economic perspective, which is in line with the theory of make and buy decisions. Specialists are excluded for counting since we assume them to be focussed on quality. As a result, they could disturb the direction of the perspective.

4.2.1 Strategy

According to the two executive board members of *Atal-Medial* the outsourcing structure in general is aimed at a centralized organization of the laboratory for the routine and bulk part of both primary care and secondary care diagnostic tests as well as the overhead of it. A larger increase in scale

enables the organization to centralize more laboratory functions in order to realize cost savings and simultaneously realize added value of diagnostics. To realize costs savings, it is of importance to create a centralized volume for bulk production. Simultaneously, to add value, organization of knowledge within the laboratory and close to both the clinic and the primary care diagnostics is needed. As a precondition Mrs. Pronk-Admiraal (executive board *Atal-Medial*) argues that a good logistic operation is essential to prevent an increase in time of the pre analytical phase. Therefore a critical reflection on what to outsource and what not is essential. To achieve increases in scale *Atal-Medial* attempts to connect hospitals to *Atal-Medial*. The hospital laboratory production goes to *Atal-Medial*, in turn hospitals are expected to reduce the manpower of their laboratory organization. As a precondition within this framework support by the laboratory personnel is essential to realize growth with promising results in terms of efficiency.

4.2.2 Effects

The effects are divided over three groups corresponding with the objects of research: efficiency, quality and disadvantages.

Efficiency

Atal-Medial uses a model that leads 30% cost savings at a level of € 100 million, by centralizing 85% of production and to deal with 15% on a local base. According to both Mrs. Pronk – Admiraal and Mr. Dijkman the costs of *Atal-Medial* are about 25% less compared to other hospitals in The Netherlands. According to Mr. Dijkman and Mrs. Pronk-Admiraal the outsourcing model is able to produce services against lower costs by:

- Sharing facilities with other partners.
- Centralizing bulk production and applying the complex tests in a decentralized setting. The laboratory organization is able to save labour costs in the decentralized areas by placing a large capacity and minimal staff.
- Spread of fixed costs (for instance ICT) on a larger basis. Therefore, more assets are available for investments in research, education and innovation.
- More profitable agreements with suppliers. Because of the growth and location of the laboratory organization it is more important for the suppliers to contract *Atal-Medial*.

The organizational manager of the *Kennemer Gasthuis* focuses on the lack of transparency about the prices from *Atal-Medial*, while helping *Atal-Medial* with their focus on the application behaviour of specialists.

To verify the claims on efficiency, the year reports of *Atal-Medial* are studied. The following observations are made. Comparing the number of analyses (production) and manpower (FTE) in the period 2008-2011 gives an impression of the trends in efficiency effects for *Atal-Medial*.

	2008	2009	2010	2011
Total number of analyses (x1000)	4510	4738	4722	4984
Number of analyses secondary care (x1000)	2250	2354	2291	2253
% secondary care of total number analyses	49,9	49,7	48,5	45,2
Total FTE	241,45	253,08	254,03*	255,3
Laboratory FTE	103,1	102,74	101,5*	100,6
secondary care analyses per FTE (Laboratory)	21823	22912	22571**	22395
Total number of analyses per FTE (Total)	18678	18721	18588**	19522

* Estimated based on the total personnel cost and the percentage of FTE per department.

** Calculated based on estimated data.

Table 4.1: The number of analyses (secondary care) compared with the number of (total) FTE for the laboratory organization *Atal-Medial* (Source: SMD *Atal-Medial*, 2011)

Based on these numbers, a trend towards a higher level of analyses with a lower manpower (both total and in the laboratory) can be observed. This may indicate the positive efficiency effects as indicated by the executive board members of *Atal-Medial* out of labour cost savings. However the FTEs for departments 'Relations and project management' and 'HRM' are increasing. Combined with an increasing positive operating income the efficiency effects are at least partially confirmed. Data are based on the number of analyses for *Kennemer Gasthuis* and *Spaarne Ziekenhuis*. It should be noted nevertheless that the organization is growing with secondary care analyses from other hospitals in the region. If the laboratory organization succeeds to produce a larger base of samples against the same or marginally higher overhead costs, efficiency results may be even better.

Quality

The two executive board members of *Atal-Medial* argue that quality is rising within the outsourcing structure since:

- Clinical chemists are able to specialize on parts of the laboratory work.
- Automation of infrastructure assumes reduction of mistakes.
- Coupling between primary care and secondary care diagnostics becomes better, because specialists can have a look in the results of their primary care diagnostic colleagues.

The expectations of the executive board members are verified by interviews with specialists. All three specialists indicate that:

- Improved quality as an effect of more specialized laboratory specialists is not experienced.

- The better utilization of the chain is not experienced since requests from general practitioners or colleague hospitals like *Spaarne* are still not clarified for each other. The specialists argue that this would be a large improvement in quality of the service.
- Despite the lack of experienced effects in these two aspects, they are either satisfied or very satisfied with the delivered services by the laboratory.
- No differences are experienced over the years. Elementary criteria for a good laboratory test are accurate and quick analyses. For specific areas the rapidity of the tests is more important compared to other. As an example of less satisfied results the Stat determinations are difficult to retrieve within one hour.

Finally, an organizational head of the *Kennemer Gasthuis* indicates that there are no problems in the field of quality, service, responsiveness of clinical chemists.

Disadvantages

The outsourcing model is confronted with a number of disadvantages according to various respondents:

- Not prospect-proof seeing since in prospect the set of emergency determinations increases and approaches like outpatients' treatment are rising. The decentralized satellite laboratories are not designed for these developments (one of the laboratory heads of the integration model).
- Lack of governance structure. Agreements with *Atal-Medial* were based on trust, now agreements are far more formalized. The head misses the large transparency of sharing data and high goal consensus, compared to the former hospital of the respondent in which the clinical laboratory was an integral part of the hospital (organizational head laboratories *Kennemer Gasthuis*).
- Mrs. Pronk-Admiraal argues that there are some difficulties to remain a recognizable organization for the patients while increasing in scale.
- A changing perspective of clinical chemists is requested. This may be a threat from the perspective of the laboratory staff, not all staff will stay and not all tasks remain the same. This may hinder the transition of laboratory organization.
- Rational effects (and the success) of the outsourcing model are bounded by the environmental and organizational circumstances (Mr. Kleinjan – member of executive board *Deventer Ziekenhuis*).

4.2.3 Expectations

Mrs. Pronk – Admiraal and Mr. Dijkman expect that laboratory work will be organized according to large centralized laboratories with satellite laboratories in the hospitals on a private basis. Respondents expect that about five players in the field will possess 80% of the laboratory market. Furthermore, both of the respondents argue for the added value of a connection in the primary care and secondary care diagnostics, with a clear framework of the care chain to patients as a result. Within this framework Mrs. Pronk – Admiraal nuances that the trade-off between cost effectiveness and the speed of test results for patient care has to be followed critically.

The respondents think the centralized model has chances, because increases in scale effect advantages of scale. According to rational principles the cost of infrastructure are equal in rotating 10, 100 or 1000 samples. As a consequence fixed costs can be distributed over a larger base of samples. The hospital remains responsible for the results and offered health care based on the results. No shift in responsibility towards the laboratory organization is indicated. However, the hospital can formalize the agreements with the laboratory organization, and in case of dissatisfaction opt for another laboratory organization. The loss of control and authority by hospitals is therefore not a real risk (Mrs. Pronk-Admiraal).

According to Mr. Dijkman there are some barriers for action based on costs and quality measures in the current (regulated) market.

- Mr. Dijkman refers to the dependency of the system and states the current budget financing in primary care diagnostics has negative incentives for hospitals.
- The power of the medical staff is large. Partly caused by the organization in the association medical staff, which is mostly just as powerful as the executive board of the hospital. This power vacuum could lead to irrational choices from the executive board, since the cooperation with the medical staff is more important for them than intervening in a field with relative small cost savings.

The risk that laboratories in a performance based financing system have the incentive to increase the volume is, according to Mr. Dijkman, unfunded. This can be overcome by a financing system between the hospitals and the private laboratory organization consisting of both lump sum budgets and a variable component. Mr. Dijkman (executive board *Atal-Medial*) devotes himself to lateral integration with other specialisms like radiology and micro biology (*ontschotting*) besides increases in scale. The organizational head of *Kennemer Gasthuis* supports this view.

4.3 Case 'Synergos'

Within the framework of this thesis, an extra interview is conducted with a respondent that wanted to participate. The chairman of the executive board of the diagnostic centre *Synergos*, Mr. Keijzer, in the south of The Netherlands is interviewed. The *Synergos* organization is organized partially different from the *Atal-Medial* case, but the main organization and the perspective on the laboratory market are shared principles. The statements of the respondent in this case could strengthen the results observed in the *Atal-Medial* case. Therefore, the results of this interview are part of this thesis. It has to be noticed that the interview is perceived as a new case.

Background of the case

The *Stichting Synergos* is a primary care diagnostic organization in The Netherlands and is founded in 1986. The organization has main offices in Eindhoven, 's-Hertogenbosch, and Helden-Panningen, about 30 diagnostic locations and more than 100 blood sampling locations. The service area encloses Limburg and the eastern part of Noord-Brabant. *Diagnostiek voor U* is the brand name under the flag of *Stichting Synergos*. *Diagnostiek voor U* realized in 2011 a result of 3,8 million laboratory analyses with a manpower of 500 employees. In March 2009, *Synergos* took over the laboratory activities of the *St. Jans Gasthuis Weert*. A large part of the non-emergency tests is applied in the laboratory at

the main location in Eindhoven. The laboratory in Weert can now specialize on the specialties of the hospital (Stichting Synergos, 2009; Diagnostiek voor U, 2011).

Analysis

Mr. Keyzer argues that the elements volume, breaking down cultural barriers (*ontschotting*), combining primary care and secondary care diagnostics have advantages for patient care, results in continuity and realizes one database. In order to achieve the intended effects laboratory activities have to be centralized as much as possible. The emergency samples are applied in a satellite (decentralized) laboratory. Quality increases as a result of focussing on emergency samples in the satellites and emergency tests become more routine work, while cost savings are possible due to the centralized approach. Cost savings are directed on labour. Of course savings are achieved on infrastructure and ICT, but only marginally. Laboratory costs account for about 60-70% of labour costs. Satellite laboratory is relatively expensive, but the costs compensated by the profits of the centralized laboratory. Mr. Keyzer observes large cost savings, increased transparency and improvements of throughput time. Governance of relationships is formalized in the organization of the respondent, while simultaneously the respondent tries to remain recognizable for the applicants. This is a disadvantage of the centralized structure according to the respondent.

4.4 Concluding remarks

In this chapter the construction between *Atal-Medial & Kennemer Gasthuis* is elaborated as an example of the type 'outsourcing'. The second sub question is partially answered here from the perspective of an structure most similar to the outsourcing model:

What are the results of different organizational structures in hospital laboratories in The Netherlands in terms of efficiency and quality?

The efficiency effects seems to show positive effects on the operating income based on collective purchase, spread of fixed costs and shared facilities according to key informants as well as lower labour cost according to the year reports, shown in table 4.1. The outsourcing model is supported by efficiency improvements. Quality effects as indicated to appear according to the executive board members of the laboratory organization are not perceived by the specialists within the hospital organization. However, the specialists (two internists and one neurologist) are either satisfied or very satisfied with the service of *Atal-Medial*. As disadvantages some governance issues are mentioned in terms of changing responsibilities of both laboratory personnel and the hospital organization as a whole as partner of the laboratory organization. Additionally the relationship between hospital and laboratory organization is further formalized due to the more commercial relation.

The observations of the respondents in the *Atal-Medial* case are supported by the statements of Mr. Keyzer of the *Stichting Synergos*. *Synergos* is organized comparable to *Atal-Medial*, with the difference that *Synergos* started as primary care diagnostics organization. The ideas to achieve more efficient production, while maintaining quality are largely the same. This strengthens the observations done in the *Atal-Medial* case. All in all the outsourcing model is focussed on a more efficient organization. This is supported by the number of quotations in the direction of efficiency, as well as the statements given by the respondents. However, the possibilities to roll out the outsourcing model are bounded by environmental and organizational circumstances.

Chapter 5: Case ‘Deventer Ziekenhuis, Slingeland Ziekenhuis Doetinchem, en Streekziekenhuis Koningin Beatrix Winterswijk’

This chapter deals with the second case, ‘Deventer Ziekenhuis, Slingeland Ziekenhuis Doetinchem, en Streekziekenhuis Koningin Beatrix Winterswijk’. The structure of this chapter is the same as in the former chapter four.

5.1 Background of the case

The cooperation between hospitals of *Deventer Ziekenhuis*, *Slingeland Ziekenhuis Doetinchem*, and *Streekziekenhuis Koningin Beatrix Winterswijk* situated in the mid-eastern of the Netherlands was initiated by the hospitals of Doetinchem and Winterswijk and started in 2006. These hospitals wanted to develop an intensive care for thrombotic patients and therefore summoned the help of *Deventer Ziekenhuis* for the development. Afterwards the cooperation among laboratories intensified. The hospitals formalized the cooperation in April 2008 by formulating a declaration of intent for the executive boards in the field of the existing intensive care for thrombotic patients and collective purchasing. The idea of collective purchasing of infrastructure was initiated by a manufacturer. The advantage for the manufacturer was expansion of the number of hospitals they deliver to. With the cooperation the hospitals hope to work more efficiently and to agreed higher discounts on the purchasing of equipment and variable materials. In addition the quality of diagnostics is expected to improve by the sharing of knowledge. To give an indication of the size of the laboratory organization, the largest hospital in the cooperation – *Deventer Ziekenhuis* – has a turnover of 12 million euro’s and a manpower of 91,81 FTE (*Deventer Ziekenhuis*, 2011).

The agreement among the three hospitals does include laboratory diagnostics that is not applied daily, such as allergy- and DNA diagnostics, which are centred on one location only. Simultaneously research that is applied in external laboratories yet, can be applied by the hospitals itself due to the cooperation. According to the hospitals this can enhance quality (*Deventer Ziekenhuis*, 2008). In the new situation all hospital laboratories over the different hospitals are maintained.

In this situation cooperation between three hospitals in a region is arranged according to network principles. Governance between hospitals is arranged by monthly meetings between the heads of the laboratories with decision-making on consensus basis. Hospital laboratories cooperate in order to enhance the number of patient samples to effect efficiency advantages and to achieve quality benefits. It is conspicuous that as a result of cooperation the three hospitals choose to integrate research that is now applied by external laboratories, because of the fact that this is expected to enhance quality. This is consistent with the transaction cost explanations for integration as described in chapter two, in which is argued that hospitals are expected to integrate those services that significantly impact quality and cause harm to a patient.

This type of arrangement shows most resemblance with the organizational structure of regional networks / integration. The production of diagnostics is completely applied in house, i.e. in one of the three hospitals within the cooperation. Based on this observation it is concluded that production is owned by the hospitals. Furthermore the integration the locus of authority is centralized in an informal cooperation between the heads of the clinical laboratories. However the mandate for decision making comes still from the participating hospitals individually. Therefore it is argued that

the cooperation is not completely centralized. The case is observed as most similar to the integration model, but not completely matching with the typical situation of integration.

In the spectrum of centralization and ownership the ‘*Deventer Ziekenhuis, Slingeland Ziekenhuis Doetinchem and Streekziekenhuis Koningin Beatrix Winterswijk*’ (DeWiDo) organization is situated as indicated below:

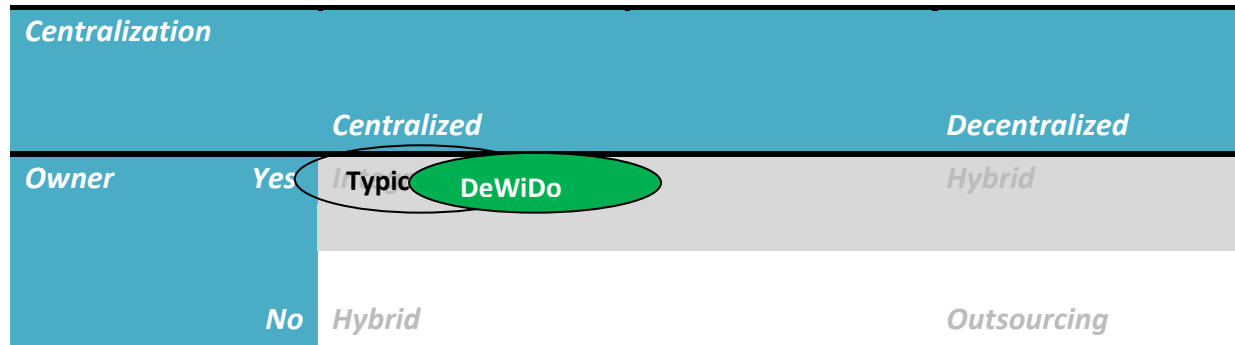


Figure 5.1 The location of the *Deventer Ziekenhuis, Slingeland Ziekenhuis Doetinchem and Streekziekenhuis Koningin Beatrix Winterswijk* cooperation in the centralization-ownership landscape, which is not completely integrated but most similar to the integration structure.

5.2 Analysis

The analysis phase of the different organizational structures focuses on a detailed description of the results of the interviews. The categorization of the indicators efficiency, quality and disadvantages is taken as a framework to explain the results here in a systematic manner. To put it in a comprehensive perspective the strategy and expectations of the respondents’ model are described. For this case six persons are interviewed. This group consists of two heads of the laboratories, Mr. Salden (*Deventer Ziekenhuis*) and Mr. Van Der Vuurst (*SKB Winterswijk*), one executive board member of *Deventer Ziekenhuis*, the care group manager of *SKB Winterswijk* and two specialists within the *Deventer Ziekenhuis* of which one internist and one cardiologist. Before referring to the statements of the respondents, the number of quotations related to whether efficiency or quality is counted. In the case *Deventer-Doetinchem-Winterswijk*, respondents (specialists excluded) refer ten times to efficiency and eleven times to quality. This may indicate a more balanced perspective of both efficiency and quality, which is slightly deviant to the theory of make and buy decisions. The theory indicated the integration case as quality driven. Specialists are excluded for counting since we assume them to be focussed on quality. As a result, they could disturb the direction of the perspective.

5.2.1 Strategy

Mr. Salden of the *Deventer Ziekenhuis (DZ)* perceives the organizational structure as a kind of cooperation: every hospital stays independent and making agreements about collective measures. By larger series of samples the hospital network can effect lower production costs without reducing quality. His colleague of *SKB Winterswijk*, Mr. Van der Vuurst, tells about the idea of concentration of tests based on local expertise, possibilities for organization or sufficient overhead. The services of the laboratory organization for the hospitals in the network are applied on payment of cost price, supplemented with overhead and logistic costs.

Mr. Van der Vuurst formulates some essential indicators for successful network cooperation for this specific situation. The hospitals have mutually decided to concentrate specific tests over the different hospitals and not everything to the largest hospital – *Deventer Ziekenhuis*. According to Mr. Van der Vuurst, it is important for the **trust** in the network to keep the appointments. The network model as a whole is signed by the executive boards of the hospitals for the duration of five years, which effects **stability** within the cooperation. In addition the three participating hospitals **balance** each other out: Deventer is larger than Winterswijk and larger than Doetinchem, but Doetinchem and Winterswijk are larger than Deventer. All three hospitals have the same weight in voting.

Governance of the network is arranged by the heads of the laboratories who discuss and decide about the projects. These agreements are not formalized. Decision making is based on consensus norms. In addition, Mr. Salden states that each subject is committed to paper. In this network model it is relatively easy to enter the network, but the participants try to increase the burden to leave the network by financial penalties.

5.2.2 Effects

The effects are divided over three groups corresponding with the objects of research: efficiency, quality and disadvantages.

Efficiency

The network model achieves cost savings as a result of:

- Collective purchase of infrastructure and materials. As cooperation of three hospitals they are more important to contract for purchasing organizations (Mr. Van der Vuurst, Mr. Salden and the care group manager of the *SKB Winterswijk*).
- The specialization and concentration of tests a part of the machinery is reserved for specific tests. This helps to utilize the infrastructure optimally (Mr. Van der Vuurst).
- Prospective expected savings in labour. The hospitals are able now to produce tests with a high time intensity on a larger and centralized basis. Therefore a reduction of personnel is possible.
- The concentration of low volume-high complex tests and the insourcing of tests that are outsourced yet

Mr. Kleinjan (member executive board *Deventer Ziekenhuis*) argues that a laboratory near to the hospital processes is useful. In case of outsourcing on the decentralized locations a satellite laboratory has to be organized. This satellite is in any case more expensive in comparison with a laboratory as integral part of the hospital. Consequently, the outsourced laboratory needs to compensate for the loss of its satellite next to the 'own' (financial) advantages.

Based on the interviews with the heads of the laboratories and organizational staff of the hospitals of Deventer and Winterswijk, effects on efficiency are observed by purchase advantages and increases in scale (due to concentration and specialization of tests). The respondents, however, agree that in terms of personnel the staffing of the laboratories is still large and cost savings within this field are possible.

	2008	2009	2010	2011
Total number of analyses (x1000)	2815	3007	3152	3255
Number of analyses secondary care (x1000)	1783	1916	1976	2007
% secondary care of total number analyses	63,3	63,7	62,7	61,7
Total FTE	129,04	135,98	139,25	141,49
Laboratory FTE	93,35	97	97,56	98,58
secondary care analyses per FTE (Laboratory)	19100	19753	20254	20359
Total number of analyses per FTE (Total)	21815	22114	22636	23005

Table 5.1: The number of analyses (secondary care) compared with the number of (total) FTE for the clinical laboratories of Deventer Ziekenhuis & SKB Winterswijk (Source: Deventer Ziekenhuis, 2009, 2010, 2011; SKB Winterswijk, 2008, 2009, 2010, 2011)

Based on these numbers is a trend towards a higher level of analyses with a higher – but less than the increase in number of analyses – number of labour (both total and in the laboratory) can be observed. This may indicate the positive efficiency effects as indicated by the head of the laboratories of *Deventer Ziekenhuis* and *SKB Winterswijk* out of collective purchase as well as specialization and concentration of tests. The efficiency effects are at least partially confirmed based on the quantitative data of two out of three hospitals of the participation. However, the results in terms of secondary care analyses per FTE (laboratory) are lower than the results of the same calculations for the outsourcing model. In addition, the trend in number of Laboratory FTE is even rising, whereas the outsourcing model shows a trend in declining the number of Laboratory FTE.

Quality

The heads of the laboratories and Mr. Kleinjan of *DZ* argue that quality is rising within the integration structure since:

- Laboratory organization near to hospital processes is profitable for the rapidity of reporting emergency samples (Mr. Salden & member of executive board *DZ*).
- Higher frequencies and larger scales of patient samples are profitable for quality of analyses (Mr. Salden).
- Participating hospitals have entry to the specialized work of each other. In the former situation this was limited to the result and the invoice. (Mr. Van der Vuurst).
- Hospitals agree on the methods, the process and the frequencies used in order to set up a quality framework (Mr. Van der Vuurst).
- Provide advice about rational behaviour of test requests to achieve volume limitation (Mr. Salden).
- Hospital personnel finds each other quickly within the hospital organization (member of executive board *DZ*).

The expectations of the head of the laboratories are verified by asking specialists for these effects. All two specialists (cardiologist and internist) indicate that:

- The satisfaction is high due to the responsiveness of clinical chemists, the possibilities for research and the organization of the laboratory.
- Additional quality improvements are not perceived. The cardiologist nuances on this point by indicating that a lot of tests within the cardiology are 'high volume-low complex' tests.

In addition, the cardiologist states that emergency tests take relatively long before reported, which seems conspicuous against the background of the arguments of Mr. Kleinjan. A limitation of this part of research is that the interviewed specialists of *DZ* are proposed by the head of the laboratory of *DZ*, but regarding to the answers it seems confident. The care group manager of *SKB Winterswijk* is very satisfied with the quality of the clinical laboratory. However she states that specialists are still rarely cost-conscious.

Disadvantages

The integration model is confronted with a number of (expected) disadvantages according to various respondents:

- Lack of autonomy. The laboratory organizations are faced with deviant hospital interests, which are in contrast to the primarily benefits of the cooperation (Mr. Van der Vuurst).
- Governance of the network is the largest advantage, but, simultaneously, the largest disadvantage of the model. The network model is very flexible of nature compared with the administrative issues a Ltd. or outsourced organization has as a results of mergers, juridical entities, labour unions and employees councils. Until now decision making is based on consensus basis between the head of the laboratories in a kind of an 'old-boys network'. The thresholds for leaving the network are obviated by financial penalties. However for all participants it is clear that in case of expansion the cooperation should be formalized in order to overcome impasses, containing risks and decide on controversial points (Mr. Salden).
- Insourcing laboratory organization has no incentive to improve itself (respondents Ltd. model).
- Predilection of participants for own specialties and own organization remains high. Therefore it is professionally difficult to divide input and output with each other. The network model will remain too expensive because every actor will protect its own organization (Mrs. Pronk-Admiraal & Mr. Dijkman).
- Still expensive allocation of work by applying organizational tasks by medical personnel (care group manager *SKB Winterswijk*).

5.2.3 Expectations

Right across the width of respondents agree that the current cooperation is not large enough in prospect to be competitive. Mr. Salden and Mr. Kleinjan argue, however, that increases in scale are assumed to be cost efficient, but far-reaching increases in scale result in inefficiencies. It is desirable to approach the optimum, the precise position of the optimum, however, is difficult to indicate according to these respondents. There is a moment that added value decreases.

Both Mr. Kleinjan, the care group manager of *SKB Winterswijk* and Mr. Van der Vuurst agree that in case of expansion relations between participating hospitals need to be formalized for instance accommodated in a Ltd or cooperation (*stichting*). Mr. Kleinjan is most extreme on this point by arguing this is essential for making real choices. Otherwise, all hospitals keep their preference for deliverers and own hobbies. The growth of the network model is questionable due to the high extent of autonomy. The governability and controllability are uncertain elements in case of expansion, while staying sufficient decisive. In case of growth there are according to Mr. Kleinjan two scenarios:

- A centralized laboratory with decentralized satellite laboratories
- Remain the current decentralized laboratories in the current state and searching for advantages in affairs like purchase.

Centralization of diagnostics can affect a quality improvement by buying a more expensive machine, due to cost division over the participating hospitals. In addition, synergy is possible due to the overcapacity of each hospital laboratory. The presence of laboratory organizations with sufficient efficiency profits while maintaining quality, force other laboratory organizations to decrease cost prices further. Next to it, the laboratory in Deventer started with the strategy for breaking down cultural barriers between diagnostic departments (e.g. radiology, pathology). However, the centralization of tests means that those tests are no longer available in the decentralized laboratory which may be a quality indicator for specialists and patients. Mr. Kleinjan argues that hospitals need to make choices about their role, and accept a balance between quality advantages and disadvantages while being competitive. Conclusion of this respondent is that the differences are small, otherwise developments have already taken place. Advantages of the integration model are the solidarity with the hospital is (respondents Ltd. model). An organizational head of *Kennemer Gasthuis* agrees on this point, while no separate and identical departments like ICT and Finance are constructed within both hospital and laboratory organization.

5.3 Concluding remarks

In this chapter the construction of *Deventer Ziekenhuis*, *Slingeland Ziekenhuis Doetinchem*, and *Streekziekenhuis Koningin Beatrix Winterswijk* is elaborated, as an example of the type '(regional) network'. In the beginning, the background of the construction is described to provide a broad framework and explain the link to the outsourcing model. The second sub question is partially answered here from the perspective of an structure most similar to the (regional) network model:

What are the results of different organizational structures in hospital laboratories in The Netherlands in terms of efficiency and quality?

The efficiency effects seems to be moderately positive due to the profits in collective purchase as well as specialization and concentration of larger amounts of tests. The number of analyses per 'Laboratory FTE' are, however, lower than in the outsourcing model. The results are only retrieved for the *Deventer Ziekenhuis* and *SKB Winterswijk*. Simultaneously, still inefficiencies are observed according to the interviews and quantitative data, mainly in the field of labour which is still largely distributed over the hospitals. However, comparison with the outsourcing model has to be nuanced. The only quantitative data observed here are the number of 'secondary care diagnostic tests' per 'laboratory FTE'. Quality effects as indicated to appear are observed by a cardiologist of *DZ*, and the

managers of *DZ* and *SKB Winterswijk*. However, the indicated qualities are no additional quality improvements compared to the former organization. This is also considered by the heads of the laboratories, who indicate that the focus of the cooperation is more on efficiency effects. As disadvantages, the governance of the network is mentioned weak since the basis of agreements is fragile, by being based on trust and only partially formalized. The incentives for cost efficient production are inferior, since each hospital is still focussing on their own organization and hobbies. All in all the network model tries to pick advantages of integrating organizational parts, while keeping autonomy and control for both laboratory organization and hospital. According to the number of quotations related to quality, this is an important measure for this cooperating hospitals. However, in the statements the focus is more on the savings that could be achieved. There seems to be moderate positive effects on both efficiency (see table 5.1, page 37) and quality (according to the satisfaction of specialists and the attention for quality in the number of quotations) measures. The governance structure, however, is, according to the respondents, the strength and weakness of this model. It seems to achieve some cost savings in the foundation of the model, but counteracts financial profits by the current decision making process based on consensus, in a situation that laboratories focus in their own preferences.

Chapter 6: Case ‘Lab West B.V. (Medisch Centrum Haaglanden & Haga Ziekenhuis)’

This chapter deals with the third case, ‘Lab West B.V. (Medisch Centrum Haaglanden & Haga Ziekenhuis)’. The structure of this chapter is the same as in the former chapter four.

6.1 Background of the case

As of July 2011 the hospitals of *Medisch Centrum Haaglanden* and *Haga Ziekenhuis* decided to merge their laboratories. Per July 2011 both hospital laboratories together with the activities of *Stichting Regionale Trombosedienst ‘s-Gravenhage en omstreken* operate as one organization. The new organization is called *Lab West* and is funded as Limited (Ltd) – *Besloten Vennootschap*. *Lab West B.V.* has about 300 employees (269,2 FTE) and a turnover of about 12,5 million. Both hospitals are shareholder for 50% each of this organization. With the foundation of *Lab West B.V.* a clustered organization of laboratory tasks for all patients in the The Hague region is created. The clinical chemistry and haematology laboratories of both hospitals and the complete intensive care for thrombotic patients are now part of the new organization.

Aim of *Lab West B.V.* is to achieve high-quality diagnostics for competitive prices. The organization needs to process both applications of primary care and secondary care health care professionals. The organization is still in a transition phase, which will take two years. *Lab West B.V.* will be organized according to both local and central laboratories led by the following philosophy. The clinical orders and other emergency determinations are processed on decentralized basis, whereas the requests of the outpatient clinic, the primary care and the other non-emergency requests are dealt with on a centralized basis (*Medisch Centrum Haaglanden*, 2011).

According to these organizing principles the laboratories are formally positioned outside the hospital organizations of whether *Medisch Centrum Haaglanden* or *Haga Ziekenhuis* and arranged as a Limited (BV). Based on this observation laboratories of both hospitals are argued to be decentralized. However each hospital is shareholder for 50%. As a result, hospitals are to certain extent still owner of the laboratory organization. This type of arrangement is observed as most similar to a hybrid of outsourcing and integration principles.

In the spectrum of centralization and ownership the ‘*Lab West B.V., Medisch Centrum Haaglanden and Haga Ziekenhuis*’ organization is situated as indicated below:

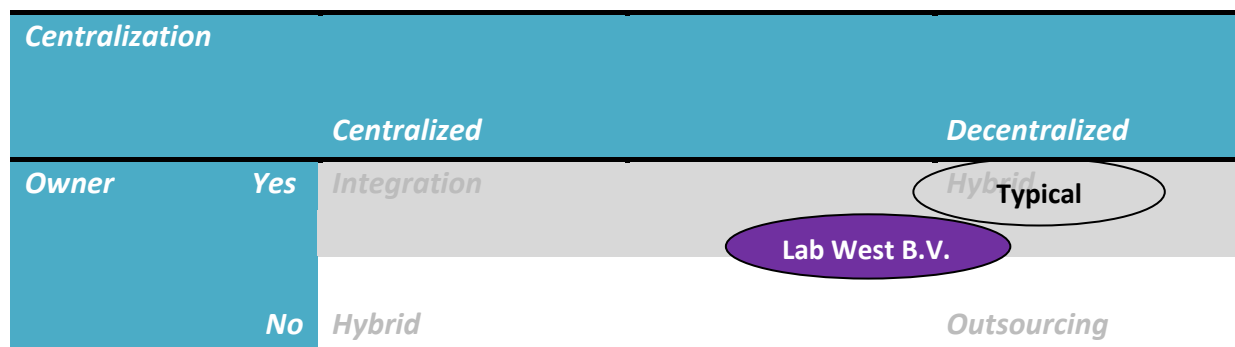


Figure 6.1 The location of the *Lab West B.V., Medisch Centrum Haaglanden and Haga Ziekenhuis* cooperation in the centralization-ownership landscape, which is most similar to the hybrid structure.

6.2 Analysis

The analysis phase of the different organizational structures focuses on a detailed description of the results of the interviews. The categorization of the indicators efficiency, quality and disadvantages is taken as a framework to explain the results here in a systematic manner. To put it in a comprehensive perspective the strategy and expectations of the respondents' model are described. For this case three persons are interviewed. This group consists of the head of the laboratory of *Lab West B.V.*, Ms. Overboom, and two specialists within the *Medisch Centrum Haaglanden* of which one internist and one neurologist. Before referring to the statements of the respondents, the number of quotations related to whether efficiency or quality is counted. In the case *LabWest B.V.*, Ms. Overboom refers five times to efficiency and four times to quality. This may indicate a more balanced perspective of both efficiency and quality, which is in line with the theory of make and buy decisions. Specialists are excluded for counting since we assume them to be focussed on quality. As a result, they could disturb the direction of the perspective.

6.2.1 Strategy

According to the chairman of the executive board of *Lab West B.V.*, Ms. Overboom, the trend is that growing laboratories are more efficient, more versatile and more innovative. Within the framework of this organization the respondent observes the *Lab West* organization as a typical shared service centre. In order to achieve cost efficient and high-qualitative production, *Lab West B.V.* transformed the laboratories on the small locations of both hospitals to emergency laboratories. Additionally, bulk tests are processed on the two large hospital locations as follows from the philosophy explained in the previous section. Until now the *Lab West* organization has not chosen for a still more centralized approach since Ms. Overboom considers organizational approaches in coherence with the environmental circumstances. To give an idea the respondent takes the costs and benefits of for instance logistic operations, housing, distances, and content of the package.

6.2.2 Effects

The effects are divided over three groups corresponding with the objects of research: efficiency, quality and disadvantages.

Efficiency

The Ltd.-model will be profitable in terms of cost savings according to Ms. Overboom by:

- Increases in scale a more cost efficient organization can be achieved, the optimal size of organization however is still unknown at the moment.
- The centralization of tests to the two large hospital locations.
- Specialization of those locations on specific tests.
- The purchase of infrastructure since it is important for suppliers of infrastructure to contract large laboratory organizations, the necessity to contract is higher.
- The allocation and planning of personnel can be organized more efficiently in case of a larger scale.

In general the current results of *Lab West* do not provide a basis for comparison of the number of analyses (production) and the number of labour (FTE) over years, since *Lab West* is only one year

active on the market. Looking to the year report 2011 of *Medisch Centrum Haaglanden* however the total turnover from July 1st 2011 was € 12.634.704. The result was € 831.954 negative as expected in the business case of *Lab West* caused by the initial costs. To give an indication about the production, *Lab West* has about 300 employees representing 269,2 FTE and apply about 8 million tests for about 1 million blood samples.

Quality

According to Ms. Overboom several improvements may be expected in terms of quality:

- Logistic operations are strongly improved. Hospitals are historically seen poor-functioning on logistic operations, whereas this is one of the strongest points of the intensive care for thrombotic patients (*trombosedienst*). Therefore the logistic service is strongly improved by the new organizational structure.
- Specialists complained about the lack of locations for taking blood samples (*prikposten*) and their restricted opening hours. *Lab West B.V.* initiated so called '*combiprikposten*'. Ms. Overboom states that both specialists and patients are enthusiast about this initiative since both the number of '*prikposten*' increased and the opening hours expanded.
- The data flow between the participating hospitals improved and the respondent expects that this will be the case in the future, because *Lab West* intends to work with one laboratory system.

Ms. Overboom, however, nuances the quality improvements by stating that it will not affect extreme quality improvements directly. There are severe norm times for determinations already. The respondent expects that the specialists of the hospitals are satisfied with the services of *Lab West*. To verify the effects in the field of quality, two specialists (one internist and one neurologist) from the *Medisch Centrum Haaglanden* are interviewed:

- Both specialists are satisfied about the provided services. Apart from the accuracy and rapidity of tests, specialists are especially satisfied about the accessible attitude of clinical chemists.
- The satisfaction is stable according to the neurologist (with less special determinations within the field of expertise), whereas the internist perceives improvement over years – not necessarily related to the change in organizational structure – in the rapidity of special determinations.
- Specialists are satisfied about the rapidity of tests, but have not commented on the improvements from a logistic point of view.
- The extension of the number and the expanding of the opening hours of '*prikposten*' are positively perceived by both specialists.
- In reaction on the integrated laboratory system both specialists are enthusiast. In the current situation hospitals cannot observe the results of each other due to working with different systems. This costs time, money due to double testing, and is undesirable from a patient (and specialist) point of view. The most obvious advantage for the patient is that the patient can be seen at location 'x', while results are known at location 'y'.

Disadvantages

The hybrid model is confronted with a number of (expected) disadvantages according to various respondents:

- Difficulty for participating hospitals to separate roles of client and shareholder. If insufficient the Ltd. loses the advantage of autonomy (Ms. Overboom).
- Dependency of the stringency of hospitals' management in achieving free market advantages (Mrs. Pronk-Admiraal & Mr. Dijkman).
- Dependency of the stringency of hospitals' management in achieving chain care also from the perspective of the primary health care (Mrs. Pronk-Admiraal & Mr. Dijkman).
- Incentives in a Ltd. structure are lost. As a client the consequence can be to leave the laboratory organization in case of poor quality or too high prices. In a situation when the hospital is shareholder simultaneously other interests and consistent behaviour are probably shown. The only possible punishment is to fire the management in case of mismanagement (respondents integration model & specialist *Medisch Centrum Haaglanden*).

Ms. Overboom realizes that the (formal) outsourcing of the laboratory organization is a risky operation, since the hospital perceives a loss of control and responsibility. The governance needs strict organization, but strong ties with important partners (e.g. hospitals) are essential. Ms. Overboom argues that the Ltd. model does not necessarily effect a loss of authority.

6.2.3 Expectations

According to Ms. Overboom, the current size of Lab West is acceptable within the framework of the current conditions of the Dutch market. The most clear change within these conditions is the expected transition of a budget financing system in primary care diagnostics in a performance based financing system. Hospitals and laboratory organization need to adjust on each single development based on the trends in the market. The possibilities within the market are situated in development of laboratory organizations. This may be growth in width (add to current assortment) or growth in scale (within the current assortment). The specialists frame the discussion from the boundaries of growth. Tests need to be available at the decentralized locations also, and with increasing complex logistic operations a loss of rapidity is expected to appear. Additionally, specialists like it when as much as possible is available in their own laboratory. As long as the rapidity is achieved however this is not a problem. Ultimately, the specialists argue that the organizational structure should be inferior to the service for the patient.

6.3 Concluding remarks

In this chapter the construction of *Lab West B.V.* (daughter of *Medisch Centrum Haaglanden & Haga Ziekenhuis*) is elaborated as an example of the typical 'hybrid form: outsourcing + integration'. In the beginning the background of the construction is described to provide a broad framework and explain the link to the outsourcing model. The second sub question is partially answered here from the perspective of an structure most similar to the hybrid form (outsourcing + integration):

What are the results of different organizational structures in hospital laboratories in The Netherlands in terms of efficiency and quality?

The efficiency effects are still uncertain looking to the current results (since July 1st 2011) of *Lab West B.V.* However, the positive effects in the outsourcing case on cost savings may be expected too in case of *Lab West B.V.* Simultaneously, it is questionable to what extent advantages from free market principles can be achieved, against the background of the shareholder status and control of the hospitals. The hybrid model is expected to achieve moderate improvements. Less compared with the outsourcing structure and approximately equal to the network structure. Quality effects, as indicated to appear according to the executive board members of the laboratory organization, are partially perceived by the specialists within the hospital organization. To nuance this effect, it is not said that the other models could not have or achieve the same service level. Next to it, the specialists (one internist and one neurologist) are either satisfied or very satisfied with the service of *Lab West B.V.* As disadvantages, the role of the hospital board is mentioned ambiguous by being client and shareholder simultaneously. This demands strict separation of tasks to overcome strategy conflicts and to achieve financial advantages according to free market principles. All in all the hybrid form (outsourcing + integration) model tries to combine the advantages of both outsourcing and integration, by formally outsource the organization and leave the ownership at the participating hospitals. There seems to be some positive effects on both efficiency and quality measures, but we could not check that with quantitative data. Specialists experience an increase in quality, and the balanced view of Ms. Overboom causes that positive quality effects may be effected. At the same time the governance structure seems to counteract the profitable effects from a financial point of view. The Ltd. construction is able to be profitable, if the hospital separates the roles of client and shareholder as well as the extent of stringent steering.

Chapter 7: Analysis per group

In this chapter the main observations of the several groups of respondents and most common differences and similarities are described. Furthermore the data used and observations done are reflected with the results of interviews with two 'extra' respondents of laboratory organizations independent from one of the three cases selected.

7.1 Group observations

This paragraph contains the observations made by the groups of respondents. In this thesis the following groups are distinguished: the head of the laboratory, member of the executive board, and specialist within the hospital organization. In this section common observations per group are elaborated.

Heads of laboratory

The heads of the laboratory group consist of the two members of the executive board of *Atal-Medial* (outsourcing model), the head of the laboratory of Winterswijk, the head of the laboratory Deventer (both network model), and the head of the laboratory *Lab West* (Ltd. model). The heads of the laboratories are strongly driven from an economical perspective. The pressure to produce cost efficiently is high. The heads agree that increases in scale are necessary to achieve cost efficient services. This tendency is observed in the way of organization, all three models are characterized by cooperation. Based on these observations quality seems to be important, but from the effects in the cases on quality follows that quality is good and changes only marginally. All heads argue that it is primarily directed to provide the same quality for lower costs.

The differences in structure are according to the heads a consequence of:

- The focus of the hospital on diagnostics
- The possibilities of organization within contextual factors.

Member of the executive board

This group consists of one member of an executive board, a care group manager, and an organizational head, respective allied to the network model, the network model and the outsourcing model. This group is searching for a balance of an efficient organization and high-quality laboratory health care. If quality remains the same and organizational structures are able to fix economic deficits, the decision is purely about business economics. This is an typically situation since there are many factors within the laboratory organization in connection with the hospital that have a difficult quantifiable value such as the responsiveness of clinical chemists and the organization of the laboratory close to the health care process. It is difficult to achieve full accounting of costs and benefits before taking a decision on laboratory organization.

Specialist within the hospital organization

The group of specialists is composed of one internist and one neurologist of the *Medisch Centrum Haaglanden* (Ltd. model), two internists and one neurologist of the *Kennemer Gasthuis* (outsourcing model), and one cardiologist and one internist of the *Deventer Ziekenhuis* (integration model). Total

this means four internists, two neurologists, and one cardiologist are interviewed. In their perspective on quality the specialists are unanimous that accurate and rapid test results are essential for their judgements on quality and satisfaction. Improvements of laboratory health care are possible when specialists can dispose of the patient results of diagnostics from other hospitals for instance to overcome double tests. All specialists argue that the organizational structure of the laboratory is of inferior interest. The most important from their perspective is to dispose of accurate and rapid test results.

7.2 Concluding remarks

Based on the group observations the heads of the laboratories and the members of the executive boards mainly have an economic perspective (costs – benefits) within this discussion, whereas the specialists are more service oriented and do not focus much on the organizational structures as long as the service level is maintained. Derived from this information the important notification can be made that the reference points of the distinguished groups differ partially. The lack of unambiguous data and the difficulty in making quality values quantifiable makes decision-making rather complex.

Chapter 8: Conclusion and discussion

In the following chapter, first the approach to observe successful organizational structures of medical laboratories is summarized. After this the main results are elaborated and recommendations for successful clinical laboratory organization are formulated. Finally, a discussion section which deals with choices and assumptions made in this thesis is presented, as well as a discussion of the limitations.

8.1 Approach

Having described the characteristics and developments in the field of clinical chemistry, the organizational structures are perceived as part of a broader theorem. This thesis takes transaction cost economics as a broader theorem to introduce the organizational structures. Transaction costs refer to all costs involved in arranging and executing a contract. This concept can be used for examining make or buy decisions. The theory of make or buy decisions argues that the degree of integration has to do with 1. the asset specificity of a product or service, 2. the uncertainty of predicting situations affecting planning and adaptation of a transaction, and 3. the quality of a product or service. Based on a centralization-ownership continuum three typical organizational structures are distinguished:

- Outsourced (no ownership and decentralized)
- Integrated network (ownership and centralized)
- Hybrid: outsourced & integrated (ownership and decentralized)

According to the theory, the decision to integrate is driven by quality considerations whereas the decision to outsource is based on efficiency considerations.

The theoretical rationale as indicated above, has been observed with three cases of clinical laboratory organization in The Netherlands. The cases are selected based on the structure of the laboratory organization. In this thesis the following cases (in accordance with the mentioned models) are observed:

- Stichting Atal-Medial – Kennemer Gasthuis
- Deventer Ziekenhuis – Slingeland Ziekenhuis Doetinchem – Streekziekenhuis Koningin Beatrix Winterswijk
- Lab West B.V. – Medisch Centrum Haaglanden - HagaZiekenhuis

8.2 Results

In consideration of the three cases, it is possible to consider the answer to the third sub question:

Is there a relation between the way hospital laboratory services are organized in hospitals in The Netherlands, and the efficiency and quality of hospital laboratories?

In this thesis, interviews with key informants and available quantitative data are used to answer this sub question. Of course, the head of the laboratories and members of the executive boards do not argue, that their organization has become weaker due to organizational change. Most important

observation is that the respondents of the *Atal-Medial* case emphasize the cost savings of laboratory manpower, whereas the respondents of the *Deventer-Doetinchem-Winterswijk* case suggest that laboratory manpower is still largely distributed over their hospitals. This observation is supported by the quantitative data studied in this thesis. The total number of secondary care diagnostic tests per laboratory FTE, is higher for *Atal-Medial* in the period 2008-2011. However, the nuance has to be made that the type of analyses is unknown. It is possible that the laboratory combination *Deventer-Doetinchem-Winterswijk* applied more complex tests, whereas *Atal-Medial* performed mainly 'low complex-high volume' tests. In addition, data of the *Slingeland Ziekenhuis Doetinchem* (part of the DeWiDo-combination) and the *Lab West B.V.* were not available and no part of the data here.

<i>Analyses per FTE</i>	<i>Year</i>			
	2008	2009	2010	2011
Secondary care analyses per FTE (Laboratory) – Deventer, Winterswijk, Doetinchem	19100*	19753*	20254*	20359*
Secondary care analyses per FTE (Laboratory) – Atal-Medial	21823	22912	22571**	22395

* Based on data of the clinical laboratories of Deventer Ziekenhuis and SKB Winterswijk.

** Calculated based on estimated data.

Table 8.1: The number of secondary care diagnostic analyses compared with the number of laboratory FTE for both the laboratory organization Atal-Medial and the clinical laboratories of Deventer Ziekenhuis & SKB Winterswijk in the period 2008-2011.

(Source: Deventer Ziekenhuis, 2009, 2010, 2011; SKB Winterswijk, 2008, 2009, 2010, 2011; SMD Atal-Medial, 2011)

Changes in the level of quality derived from the perception of respondents are rather small for all cases. Only in the hybrid case specialists within the hospital observe an expansion of the service level in their organization. The real satisfaction level of specialists remains uncertain, since they might be confronted with different service levels in different organizations. Conclusions are thus formulated rather reserved due to lack of mutual comparability. The exact direction and strength of the relation between the way hospital laboratory services are organized in The Netherlands and the efficiency and quality of hospital laboratories remains not clear. However, the limited data available show that the total number of secondary care diagnostic tests per laboratory FTE is higher for the outsourcing case in the period 2008-2011. This may indicate a higher level of efficiency in case of outsourcing compared to the integration case.

8.3 Conclusion

In all cases studied in this thesis, an economic perspective was used as reference point for laboratory organization. From the quantitative data and the content of the interviews follows that efficiency effects seems to appear more strong in the outsourcing case, but this is uncertain since nothing is known about the type of analyses and the lack of available data. Quality effects are not perceived

based on expert opinions of specialists. The direction and strength of the relationship on both efficiency and quality remains unclear due to the lack of additional available (quantitative) data. Having discussed this, the main research question of this thesis can be answered:

What are the strengths and weaknesses of different organizational structures in hospital laboratory health care in terms of efficiency and quality?

All heads of laboratories and members of the executive boards argue, that the geographic setting of (hospital) laboratories is a key factor in choosing an appropriate organizational structure. Furthermore they suggest that hospitals need to reflect what level of quality they want to deliver at what cost. The main conclusion is that the preconditions of organizational structures (**CANS**) determine the possibilities and success of organizational structures. Furthermore, the strategy of the hospital board is leading in deciding on organizational structures (**WANTS**). The possibilities are, for instance, determined by the geographical distances and the changes an organization is able and willing to take.

All key informants argue that the goal of rethinking organizational structures is to achieve efficiency gains, while maintaining quality. Of course, heads of laboratories argue that their organizational structure is successful in terms of efficiency. In case of *Lab West B.V.* there are no data available to test for the expectations of the head of the laboratory. As a result the effect is unknown. Based on the quantitative data (secondary care diagnostic analyses compared to the number of laboratory FTE) available for both the outsourcing and integration case, a higher number of analyses per laboratory FTE is observed. It might be concluded that they are successful in terms of efficiency. However, the quantitative dataset is rather limited. Nothing is known about for instance cost prices and the type (complexity) of analyses. Therefore, it is not possible to validate the claims of improvements in efficiency levels although the anecdotal evidence indicate improved efficiency levels. Quality effects seems to be equal over all selected cases. In all cases, specialists within the hospital are satisfied and perceive no or only marginally positive additional quality improvements. However, the service level they based their opinion on is unknown and may be different between the organizations. For specialists accurate and rapid results of laboratory research are essential. The maintenance of quality in all selected cases is a shared strength. The most important weaknesses in governance structures respondents are faced with, are problems with the distribution of responsibilities and the extent of trust (high or low) within the organization. However, these seem temporary issues in the transition phase of laboratory organization and hospital to new governance structures.

A general weakness of this thesis is the lack of transparency of quantitative data. Apart from the legal requirements for documenting staffing, production and reporting incidents of laboratory organization, no guidelines are available to make a significant comparison of different organizational laboratory models. The clinical laboratories are cautious to provide quantitative data for comparative research, and if data is supplied, the meaning of it often differs. For instance, in one laboratory organization overhead costs and ICT are part of the hospital organization, whereas in a more privatized laboratory organization those costs are part of the total budget of the organization. If benchmarks and other comparative intentions want to be meaningful for decision-making, the calculation of costs has to be uniformed. Guidelines for uniform calculation of costs (cost prices,

laboratory FTE, and analyses) and meaningful benchmarks would be helpful as a basis of decision-making for cooperative models. A general benchmark, in which all clinical laboratories in The Netherlands are included to reflect on the quantifiable success of laboratory organizational models (of cooperation), could be started. Such an innovation would make it more easy to draw conclusions between the cases.

The effects on efficiency and quality show that, in the ‘make and buy discussion’, both efficiency and quality issues play a role in the make and buy debate. In addition, the respondents argued that the ‘CANS’ and the ‘WANTS’ are essential preconditions for an appropriate organization of clinical laboratories. The theory could be added, by taking these preconditions into account in ‘make and buy discussions’. In further research, it would be helpful if there are more and better possibilities to compare laboratories in a quantitative manner. Such possibilities would enable researchers to conduct more thorough comparative research on the basis of which stronger conclusions could be drawn. Also, in further research the organizational structure of laboratories could be even more comprehensively related to its consequences for the rest of the hospital organization. Does savings on diagnostics cause savings for the organization as a whole?

8.4 Recommendations

Based on the results and analyses some recommendations for organizing clinical laboratory activities can be formulated:

1. The chosen organizational structure has to fit in the setting of the hospital and the strategy of the hospital board(s), corresponding with the ‘CANS’ and the ‘WANTS’.
2. The governance of change has to be included in consideration of (re)thinking organizational structures of laboratory activities, and the organization has to accept the changes that occur after the implementation of the desired model.
3. Reference points of the heads of the laboratories, together with the members of the executive boards (economically perspective), differ from those of the specialists within the hospital organization (patient satisfaction perspective). When implementing organizational structures, both groups have to search for a new and shared reference point.

8.5 Discussion

The final section of this thesis reviews the choices and assumptions made, and provides a discussion of the limitations of this thesis.

- Selection of the cases is based on the organization of the laboratory activities. The cases most similar to the distinguished types are selected. These do not completely reflect the three typical organizational models. As a consequence, the conclusions on outsourcing and integration may be observed with this nuance. However, the selected cases come most close to these concepts.
- The study originally aimed at conducting a mixed method approach. However, a lot of laboratory organizations refused to share quantitative data on, for instance, changes of number of conducted analyses, labour costs and cost prices. Strength and direction of the

relation between organizational concepts on efficiency and quality could be observed more comprehensively. This limitation is partially obviated by the use of different groups of key informants to get a broad and comprehensive view on the (intended) effects.

- Measuring success of clinical laboratory organization was not possible because the organizations rejected to distribute quantitative data. As a consequence, rather than the goal attainment, the expectations and statements of the respondents on especially efficiency are measured. Even if quantitative data was available, a proper comparison might not be possible unless there is a full accounting of resources (i.e. inputs and outputs). This resulted in an analysis of strengths and weaknesses based on expected effects instead of realized effects. To reflect on the relation between organizational concepts and efficiency and quality more hard conclusions could be made in case of realized effects. However, data on realized effects were hardly available.
- In the processing of the data, qualitative data analysis software is used to structure the transcriptions of the respondents. All statements that respondents made, are classified in categories, such as efficiency. As a result, all comments related to 'efficiency' pop up. Then a structured description of intended effects in the result sections was possible. Additionally, the software is used to count the number of comments related to efficiency or quality. As a consequence, this gave reason to indicate or strengthen perspectives per case. The programme is not used to reveal relationships. This was hardly possible since intended effects could not be checked for real effects.
- The quantitative data used, reflect only a limited part of the total, but not available, quantitative information. The results on efficiency are largely based on a comparison of secondary care diagnostic analyses and the laboratory manpower (FTE). Results have to be interpreted carefully. There is for instance nothing known about the type of analyses (i.e. are there a lot of 'low complex, high volume' analyses?). However, this quantitative data give an indication of the relation between organizational concepts and efficiency.
- In interviews, specialists within the hospital are asked to reflect on their satisfaction of laboratory services. However, the difference in service level between the different laboratory organizations is not investigated. Therefore, it is uncertain to what service level they refer to, when they argue to be satisfied. This may result in unobserved differences in the quality levels of the selected cases. However, differences may be not that large since all selected organizations met the requirements of the CCKL (accreditation committee).
- The *Lab West B.V.* was not able to produce quantitative data, since this organization has been in business for one year only. However, the organization was most similar to the type of the hybrid (outsourcing & integration). Another organization even more similar to the type (*Medlon B.V.*). The inclusion of *Medlon B.V.*, another organization even more similar to the type, could have resulted in even more insight in the realized effects on efficiency and quality. However, they opted not to participate in the study
- This thesis is organized as a multiple case study. Due to the fact that in case study designs only a limited amount of cases can be considered, the strength of relationships may be in

doubt. However, this approach fits best, since the number of examples of laboratory organization in The Netherlands is limited.

- The members of executive board of *HagaZiekenhuis* and *Medisch Centrum Haaglanden* did not participate in the interviews. In the category “executive board” two out of three respondents are not in the board, but have other management roles within the hospital organization. One head of laboratory (*Slingeland Ziekenhuis Doetinchem*) refused to respond. This may result in other perspectives towards the issues at stake. However, these respondents were the best alternative since the members of the executive board were not always willing to participate.
- The specialists are selected according to stratification, and subsequently random within the discipline. In case of the *Kennemer Gasthuis* two non-responses and two rejections were received. In case of the *HagaZiekenhuis* one non-response was received. In the integration case, the two specialists are provided via contacts of the head of the laboratory of *Deventer Ziekenhuis* and this could be a potential selection bias. However, the statements of the latter respondents gives no reason for doubting the results.

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Appendices

Appendix 1: Questionnaire head of laboratory

Appendix 2: Questionnaire member of executive board

Appendix 3: Questionnaire specialist within hospital organization

Appendix 1: Questionnaire head of laboratory

Inleidend

Interviewer stelt zich voor en vertelt wat voor onderzoek uitgevoerd wordt. In toevoeging geeft hij aan welke focus gelegd daarbij gelegd wordt.

Interviewvragen Hoofd laboratorium

Kunt u kort omschrijven hoe de laboratoriumorganisatie is georganiseerd?

Wat is de centrale idee achter uw organisatievorm van het laboratorium?

Wat heeft u doen besluiten de laboratoriumorganisatie op deze manier te organiseren?

Welke strategische keuzes maakt u daarbij?

Wat zijn de (te verwachten) voordelen van deze vorm van organisatie?

Zijn er financiële voordelen te benoemen? Zo ja, welke zijn dit?

Zijn er veranderingen in productiviteit? Zo ja, welke zijn dit?

Zijn er veranderingen in kwaliteit? Zo ja, welke zijn dit?

Hoe worden deze veranderingen gemonitord? (Doorvragen)

Waar ligt uw voorkeur voor toekomstige inrichting van de laboratoriumorganisatie?

Waarom verwacht u met deze toekomstige inrichting voordelen te behalen?

Welke voordelen verwacht u te halen met deze vorm van organisatie?

Hoe dragen veranderingen in de markt / aanvraaggedrag / financiering / patiëntdemografie bij aan uw visie op de ontwikkeling van de organisatie?

Waarom denkt u dat andere ziekenhuizen wat conservatiever zijn binnen dit soort ontwikkelingen?

Wat zijn de nadelen van dit organisatietype?

U ziet het verlies van verantwoordelijkheid / controle niet als nadeel van outsourcing?

Ziekenhuizen financieren een deel van hun tweedelijnsproductie uit eerstelijnsmiddelen. De prestatiebekostiging voor de eerstelijns zien zij dan ook als gevaar. Hoe kijkt u hier tegenaan?

Is het ziekenhuis tevreden met u?

Zijn er nog voordelen in de organisatievormen zoals andere ziekenhuizen die kennen?

Afsluiting

Interviewer bedankt de respondent en doet de respondent desgewenst het interview toekomen. In toevoeging vertelt de interviewer wat er verder met de informatie gebeurt.

Appendix 2: Questionnaire member of executive board

Inleidend

Interviewer stelt zich voor en vertelt wat voor onderzoek uitgevoerd wordt. In toevoeging geeft hij aan welke focus gelegd daarbij gelegd wordt.

Interviewvragen Raad van Bestuur

Wat heeft u doen besluiten de laboratoriumorganisatie op deze manier te organiseren?

Welke strategische keuzes maakt u daarbij?

Wat zijn de (te verwachten) voordelen van deze vorm van organisatie?

Hoe worden deze veranderingen gemonitord?

Ziet u het verlies van verantwoordelijkheid / controle als nadeel van een uitbestede organisatie?

Er staat wel eens te lezen dat ziekenhuizen aan zogenaamde kruisbestuiving doen: ziekenhuizen financieren volgens deze gedachte een deel van hun tweedelijnsproductie uit eerstelijnsmiddelen. De prestatiebekostiging voor de eerstelijns (als geïnitieerd in een recent rapport van de NZa) zien zij dan ook als gevaar. Hoe kijkt u hier tegenaan?

Bent u tevreden over het functioneren van uw laboratoriumorganisatie?

Zijn er nog voordelen in de organisatievormen zoals andere ziekenhuizen die kennen, zoals dus uitbesteding of een netwerkconstructie?

Wat zijn de nadelen van uw organisatietype?

Waar ligt uw voorkeur voor toekomstige inrichting van de laboratoriumorganisatie?

Waarom verwacht u met deze toekomstige inrichting voordelen te behalen?

Afsluiting

Interviewer bedankt de respondent en doet de respondent desgewenst het interview toekomen. In toevoeging vertelt de interviewer wat er verder met de informatie gebeurt.

Appendix 3: Questionnaire specialist within hospital organization

Inleidend

Interviewer stelt zich voor en vertelt wat voor onderzoek uitgevoerd wordt. In toevoeging geeft hij aan welke focus gelegd daarbij gelegd wordt.

Interviewvragen Specialist in ziekenhuis

Wat denkt u dat het centrale idee is achter de organisatievorm van het laboratorium van uw ziekenhuis?

In welke mate ervaart of verwacht u voordelen van deze vorm van organisatie in termen van kwaliteit?

(Atal-Medial) Uw laboratoriumorganisatie geeft aan dat door het verhogen van het volume zij hun laboratoriumspecialisten meer specialistisch te werk kunnen laten gaan, wat de kwaliteit ten goed komt. In welke mate ervaart of verwacht u dit effect?

(Atal-Medial) Uw laboratoriumorganisatie is sinds kort gefuseerd met een eerstelijns diagnostisch centrum. In welke mate verwacht u dat het 'compleet maken van de keten' extra voordelen oplevert?

(LabWest) Uw laboratoriumorganisatie heeft het aantal prikposten vergroot die langere openingstijden hanteren door trombose- en ziekenhuisprikposten te integreren. Bent u hier positief over?

(LabWest) Uw laboratoriumorganisatie geeft aan in de nabije toekomst naar één laboratoriosysteem te willen waardoor uitwisseling van gegevens tussen MCH en Haga makkelijker verloopt. Hoe kijkt u daar tegen aan?

(DZ-SKBW-SZD) Uw laboratoriumorganisatie geeft aan dat door kennisdeling en specialisatie van testen de kwaliteit van laboratoriumanalyses is verbeterd. Ervaart u dit ook zo?

Wat zijn voor u belangrijke elementen in een laboratoriumanalyse?

Hoe tevreden bent u over het functioneren van het laboratorium van uw ziekenhuis? Waar ligt dit aan (accurate analyse; tijdige rapportage)?

Verschilt uw mate van de tevredenheid door de jaren heen?

In hoeverre heeft dit volgens u te maken met de organisatievorm van het laboratorium van uw ziekenhuis?

Als we nu kijken naar organisatievormen zoals andere ziekenhuizen die kennen. Hoe denkt u over deze organisatievormen, zou dat beter werken voor uw ziekenhuis?

Waar ligt uw voorkeur voor inrichting van de laboratoriumorganisatie in de toekomst?

Afsluiting

Interviewer bedankt de respondent en doet de respondent desgewenst het interview toekomen. In toevoeging vertelt de interviewer wat er verder met de informatie gebeurt.