Trends in contextual variables of the use of business improvement approaches in Dutch hospitals.

UNIVERSITY OF TWENTE.

Master thesis

E.M. Sanders

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General information

Author:	E.M. Sanders
Student number:	0086983
E-mail:	sandersmarloes@gmail.com
Date:	30-11-2010
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University of Twente

Study:	Communication Studies
Faculty:	Behavioral Sciences
Address:	Drienerlolaan 5 7522 NB Enschede The Netherlands
Primary supervisor university:	J.E.W.C. van Gemert-Pijnen, Dr.
Secondary supervisor university:	W.H. van Harten, Prof. Dr.

Preface

During a meeting with Prof. Dr. van Harten about possible graduation assignments in May 2009, I became interested in a research of the use of business improvement approaches in Dutch Hospitals. For me it was an opportunity to combine the end of my master communication studies and my master business administration. Afterwards said not always the easiest challenge.

Research into contingency variables of new management techniques, the first assignment description, is a fairly broad concept. In collaboration with Wineke van Lent MSc, as part of her doctoral research, we were able to frame the research. We have limited the research to an exploration of the use of eleven business improvement approaches in Dutch hospitals. Because it is a relatively new field extensive inventories of the use of business improvement approaches in Dutch hospitals and the trends of contextual variables and the choice for a specific approach and the success of the approach have been developed. The results offer many new perspectives and opportunities for further research.

For me this thesis indicates the end of my life as a student. Several persons helped me realizing this research. First of all I would like to thank Wineke van Lent MSc, for the pleasant corporation during this research, your many good advices, daily guidance and the encoring words when I needed it.
I also am very grateful to Prof. Dr. Wim van Harten, for his time, all the great advice and criticism. And off course I am thankful to the 'Antoni van Leeuwenhoek' for giving me this opportunity to do the research and finalize my masters.

Third, I would like to thank all the respondents, who took the time and effort to fill in the survey. Without their help I would not have been able to explore the use of business improvement approaches in Dutch hospitals and would not be able to perform my research. I also would like to thank the different experts we have spoken to and the hospitals included in the pilots, who all helped to validate and improve the survey and therefore to improve the research.

Last, but certainly not least a special thanks to my family, friends and boyfriend, who always were willing to listen to me, to talk about my research over and over again and helped me to stay positive and finish my research.

Management summery

Introduction

Over the past century, the health care sector is being reformed in many countries. Costs are exploding, attributed to technological advances and an aging society, and waste is identified as an important contributor to the increase in health care expenditures (Institute of Medicine, 2001). In an effort to strengthen their operating performance, leading health care organizations use interventions originating from operations management, however Rundle (2000) has suggested that the health care industry is falling behind in issues of management. Sousa and Voss (2008) suggested that contingency factors might contribute to the success of the use of business improvement approaches. The contingency theory claims that there is no best way to organize a corporation; instead the optimal course of action is dependent upon the internal and external situation (Woodward, 1985). Contingency research on the quality improvements in healthcare has rarely been performed (Dean, Suchyta, Bateman, Aronsky, & Hadlock, 2000; Hackman & Wageman, 1995). This thesis will conduct a research about the approaches used in Dutch hospitals in order to improve their business, in this report called business improvement approaches, and the success and evaluation of those approaches. The research describes the different trends in the contextual variables relating to the use and the success of the approaches and will elaborate on the different contingency variables.

Research Approach

The main research question of this research is: *What are the trends and possible influences in the selected contextual variables of business improvement approaches relating to the response and performance variables in Dutch hospitals?*

This research is a first step exploring the relatively new field of the use of business improvement approaches in Dutch hospitals. The objectives of this research are to develop an overview of variables that influence the use of the most common business improvement approaches and to develop several inventories of the trends of the contextual variables and the use of business improvement approaches.

Methodology

This research is the second part of a larger research study. The first research has been started with an inventory on what common business improvement approaches exist in the literature and a selection of approaches was been made based and the approaches have been characterized and distinguished. Thereafter based on the literature, the variables influencing the response and performance variables of business improvement approaches have been described for this part of the research and four of those variables have been selected for further examination for this research. Thereafter an expert meeting

was been set up, to validate the selection, definitions and characteristics of the different business improvement approaches. After validating the characterizations a survey was been held for both the researches. Thereafter a pre-test of the surveys was been performed in four different hospitals and the survey has been adapted, based on the comments of the different managers, before it was ready to go online. The outcomes of the survey were analyzed for the first part of the research and different inventories of the improvement approaches used in the hospitals and of the evaluation of the used approaches were provided. For this research those results were needed in order so analyze the possible trends between the four selected contextual variables and the response and performance variables of the business improvement approaches.

Results

An inventory of the contextual variables influencing the use of business improvement approaches has been made and four of those variables have been included in this research en have been explored in more detail. Eleven business improvement approaches have been included in this research.
The results show that general hospitals have been using a wider range of approaches, compared to the other types of hospitals The university hospitals never evaluate the results above objectives , while general hospitals most of the times achieve the quality aspects objectives. The results confirm the fact that the use of business improvement approaches in hospitals is a relatively new field, with little experience of the hospitals. However the results contradict each other in the trends in experience and the success of business improvement approaches. The priorities of the approaches are divided, overall timely is most often high prioritized, corresponding with the use of care pathways, while financial is mostly no priority. The results show that most hospitals do have different kind of datasets available and make use of external parties in the use of approaches. Most of the hospitals do have an education program, however professionals are rarely included.

Conclusions

It seems that in general the approaches that are harder to use, because they require more knowledge or are harder to implement, are more often used or only used in general hospitals, compared to UMC's and top clinical hospitals. It could be possible that general hospital use a wider range of business improvement approaches, because they are more influenced by the changes in the Dutch health care and the more competitive environment, this could also explain the better performance of general hospitals. The results show that there is little expierence with the approaches in the hospitals and that there is a possible lost of knowledge, when employees rapidly change jobs and external parties have been extracted. The results show that there is a possible lack of dissemination of knowledge and experience in the hospitals. Both facts could cause problems in the future.

The fact that financial is most often the lowest priority of the use of business improvement approaches is remarkable based on the changes in the Dutch Health care and the pressure to cut costs.

Limitations

The most important limitation of this research remains the use of the different business improvement approaches, corresponding with the limitations of the first research. This could influence the possible trends that have been explored in this research. Another limitation is the number of respondents per hospital and the total number of included hospitals. This research is a first exploration of the field and therefore the perception of the manager is important and the answers of managers of different hospitals are more interesting than the answers of different managers at one hospital.It could be interesting for further research to examine the answers of the managers of one hospital in order to compare the answers and to provide a more representative view of the hospitals. Thereby is the total number of respondents is too small in order to examinine different influences and relations between the variables. However the design of the study has ben chosen consciously in order to collect as much interesting data as possible, being a first exploration of the field. The results provide many opportunities for next research.

Another field for further research could be the success of the business improvements. The results of this research show that most of the quality aspects are evaluated below the objectives of the hospitals. It would be interesting to examine why they are evaluated below objectives. Did the hospitals apply the business improvement approaches in the wrong way or were the demands too high?

Implications

Because this is a first step in exploring the field of the use of business improvement approaches in Dutch hospitals, it is difficult to provide practical recommendations for Dutch hospitals based on this research. Though the results show some interesting insights that have implications for hospitals. In order to improve the use of business improvement approaches two importants steps should be taken. A first step should be to make use of the resources that are already in the organization; to recognize knowledge and experience, to involve the employees and to train the different stakeholders and to make the information about the processes more standard and easy accessible. A next step should be to collaborate together with other organizations to work together, as well external parties as research centres as other hospitals in order to share knowledge and experience and together improve the processes.

Table of content

Chapter 1. Introduction

Over the past century, the health-care sector is being reformed in many countries. Those health-care reforms can be roughly subdivided into three consecutive phases according to Schut and van de Ven: a first wave of ensuring universal coverage and equal access, a second wave of controls, rationing and expenditure caps and a third wave of reinforcing incentives and competition (2005). The cost of medical care is increasing at an alarming and unsustainable rate worldwide (Koning, Verver, Heuvel, Bisgaard, Does, 2006). Costs are exploding and waste is identified as an important contributor to the increase in health care expenditures (Institute of Medicine, 1996). Admittedly, a significant percentage of these cost increases can be attributed to technological advances and an aging population. These two factors are largely beyond control, however they are inevitable because of the technological and demographic developments of modern society (Koning, Verver, Heuvel, Bisgaard, Does, 2006). Nowadays, hospitals are charged with developing internal organizations where solid quality and cost effectiveness go hand in hand in order to improve the hospitals. (Berwick, Nolan, 1995; Shortell, Zimmerman, Rousseau, Gillies, Wagner, Draper, Knaus, Duffy 2004; Shortell, Marsteller, Lin, Pearson, Wy, Mendel, Cretin, Rosin, 2004). However there is widespread support for the premise that health-care managers and executives are struggling to cope with the challenges in the health care industry (Fok, Li, Hartman, Fok, 2003).
The worldwide problems are similar to the situation in the Dutch Health care, where many reforms have taken place. The Dutch Government maintained and even tightened its control over the supply and prices of health services (Schut, Wynand, van de Ven, 2005). Since 1996 there is more pressure on Dutch health care organizations and they are bound by law to provide efficient, effective and patient oriented care (Care Institutions Quality Act, 1996). Currently major reforms of the health insurance system and reimbursement systems for care providers are taking place in The Netherlands (Custers, Onyebuchi, Klazinga, 2007). The Netherlands has introduced major market-oriented reforms that aim to strengthen the purchasing role of the financiers within the health care system (Ministry of Health, Welfare and Sport, 2002; Ministry of Health, Welfare and Sport 2005). The demand to improve hospitals-processes, to operate more efficient, is still rising; the government exerts increasing pressure to cut costs and the government is commercializing the health care, whereas in the future, an increase in the demand for care is expected, resulting in more weight on the efficiency and quality of the service of the health care (Mans, Schonenberg, Song, van der Aalst and Bakker 2008).

However, despite the pressure on improving and assuring the quality of care, research showed that not enough progress has been made with the construction of quality management systems and the spread of knowledge of best practice (Consortium, 2004; Sluijs & Wagner, 2003). Another significant source of health- care cost increases can be broadly characterized as unnecessary operational inefficiency.

During the past century, industry deployed a large arsenal of tools and innovation approaches to achieve high levels of operational efficiency (Koning, Verver, van den Heuvel, Bisgaard, Does, 2006). In an effort to strengthen their operating performance, leading health care organizations use interventions originating from operations management and operations research to reduce costs, increase safety, and improve clinical outcomes in an increasingly aggressive health care marketplace (Olson, Belohlav, Cook, Hays, 2008). Rundle (2000) has suggested that the health-care industry is falling behind in issues of management. The implication is that managers and executives in health care, compared with their counterparts in other industries, do not have the business knowledge and skills to fully utilize the available automation and technology. They seem to choose a specific approach on basis of unknown reasons or fashionable choices. Furthermore, little is known about the business approaches that hospitals apply and the strength of the evidence. The current literature describes different operations management theories, however there is no overall overview, which relates or distinguishes the different approaches. There are a few publications of studies that present improvements achieved with the applied business improvement approach (Duckers 2009; Elkhuizn, Limburg, Bakker and Klazinga, 2006; Yasin, Zimmerer, Miller and Zimmerer, 2002; Olson et al., 2008; Hendricks and Singhal, 2001), though many of these success stories are just anecdotal and limited to success stories on an increasing basis (Langabeer, DelliFraine, Heineke and Abbas, 2009). Sousa and Voss (2008) suggested that contingency factors might contribute to the success of the use of business improvement approaches. The contingency theory claims that there is no best way to organize a corporation; instead the optimal course of action is dependent upon the internal and external situation (Woodward, 1985). Contingency research on the quality improvements in healthcare has rarely been performed (Dean, Suchyta, Bateman, Aronsky, & Hadlock, 2000; Hackman & Wageman, 1995).

On one hand, there is a need to improve the organization of hospitals, however on the other hand, little is known about which approaches hospitals should use to improve and how they could increase the chances of successful results. This research is the second part of a larger research study off the different contingency variables of the use of business improvement approaches in Dutch hospitals. This first part of the research has explored the use of the business improvement approaches in Dutch hospitals, with a special attention to distinguish and characterize the different approaches and the evaluation of the approaches. The focus of this second part of the research is the influence of the contextual variable on the use of business improvement approaches in Dutch hospitals and the success of the use of those approaches. The research describes the different trends in the contextual variables relating to the use and the success of the approaches and will elaborate on the different contingency variables. In order to examine the different trends in the contextual variables, some of data of the earlier research will be used. The structure of this report is as follows: the second chapter describes the research approach. The methods of analysis are provided in chapter three. The fourth chapter contains

an overview of the used business improvement approaches, based on the results of the first part of the research. Chapter five presents an overview of the different variables that could influence the use and the success of the business improvement approaches in hospitals and chapter six will elaborate on the selected variables. Chapter seven presents the results of the research and chapter eight provides the final conclusions, limitations of the research and implications for further research.

Chapter 2. Research Approach

This chapter will describe the objectives of the research, the research questions, the research scope and briefly the research design in the following paragraphs. The first paragraph describes the different objectives. The next paragraph describes the main research question and the different sub questions. There after the research scope will be presented by making use of the aims for improvement of the Institute of Medicine (1996). Finally the research design will be described briefly.

2.1 Objectives

The objectives of this research project are:

1. Develop an overview of variables influencing the response and performance variables of business improvement approaches in the literature.
2. Develop an overview of the four selected contextual variables (from objective 1) and the possible influences (on the response and performance variables) of the business improvement approaches in Dutch hospitals based on the literature.
3. Develop an overview of the use of selected variables in Dutch hospitals
4. Develop an overview of the trends of the contextual variables and the response and performance variables of business improvement approaches in Dutch hospitals.

Definitions

Business improvement approaches: the collection of methodologies used to improve efficiency. The business improvement approaches are also known as operations management methods. In this research the term business improvement approaches will be used.

Variables influencing the response and performances variables of business improvement approaches: the combination of internal and external environmental factors affecting the business improvement approach and the performance of the hospital.

Variables of business improvement approaches

The different influences of business improvement approaches and the success of business improvement approaches can be divided into 3 groups of variables: contextual variables, response variables and performance variables. Table 2.1 shows the model of Sousa and Voss (2008), which presents the different variables and relations between the variables.

Table 2.1 Model of Sousa and Voss (2008)

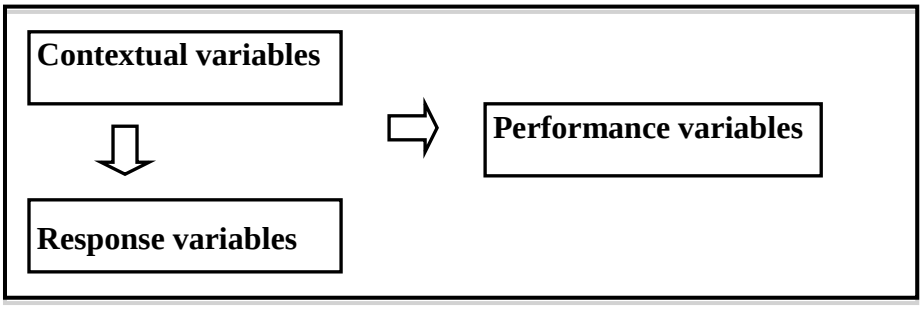


Table 2.1 shows the three groups of variables that could influence the business improvement approach. Sousa and Voss (2008) describe the three variables as following: *Contextual variables* represent situational characteristics. Contextual variables could be subdivided in to internal and external variables. Internal variables are characteristics of the organization. 'External variables are mostly related to the general environment and the industry' (Albaum, Duerr and Strandskov, 1998). *Response variables* are 'the organizational or managerial actions taken in response to current or anticipated contingency factors' (Sousa and Voss, 2008). In this research the response variable is the choice for a particular business improvement approach. *Performance variables* are 'dependent measures and represent specific aspects of effectiveness that are appropriate to evaluate the fit between contextual variables and response variables for the situation under consideration' (Sousa and Voss, 2008). In this research the included performance variables are outcomes of the use of the business improvement approaches (the success) and the evaluation of the results of the business improvement approaches (whether and how they are evaluated and whiter the results are published).

This research is the second part of a larger research study off the different contingency variables of the use of business improvement approaches in Dutch hospitals, based on the Model of Sousa and Voss (2008), (table 2.1). The larger research is divided into two different parts: one with a special focus on the use of the business improvement approaches (in Dutch hospitals) and one with a special focus on the influence of the contextual variable. This first part of the research has explored the use of the business improvement approaches in Dutch hospitals, with a special attention to distinguish and characterize the different approaches and the evaluation of the approaches.
The focus of this second part of the research is the influence of the contextual variable on the use of business improvement approaches in Dutch hospitals. The research describes the different trends in the contextual variables relating to the response and performance variables and will elaborate on the different contingency variables. In order to examine the different trends in the contextual variables, some of data of the earlier research will be used.

2.2 Research questions

The main research question is:

What are the trends and possible influences in the selected contextual variables of business improvement approaches relating to the response and performance variables in Dutch hospitals?

To answer the main research question, the question can be divided into sub questions. The following sub questions are defined to answer the main research question:

1. Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?
2. What are the trends in the selected contextual variables and the response and performance variables of business improvement approaches in Dutch Hospitals?
    a. What are the trends in hospital types and the response and performance variables of business improvement approaches?
    b. What are the trends in the maturity phase of the hospital and the response and performance variables of business improvement approaches?
    c. What are the trends in the operations management strategy and the response and performance variables of business improvement approaches?
    d. What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?

2.3 Research Scope

The Institute of Medicine (1996) describes six aims for improvement: save, effective, patient-centred, timely, efficient and equitable. In the following table 2.1, the six aims will be described.
Table 2.1 describes the different aims for improvement in Hospitals of the Institute of Medicine (1996). In this research the improvements aiming for timely and efficient, will be examined, because the focus of this research is the use of the business improvement approaches defined as the collection of methodologies used to improve efficiency.

Table 2.2 The six aims for improvement of the Institute of Medicine (1996)

Aim for improvement	*Description*
Safe	Avoiding injuries to patients from the care that is intended to help them
Effective	Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively)
Patient-centred	Providing care that is respectful of and responsive to individual patient preferences, Nods, and values and ensuring that patient values guide all clinical decisions
Timely	Reducing waits and sometimes harmful delays for both those who receive and those who give care
Efficient	Avoiding waste, including waste of equipment, supplies, ideas, and energy
Equitable	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status

2.4 Research Design

Like described above, this research is a deepening of the first part of the research, the research of the use of business improvement approaches. The first research has been started with an inventory on what common business improvement approaches exist in the literature and a selection of approaches was been made based on the number of citations and the approaches have been characterized and distinguished. Thereafter based on the literature, the variables influencing the response and performance variables of business improvement approaches have been described for this part of the research and four of those variables have been selected for further examination for this research. Thereafter an expert meeting was been set up, to validate the selection, definitions and characteristics of the different business improvement approaches. After validating the characterizations a survey was been held for both the researches. A survey was preferable, in order to acquire more data from different managers of different hospitals, so the data would be more representative and become more valid. Thereafter a pre-test of the surveys was been performed in four different hospitals and the survey has been adapted, based on the comments of the different managers, before it was ready to go online. The outcomes of the survey were analyzed for the first part of the research and different inventories of the improvement approaches used in the hospitals and of the evaluation of the used approaches were provided. For this research those results were needed in order so analyze the possible trends between the four selected contextual variables and the response and performance variables of the business improvement approaches. The following chapter will elaborate on the research design, by describing different components of the literature research and the survey in detail.

Table 2.3 presents an overview of the steps of the research design. In the second column the steps of the first part of the research are being described, the second part presents the steps of this research.

The table shows that several steps of both parts of the research were being performed at the same time and that some steps were being combined for both parts of the research.

Table 2.3 Steps of research design

Step	***Content***	
	First part of the research	***Second part of the research***
Step 1	Inventory and selection of business improvement approaches	Inventory of the variables influencing the use and success of business improvement approaches
Step 2	Characterize and distinguish business improvement approaches	Selection of variables based on the scope and more extensive inventory of those variables
Step 3	First draft of survey	First draft of survey
Step 4	Expert-meetings	Expert-meetings
Step 5	Adapting survey and characterizing of business improvement approaches	Adapting survey
Step 6	Pilots	Pilots
Step 7	Adapting survey	Adapting survey
Step 8	Collecting data	Collecting data
Step 9	Analyzing data	Analyzing data

Table 2.4 presents an overview of the research question and the used approach to answer the particular research question and the chapter that describes the result of the specific research question.

Table 2.4 Research question, approach and chapter

Question	***Approach***	***Chapter(s)***
Question 1	Literature	**5,6**
Question 2	Survey	**7**

Chapter 3 Methodology

In this chapter the research methods of this research will be presented. The methods that are used to answer the research questions can be subdivided into literature and survey. Both components will be described in this chapter in the paragraphs literature research and survey.

3.1 Literature research

The literature research in combination with the expert-meetings answer research question 1:

> *Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?*

In order to collect some general information about the research field, Google scholar has been used. After reading some general information, more specific information has been selected by making use of different databases and different keywords. The next two tables, table 3.1 and table 3.2 provide an overview of the used databases and the used keywords in order to collect more specific information.

Table 3.1 Used databases

Scopus
Web of Science database
Health Services Research
Picarta database
Emerald
Jstor
Quality and Safety in Health Care
British Medical Journal
JAMA – Journal of the American Medical Association
Harvard Business Review
Health Care Management Review
Pubmed
Journal for Quality in Health Care

Table 3.2 Most frequent used keywords

Business and improvement and approaches
Innovations and Health and Care and Organizations
Operations and Management and Health and Care and Organizations
Disseminating and Innovations and Health and Care and Organizations
Change and Health and Care
Culture and Gap and Health and Care
Contextual and variables and change and Health and Care
Maturity and Phase and Experience
Maturity and Phase and Development
Maturity and Phase and Operations and Management
Knowledge and Communication and Health and Care
Knowledge and change and Health and Care
Type and of and hospital and Netherlands
Type and of and hospital and operations and management

Like described in chapter two, the first part of the research was been started with a literature research of the business improvement approaches. Because those approaches (and the selection, definitions and characteristics) play also in important role in this research and the literature research was combined with the literature research for this research, the literature research for both studies will be described. First the most important authors of the different operations management methods (business improvement approaches) were identified, by making use of the number of citations. Based on the most important authors, definitions and the characteristics of the different approaches have been summarized. After identifying the common business improvement approaches (the operations management methods), a literature research of the influencing variables was been performed, for this research. First a more general search was been performed, to identify basic influences, by making use of key words like ‘Operations and Management and Health and Care and Organizations’; ‘Innovations and Health and Care and Organizations’ and ‘Disseminating and Innovations and Health and Care and Organizations’. After identifying the most basic or common influences like, culture, structure and communication, a selection of variables has been made in order to research different possible trends on the choice for a particular business improvement approach and the (perception of the) results of the use of a particular business improvement approach. The survey consists of the following constructs; hospital type, maturity phase, dissemination of knowledge and information, operations management strategy and the use and success of business improvement approaches. These selected variables are mostly well described in the current literature, however they are not linked to trends in the use of business improvement approaches in hospitals. After the literature research, four expert-meetings were set up, with experts with both a theoretical as a practical background in order to validate the literature research. Based on the meetings, the characteristics were adapted and different tools were added in order to clarify the differences (in the use) of different business improvement approaches for the first

research. The experts were also asked to give their opinion about the selected contextual variables (hospital type, maturity phase, dissemination of knowledge and information, operations management strategy), about how to research those constructs (could a respondent answer questions about those constructs) and in order to validate the importance of those constructs or if there were missing important elements. After the expert-meetings, four pilots of the survey were set up, in order to test the survey, before going online. The survey will be described in the next paragraph.

3.2 Survey

The survey should answer research question two:

What are the trends in the selected contextual variables and the response and performance variables of business improvement approaches in Dutch Hospitals?

a. What are the trends in hospital type and the response and performance variables of business improvement approaches?

b. What are the trends in the maturity phase of the hospital and the response and performance variables of business improvement approaches?

c. What are the trends in operations management strategy and the response and performance variables of business improvement approaches?

d. What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?

In this paragraph the following elements will be described: advantages and disadvantages of making use of a survey, design, sample size and respondents and contact. First the advantages and disadvantages of making use of a survey will be described by enumerating the different benefits and disadvantages and describing how the advantages have been used and the disadvantages have been reduced in the survey. Thereafter the design of the survey will be listed by describing the design process. There after the respondents and contact will be elaborated, by describing the respondents and how the respondents have been selected and reached. Finally the preferable sample size will be described.

3.2.1 Advantages and disadvantages of making use of a survey

Making use of a survey has as benefits as well as disadvantages. Tables 3.3 and 3.4 provide an overview of the advantages and disadvantages of making use of a survey.

Table 3.3 Advantages of making use of a survey

The manager is independent of time and space. The respondent decides where and when he will answer the questions.
The survey is anonymous, therefore respondents will be more honest and there will be less social desired answers.
If the survey is sent to the proper managers, who is involved in the process, could easy answer the question, even of more largely surveys.
The duration of the survey-approach is constant
In a short period of time, the researcher could aggregate a lot of date
No high costs

Table 3.4 Disadvantages of making use of a survey

In general the response rate is low
The information could be superficial. If a question is wrongly understood, there is no opportunity to correct or illustrate the questions or to ask follow-up questions
There is no control about who is answering the questions. The respondent could ask others about their opinions, or the information could be incorrect

The choice for making use of a survey has been made in order to collect as many information of different hospitals instead of one hospital. This research is a first exploration of the field of the use of business improvement approaches in Dutch hospitals; the main purpose of the research is to develop an overview of the use of those approaches in Dutch hospitals. Therefore the answers of managers of different hospitals are more interesting than the answers of different managers at one hospital. The perception of the manager is very important compared to an inventory of which business improvement approaches are really used in the hospitals. Those two characteristics of this research have turned the scale in favourite of making use of a survey.

There has been tried to make the most of the benefits of making use of a survey. The respondents could completed the survey on the Internet at the time en place they have wanted to log in and there has been offered to take an interview by telephone instead of the online survey if this was preferable. In the accompanying letter has been described that all the answers will be processed anonymously. Also there has been put an effort in finding the proper managers in the hospitals, this will be described at paragraph 3.3.2 ‘Sample size respondents and contact’.

On the other hand has been tried to reduce the disadvantages by making use of several pre-tests to test and improve the questions to make sure that the respondents understood the questions. Also has been tried to generate a high response-rate by making use of several reminders and to offer an interview instead of the online survey if this was preferable.

3.2.2 Design

First a pre-test of the survey was been performed in four different hospitals in order to test the survey. The questions of the survey were presented at an interview setting so that the respondents could explain their possible concerns about the questions. Their input was used to make modifications to the instrument. After adapting the survey after each interview, the survey was finalized and ready to go online. First the selected mangers have received a mail with the invitation to the survey and information about the purpose of the survey in order to get their attention and interest and to eliminate suspiciousness and to motivate the managers, in order to keep the non-response rate as low as possible. The email described that it was possible to answer the questions in a telephone-interview, if this is preferable. By offering another option to answer the question, the non-response rate should be as low as possible. After a week from the moment they received the survey, a reminder was sent to those managers who did not reply or did not fill out the whole survey. A week later another reminder was sent. After about four to five weeks from the first announcement (depending on the time that the person had been reached), the collection of data has been stopped.

3.2.3 Sample size respondents and contact

In the Netherlands are 95 Hospitals, which all have been approached. In advance was agreed with the researchers that a response rate around 35 respondents is preferable, in order to provide a representative overview of Dutch Hospitals. Deutskens, de Ruyter, Wetzels and Oosterveld (2004) describe different characteristics of surveys and how they could influence the response rate of the survey. The fact that it is an online survey with a lot of questions and a textual presentation of the questionnaire reduces the response rate. Deutskens et al. (2004) describe that an early follow-up email should increase the response rate. The respondents had to be managers who have insight in the (change) process, the strategies and choices and the implementation-process. It should be a middle manager that has insight in as well the ideas and strategies of the higher management, as the organization of the shop floor. The hospitals make use of different job descriptions and job titles. The manager we wanted like to approach could be a quality-advisor or a logistic manager (of patient logistics). To improve the response rate and to involve multiple hospitals in the research, several managers have been approached. The managers of the different hospitals have been contacted, by making use of the network of VLM (an association of logistic management, in Dutch: ‘Vereniging Logistiek Management’) and the NVZ (a Dutch association of hospitals, in Dutch: ‘Vereniging van Ziekenhuizen’). Their network consists largely of managers interested in (or joining) the master class of VLM about patient logistics or the ‘LogiZ-project’, about logistics in health care organizations. Therefore those selected persons are all managers with interests in the area we are researching. It remains still very important to select the right persons with insight in as well the ideas and strategies of the higher management, as the ideas on and the organization of the shop floor. After receiving the

contact information of the different networks, it appeared to be that a lot of contact information of hospitals was missing. Therefore contacts of the 'Antoni van Leeuwenhoek' hospital had to be used and other hospitals were being contacted by the general information number and asked for the particular managers. Not all members of the general information number could indicate the right member, therefore attaining the right people was more time consuming than was estimated in advance and not all right members could be attained. The respondents were three times approaches in order to receive as much data as possible.

3.3 Analysis

After collecting enough data, the data has been processed in a statistical programme (SPSS) and an expert has verified the coding and entering of the data. Every analysis of the different contents of the different constructs has followed the next three steps: first some general information about the content has been provided, followed by information about the response (the choice for a particular business improvement approach) and the performance variable (the success of a business improvement approach). Based on the number of respondents and the many variables, there were too few cases in each group for a statistical analysis like the chi-square test. In the results an overview of the answers will be provided in different tables and crosstabs. If the content of the different questions permitted, everywhere is used a 5-points-scale in order to make it easier to compare different questions or elements. The survey consists of six constructs: type of hospital, maturity phase, dissemination of knowledge and information, operations management strategy, use of business improvement approaches and success of the use of business improvement approaches. The different constructs of the survey are described in chapter five. Also an overview of the different constructs, the corresponding research questions and the literature can be found at the end of chapter five. The survey (in Dutch) is located in appendix B.

Chapter 4. Business Improvement approaches

In this chapter the different business improvement approaches will be shortly described. The table with the definitions of the approaches is one of the results of the first research about the different business improvement approaches and is needed in order to understand the next chapters.

Eleven business improvement approaches will be considered in this research: Total Quality Management, Business process re-engineering, Operations research, Lean management, Six sigma, Lean sigma, Theory of constraints, Benchmarking, Collaborative improvement and Focused factories The eleven approaches are defined in the table 4.1. More detailed information about the business improvement approaches is located in appendix A.

In this report the term business improvement approaches is used. The term is an umbrella term for different methodologies used to improve efficiency and are often also known as operations management methods or quality improvements. The field of Operations Management has evolved from a purely descriptive origin through the Management Science/Operations Research phase and is in the process of finding itself as a functional field of management (Buffa, 1980). Operations management is important. It is concerned with creating the services and products upon which we all depend. And all organizations produce some mixture of services and products, whether that organization is large or small, manufacturing or service, for profit or not for profit, public or private (Slack, Chambers, Johnston, 2004).

Table 4.1, on the next page, will present the included business improvement approaches and the corresponding definition.

Table 4.1 Business improvement approaches and definitions

Business Improvement Approach	***Definition***
Total Quality Management	*TQM is an approach for ridding people's lives of wasted effort by involving everyone in the processes of improvement; improving the effectiveness of work so that the results are achieved in less time. The approaches and techniques used in TQM can be applied throughout the organization. They are equally useful to finance, sales, marketing, distribution, development, manufacturing, public relations, personnel, to every one of a company's activities (Oakland, 1989).*
Business Process Re-engineering	*BPR is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed (Hammer, 1990).*
Operations Research	*Operations research is a scientific approach of providing executive departments with a quantitative basis for decisions regarding the operations under their control (Morse & Kimball, 2003).*
Lean Management	*Lean production is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer and internal variability (Shah, 2007).*
Six Sigma	*Six Sigma methodologies provide the techniques and tools to improve the capability and reduce the defects in any process. Six Sigma methodologies improve any existing business process by constantly reviewing and re-tuning the process (Koning et al., 2006).*
Lean Sigma	*A combination of lean management and six sigma. Lean six sigma is a methodology that maximizes shareholder value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed, and invested capital* (George, 2002).
Theory of Constraints	*Theory of constraints (TOC) is a management approach that emphasizes the importance of managing constraints. A constraint or bottleneck is any thing that prevents you from getting more of what you want* (Goldratt, 1984).
Care Pathways	*Integrated care pathways are structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem* (Campbell, Hotchkiss, Bradshaw, Porteous, 1998).
Benchmarking	*The search for- and implementation of best practices. (Camp, 1995).*
Collaborative Improvement	*A collaborative brings together groups of practitioners from different healthcare organizations to work in a structured way to improve one aspect of the quality of their service (Øvretveit et al. 2002 in Duckers, 2009).*
Focused Factories	*Its entire apparatus is focused to accomplish the particular manufacturing task demanded by the company's overall strategy and marketing perspective (*Skinner, 1974).

Chapter 5. Variables influencing the performance and response variables of business improvement approaches

In this chapter the different variables influencing the response and performance variables of business improvement approaches will be described. The results of the literature research will be presented in this chapter in order to answer the first part of the first research question:

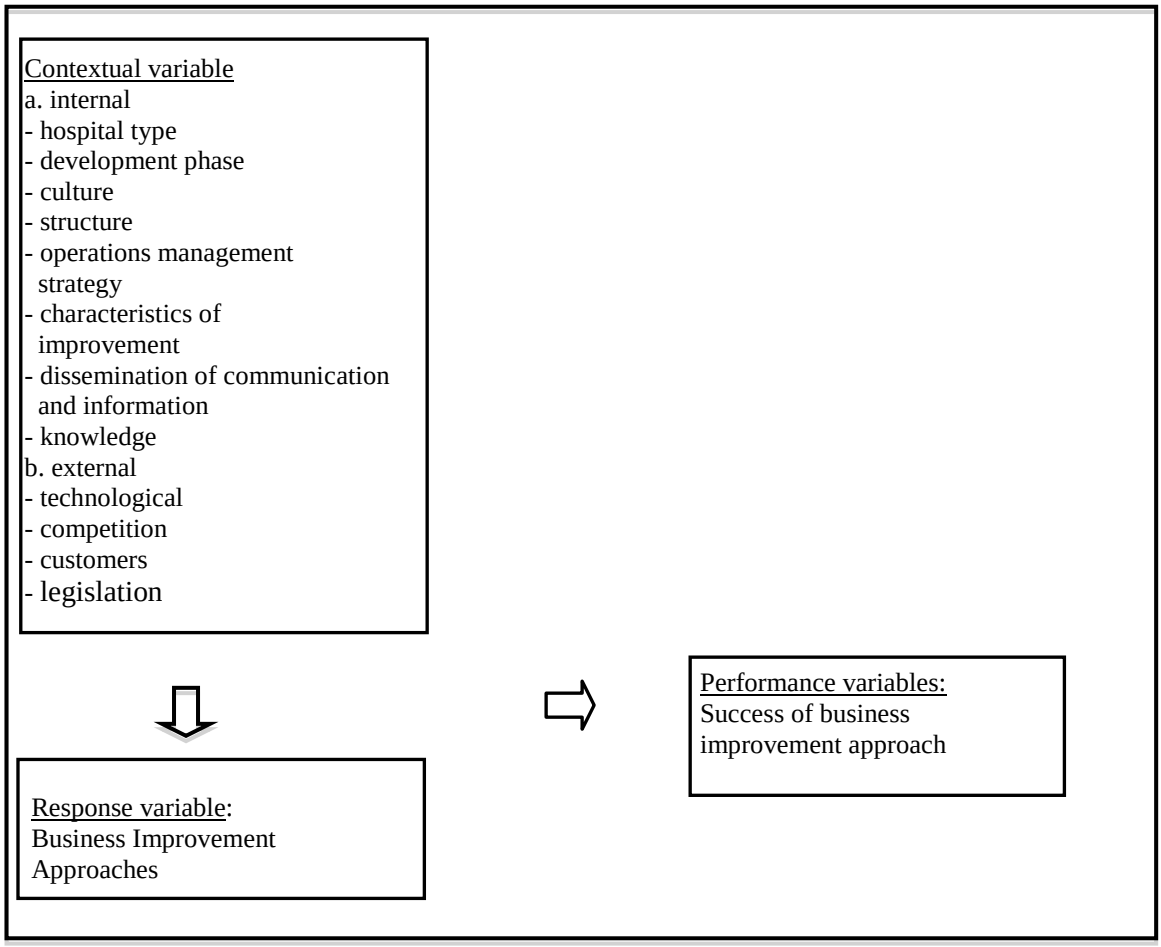
> *Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?*

First an overview of existing variables in the literature will be presented. In the second paragraph a selection of variables will be made based on the scope of this research and the different constructs will be described.

5.1 Overview of variables influencing the performance and response variables of business improvement approaches

Like described in Chapter 2, the variables influencing the response and performance variables will be presented in the model of Sousa and Voss (2008). In this chapter the model will be more extensive described.

Model 5.1 Model of variables influencing the success of a particular business improvement approach



5.1.1 Contextual variables

The contextual variables are subdivided in to internal and external variables (Butler and Leon, 2000). Internal variables are characteristics of the organization. 'External variables are mostly related to the general environment and the industry' (Albaum, Duerr and Strandskov, 1998). Both variables will be described in the next sections.

Internal variables

Internal variables include hospital type, development phase of the hospital, organizational culture, structure of the organization and strategy of the organization. There are different classifications of hospital types, based on size and background. Yasin, Zimmerer, Miller and Zimmerer (2002) describe in their research the influence of hospital types on the performance variables of hospitals. The development phase of the hospital illustrates the experience with business improvement approaches and could influence the success of the used approaches (Berwick, 2008). The development phase of the hospital can be determined by using the INK/EFQM-model. Organization culture refers to a shared value system derived over time that guides members as they solve problems, adapt to external environment and manage relation ships (Schein, 1992). Organizational structure institutionalizes how

people interact with each other, how communication flows, and how power relationships are defined (Hall, 1987). The structure of an organization reflects the value-based choices made by the company (Zammuto and O'Connor, 1992); it refers to how job tasks are formally divided, grouped, and coordinated. The methods or approaches that are being used should be suitable for application/adaptation within the context in which they are to be used (Adler, Kwon & Singer 2003; Aubert & Hamel 2001; Meyer, Johnson & Ethington 1997; O'Neill, Pouder & Buchholtz 2002; Plsek 2003; Rogers 1995; Yetton, Sharma & Southon 1999). The strategy of the organization is 'the pattern of decisions in a company that determines and reveals its objectives, purposes, or goals, produces the principal policies and plans for achieving those goals, and defines the range of business the company is to pursue, the kind of economic and human organization it is or intends to be, and the nature of the economic and non-economic contribution it intends to make its shareholders, employees, customers, and community' (Andrews, 1997) The strategy of the organization should match the operations management strategy. With operations management strategy is meant the objective of the business improvement strategy. Different objectives could influence the choice for the use of a business improvement approach and therefore the success of the use of the approach.

In addition, the characteristics of the improvement and the types of problems the hospital is struggling with could influence the choice for a particular business approach and/or the implementation of the approach. The characteristics of the improvement can be categorized in structural or projects, incremental or radical and the complexity of the improvement and if the improvement will be implemented in the whole hospital or in a department(s), thereby can the improvement be categorized by the different characteristics named by Rogers (1995), namely; compatibility, relative advantage, complexity, triability, observability. The type of problems the hospital is struggling with, depends on the different objectives of the improvements.

Two other elements, which could influence the implementation process, are knowledge and communication. Communication could influence the success of the implementation of the applied business improvement approach. The degrees of involvement of the employees, the communication about the improvement and the (ICT) support has different influences on the success of the implementation (Schrijvers, Oudendijk, de Vries, 2003; Klopper-Kes, Wilderom, van Harten, 2010). Dissemination of knowledge could also be an influence on the use and success of business improvement approaches (Duckers, 2009). It is important to acknowledge, who has the required knowledge about the process of the improvement, if the knowledge is internal or should be attracted external (Cassiman, Veugelen, 2002). Some business improvement approaches require specific information and/or procedures. Managers can be trained internal, or consultants can be attracted (Schrijvers, Oudendijk, de Vries, 2003).

External variables

The external variables include technological, competition, customers and legislation. Technological variables could influence the success of a particular business improvement approach, because the different technological opportunities could restrict or enlarge the implementation (Mills and Weeks, 2004; Plsek 2003). With competition is meant the influence of other organizations. And with customers is meant the influence and the demands of the customer or patient on the implementation process. The legislation could influence the success as well because of the regulative function. The last three variables may interact. Like described in the introduction there are a lot of changes in the health care sector in the Netherlands; The Netherlands has introduced major market-oriented reforms that aim to strengthen the purchasing role of the financiers within the health care system (Ministry of Health, Welfare and Sport, 2002; Ministry of Health, Welfare and Sport 2005). The demand to improve hospitals-processes, to operate more efficient, is still rising; the government exerts increasing pressure to cut costs and the government is commercializing the health care, whereas in the future, an increase in the demand for care is expected, resulting in more weight on the efficiency and quality of the service of the health care (Borghuis, 2007; Mans, Schonenberg, Song, van der Aalst and Bakker 2008).

In the next chapter four variables will be selected based on the scope of this research. The selected variables will be described more extensively.

5.1.2 Response variable

According to Sousa and Voss (2008) the response variables are 'the organizational or managerial actions taken in response to current or anticipated contingency factors'. In this research the response variable is the choice for a specific business improvement approach, where business improvement approaches are the collection of methodologies used to improve efficiency.

5.1.3 Performance variable

Performance variables are 'dependent measures and represent specific aspects of effectiveness that are appropriate to evaluate the fit between contextual variables and response variables for the situation under consideration' according to Sousa and Voss (2008). In this research the included performance variables are outcomes of the use of the business improvement approaches (the success) and the evaluation of the results of the business improvement approaches (whether and how they are evaluated). The use of a particular business improvement approach is successful when the objectives of the hospitals are achieved.

Chapter 6. Selected contextual variables

In this chapter the selected variables influencing the response variable (the choice for the use of a particular business improvement variables) and performance variables (success of the used approach) of business improvement approaches will be described. The results of the literature research will be presented in this chapter in order to answer the second part of the first research question:

Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?

In this research the improvements aiming for timely and efficient, have been included, because the use and success of the business improvement approaches defined as the collection of methodologies used to improve efficiency, have been examined. This research is an exploration of the relatively new field of the use of business improvement approaches in Dutch hospitals. The variables are selected based on the extent to which there is an opportunity to examine the variable in the context of the research, the extent to which the hospital or the manager could influence the variable and the extent tot which earlier research has examined the variable. Based on those criteria the external variables are excluded because they are hard or even impossible to influence by the hospital or the manager. The variables culture and structure are excluded because they are hard to influence by the manager or hospital as well and are beyond the scope of the research, by being extensive and difficult to measure variables based on the much discussed influence of culture in organizations in general in the current literature. At last the variables characteristics of the communication have been excluded, because the variables contain too much detailed and distorted information, they are beyond the context of the research, being a first exploration of the field. The selected contextual variables are: hospital type, operations management objectives, maturity phase and dissemination of knowledge and information. The selected contextual variables are the different constructs of the survey. An overview of the construct of the survey is presented at the end of this chapter in table 6.4.

6.1 Hospital type

Yasin, Zimmerer, Miller and Zimmerer (2002) describe in their research the influence of hospital types on the performance variables of hospitals. Dutch hospitals are subdivided into three categories; namely STZ, MG and SAZ. The Dutch abridgment of ‘Samenwerkende Topklinische Ziekenhuizen’, which stands for Cooperating Top Clinical Hospitals, ‘Middelgrote Ziekenhuizen’, which stands for Medium Size Hospitals and ‘Stichting Algemene Ziekenhuizen’, which stands for A Foundation of

General Hospitals. The size of the organization is an important characterization; STZ are large top clinical hospitals, MG hospitals have a medium size and SAZ hospitals are the smaller hospitals. The Foundation of Dutch Hospitals Data (DHD) provides the following data about the classification and numbers of Dutch Hospitals in 2009: 37 STZ-hospitals, 22 MG-hospitals and 36 SAZ-hospitals. The first construct, hospital type, provides some background information of the hospital. The information will be provided by the third question of the survey, where is asked for the hospital name. The information about the hospital name is needed in order to classify the different hospitals per hospital type by making use of the classification of the Foundation of Dutch Hospitals Data.

6.2 Operations management objectives

Strategy in a business organization is essentially about how the organization seeks to survive and prosper within its environment over the long-term. The decisions and actions taken within its operations have a direct impact on the basis on which an organization is able to do this. The way in which an organization secures, deploys and utilizes its resources will determine the extent to which it can successfully pursue specific performance objectives. Yasin, Agusto, Alavi and Lisboa (2009) have examined the effectiveness of quality improvement initiatives, where they also made use of the perception of success, by scoring aspects to the objectives of the hospitals instead of making use of standards. Butler and Leon (2000) describe in their research about the impact of operations competitive priorities on hospital performance the existing of a notable lack of empirical analysis on hospital operations strategy in spite of widespread debate on quality, cost, and service delivery. Different performance objectives can be elaborated based on Slack et al. (2004) with a more business point of view or based on the six aims for improvement of the Institute of Medicine.

The five operations performance objectives of Slack et al. (2004) will be presented in the table 6.1.

Table 6.1 Five operations performance objectives of Slack et al. (2004)

1 *Cost*: The ability to produce at low cost.
2 *Quality*: The ability to produce in accordance with specification and without error.
3 *Speed*: The ability to do things quickly in response to customer demands and thereby offer short lead times between when a customer orders a product or service and when they receive it.
4 *Dependability*: The ability to deliver products and services in accordance with promises made to customers (e.g. in a quotation or other published information).
5 *Flexibility*: The ability to change operations. Flexibility can comprise up to four aspects: i. The ability to change the volume of production. ii. The ability to change the time taken to produce. iii. The ability to change the mix of different products or services produced. iv. The ability to innovate and introduce new products and services.

The five operations performance objectives of Slack et al. (2004), presented in table 6.1, are largely consistent with the six aims of improvements of the Institute of Medicine (1996), which are provided in table 6.2.

Table 6.2 The six aims for improvement of the Institute of Medicine (1996)

Aim for improvement	***Description***
Safe	Avoiding injuries to patients from the care that is intended to help them
Effective	Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively)
Patient-centered	Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions
Timely	Reducing waits and sometimes harmful delays for both those who receive and those who give care
Efficient	Avoiding waste, including waste of equipment, supplies, ideas, and energy
Equitable	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status

Like mentioned in chapter two, only the improvements aiming for timely and efficient are included in this research. The performance objectives of Slack can be linked to the different aims for improvement of the Institute Of Medicine. The different objectives of a specific approach could influence the content and layout of the use of the business improvement approaches and therefore the success of the use. The mentioned performance objectives are the underlying objectives of the hospitals. In the survey has been asked for a more concrete answer (in order to receive more reliable answers) by asking for the aim of the improvement in terms of: Efficiency (‘utilization’), financial (reduce costs, enlarge market segment), timely (‘access time and throughput’) and effective (‘providing effective services, for example care pathways’), by prioritizing the different aspects.

6.3 Maturity phase

The maturity phase consists of the development phase of the hospital and the experience of the hospital with business improvement approaches. The development phase describes the earlier experience with innovations and business improvement approaches in the hospital. The development phase will be described by making use of the development stages, the INK/EFQM Excellence model and by the experience of the hospital. The maturity and the experience of a hospital could a have a great influence on the response and performance variables and the underlying (communication) processes. Sousa and Voss (2008) described that the maturity determines the ‘readiness of the hospital’ to use a specific approach. The research of Olson et al. (2008) emphasizes on the influence of

the stage of development. Corresponding to the research of Yasin et al. (2002) the development phase could be indicated by the years of experience. In the survey has been asked to indicate the development phase of the hospital in the EFQM Excellence model and for the earlier experiences with the business improvement approaches on organizational, division/department or individual level.
The EFQM Excellence model provides insight in the development phase of the hospital. In the survey the place in the EFQM Excellence model has been determined by means of the five development phases, which reflect the different phases of development of the hospital. In the survey the five development phases (see table 6.3) of the EFQM Excellence model have been used, in order to describe the development phase of the hospital. The original EFQM Excellence model is located in appendix C. The EFQM Excellence model is a non-prescriptive framework based on nine criteria (leadership, people, policy & strategy, partnerships & resources, processes, people results, customer results, society results and key performance results). In the Netherlands the Dutch variant of the EFQM Excellence model (INK-model) is often used in Dutch hospitals. Therefore the managers of the hospitals are familiar with the model, so it is easily applicable in the survey.
Table 6.3 presents the five development phases of the EFQM Excellence model.

Table 6.3 Development Phases EFQM

Phase I: Activity oriented:
Each individual wants to execute its work as good as possible; Professional skills are appreciated and will be supported with training courses; In case of complaints the organization will try to solve the complaint.
Phase II: Process oriented:
Control of primary processes; Independent process steps are identified, tasks, responsibilities and authority of individuals is known; Performance indicators are used to manage the organization; Improvement of processes based on deviations of the normal.
Phase III: System oriented:
All levels in the organization continuously and systematically work on improving the whole organization; The Deming Circle is applied on all primary, supporting and managing processes; Client focus is dominant for policy; Focused on preventing problems instead of dealing/solving problems.
Phase IV: Chain oriented:
With partners (suppliers, partners & clients) the aim is to create maximum value added in the chain; Within the chain it is decided which partner is most suitable for a certain task; Managing systems of all organizations in the chain are combined; Innovation is the primary focus.
Phase V: Transformation oriented:
Focus is to be the top in the markets and the fields the organization is operating in; Based on the long term vision activities are ended and new activities are started; Continuous organizational development based on the continuously changing environment; Co-operation with the partners in the chain.

6.4 Knowledge

With knowledge is meant internal or external knowledge; if the knowledge is already in the organizations or external parties should be attracted (Cassiman, Veugelen, 2004). The different hospitals and if they have to attract external parties are being compared in this research. A lack of distribution of scientific and experience knowledge could cause problems (Schrijvers, Oudendijk, de Vries, 2003). Therefore managers and employees could be trained, internally or externally. The training of the managers and or employees has been examined. Kivisaari and Vayrynen (2004) described that there should be a combination of internal training and external parties. Greenhalgh et al. (2004) have described that in order to increase the performance objectives, human resource management and training should be involved. Schrijvers et al. (2002) emphasize on the importance of enough educational programs about the innovations for the professionals. Earlier experience with different methods could influence the chances of success and the content of the underlying processes. The different trends in the dissemination of knowledge and information are being explored in this research, by asking for the availability of different sets of information, if knowledge of external parties has been attracted and the extent of the education program.

Table 6.4, on the next page, presents an overview of the different constructs of the survey, the associated sub questions, the questions in the survey and the corresponding literature. The survey (in Dutch) is located in appendix B.

Table 6.4 Constructs of the survey

Variables/constructs	*Content*	*Sub question*	*Items in survey*	*Literature*
Contextual variables				
Type of Hospital	STZ/MG/SAZ	Q5	1	Foundation of Dutch Hospitals Data Yasin, Zimmerer, Miller and Zimmerer (2002)
Operations management strategy	Performance objectives	Q5	6	Butler and Leon (2000) Institute of Medicine (1996) Slack et al. (2004) Yasin, Agusto, Alavi and Lisboa (2009)
Maturity Phase	EFQM Experience: 3 levels: - organization - department - individual	Q5	5 9/10 11/12 13/14	EFQM Olson et al. (2008) Sousa and Voss (2008) Yasin et al. (2002)
Dissemniation of knowledge and information	- information available - training	Q5	16 17/18/19	Cassiman, Veugelen, 2004 Kivisaari and Vayrynen (2004) Schrijvers, Oudendijk, de Vries (2003)
Response				
Use of approaches	Approach indicated as priority	Q3	4 15	*Camp (1995) Campbell, Hotchkiss, Bradshaw, Porteous (1998) Duckers (2009) George (2003) Hammer (1990) Koning, Verver, Heuvel, Bisgaard and Does (2006) Morse, Kimball (2003) Oakland (1989) Skinner (1974) Shah and Ward (2007)
Performance				
Results	Outcomes Evidence	Q4	20	Slack, Chambers and Johnston (2004) Institute of medicine (1995) Yasin, Agusto, Alavi and Lisboa (2009) Butler and Leon (2000)

* *Based on the first part of the research.*

Chapter 7 Results of survey

The data received from the survey answers the sub questions of question two, presented in the following table 7.1. For the readability of this large chapter, the table also presents the different paragraphs of the corresponding different sub questions.

Table 7.1 Research question and corresponding paragraph

Research question	Paragraph
What are the trends in the selected contextual variables and the response and performance variables of business improvement approaches in Dutch Hospitals?	
What are the trends in hospital types and the response and performance variables of business improvement approaches?	7.4
What are the trends in the development phase/maturity phase of the hospital and the response and performance variables of business improvement approaches?	7.5
What are the trends in the operations management strategy and the response and performance variables of business improvement approaches?	7.6
What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?	7.7

This chapter will answer the described research questions. First the descriptive of the survey and the respondents will be presented in paragraph 7.1, thereafter some general information about the use of the business improvement approaches will of the earlier research will be repeated in paragraph 7.2 and the success of the business improvement approaches of the earlier research will be repeated in paragraph 7.3, in order to understand the different variables of the business improvement approaches (the contextual, response and performance variables).
In this chapter abbreviations of the business improvement approaches will be used, presented in table 7.2 on the next page.

Table 7.2 Abbreviations of business improvement approaches and descriptions

Abbreviatons	Description
TQM	Total quality management
BPR	Business process reengineering
OR	Operations research
LM	Lean management
SS	Six sigma
LSS	Lean six sigma
TOC	Theory of constraints
CP	Care pathways
BM	Benchmarking
CI	Collaborative Improvement
FF	Focus Factories

7.1 Survey descriptive

This paragraph describes the different descriptive of the survey and the respondents. First an overview of answered surveys will be provided. After that the descriptive of respondents and the hospital types will be presented.

The survey has been sent out to different managers in all Dutch Hospitals (94 Hospitals). In total 130 manager have been approached, whereof 4 respondents have declared to have no interest in participation and 79 respondents started to answer the survey, of 52 different hospitals, after three invitations and reminders have been sent out. The response rate is 40 percent. An overview of the responses is located in appendix D. The answers of the respondents of the same hospital have been compared and combined, however most of the time a first respondent filled out the first three questions and stopped and than later that a new respondent of the same hospital filled out the survey or the same respondent filled out several surveys where the first time the respondent only fillet out a few questions and later on the whole survey was answered**.**

Table 7.3 presents an overview of the number of completed answers per question of the survey. The first column presents the corresponding construct in the survey. The table presents only the questions that are used for this research, presented in the second column. A total overview of all the questions, including the questions used for the first research, is located in the appendix D. The third column (*completed)* presents the number of respondents that has answered a particular question. The fourth column (*% of total*) presents the percentages that have answered a particular question relative to the total respondents of the survey. The fifth column *(% of question 4*) presents the percentages of the respondents that have answered a particular question in relation to the number of respondents that has answered question 4.

Table 7.3 Overview of the number of completed answers per question of the survey

Construct	Question	Completed	% of total	% of question 4
Demographic data/ hospital type	1	52	100,0	-
	2	52	100,0	-
	3	52	100,0	-
Use of approaches	4	45	86,5	100,0
Maturity phase	5	44	84,6	97,8
	6	43	82,7	95,5
Maturity phase	9	39	75,0	86,7
	10	41	78,8	91,1
	11	41	78,8	91,1
	12	40	76,9	88,9
	13	39	75,0	86,7
	14	41	78,8	91,1
Dissemination of knowledge and information	16	36	69,2	80,0
	17	36	69,2	80,0
	18	36	69,2	80,0
	19	34	65,4	75,6
Success	20	34	65,4	75,6
	Total	52	100,0	100,0

There is a large difference in response between the third question (52 respondents) and the fourth question (45 respondents). The first three questions are general questions about the background of the respondent. The fourth question is about which business improvement approaches are used in the hospital, the core of the research. It is possible that respondents figured at question 4, that they were not the right person to fill out the survey. Like mentioned before, often another respondent of the same hospital filled out the survey, which suggested that the survey was sent to another person in the same hospital. In the accompanying mail of the survey, was explicitly stressed that if another manager within the same hospital was better fit to answer the questions, the mail should gladly be redirected. During the following question, respondents stopped at various points the survey. For this research only the respondents that filled out at least question four, were being included. The excluded 7 respondents did not share any content information of the use of business improvement approaches.

The respondents of the survey provided information about their function level, divided into hospital-wide, division and department, presented in table 7.4 .

Table 7.4 Function levels of respondents (N=45)

	Frequency	*Percent*
Hospital-wide	33	73,3
Division	10	22,2
Department	2	4,4
Total	**45**	**100,0**

Like described in the methodology chapter (chapter 3), the respondents should be managers who have insight in the (change)process, the strategies and choices and the implementation-process. It should be a middle manager that has insight in as well the ideas and strategies of the higher managements, as the organization of the shop floor. Therefore table 7.4 presents that 95,5 percent of the respondents are managers with job functions on a hospital-wide level or a division level. Of these 95,5 percent, 73,3 percent of the respondents are managers with job functions on a hospital-wide level and 22,2 percent on a division level.

All the function descriptions in the survey were different; almost everyone has filled out a different job description. An overview of the different job descriptives is located in appendix E.

The different hospitals can be divided into UMC's (university hospitals), general hospitals and top clinical hospitals. Table 7.5 presents the number of participated hospitals in the survey per hospital type, the total number of hospitals in the Netherlands per type of hospital and the percentage of represented hospitals in the survey of the total in the Netherlands per hospital type.

Table 7.5 Type of hospital in survey compared to total in the Netherlands

Type of hospital	*Number of participated hospitals in the survey*	*% Of number of participated hospitals in the survey*	*Total in the Netherlands*	*% Of total in the Netherlands*	*% Represented of total in the Netherlands*
UMC	6	11,5	8	8,5	75,0
General hospital	27	51,9	59	62,8	45,8
Top clinical hospital	12	23,1	27	28,7	44,4
Total	**45**	**100,0**	**94**	**100,0**	**47,9**

Table 7.5 shows that 11,5 percent of the hospitals are UMCs, 51,9 % is general hospitals and 23,1 percent are top clinical hospitals. Compared to the total hospitals in the Netherlands, table 7.5 shows that 75,0 percent of the UMCs in the Netherlands has participated in the survey, 45,8 percent of the general hospitals and 44,4 percent of the top clinical hospitals.

7.2 Use of business improvement approaches

This paragraph will provide some general information of the earlier research about the use of approaches. For the focus of this research, only the approaches indicated as priority are important, because all other questions refer to the approach indicated as priority. For more information about the used approaches and combinations of approaches next to the priorities, see the first part of the research.

In the survey has been asked to choose to indicate one approach as priority (question 4 in the survey), however several respondents indicated multiple priorities. The following table 7.6 presents the number of approaches indicated as priority. The used approaches indicated as priority over the past two years in a hospital, has been indicated by 45 respondents.

Table 7.6 Number of approaches indicated as priority (N=45)

Number of approaches	Number of hospitals	%
0 approach	6	11,5 %
1 approach	28	53,8 %
2 approaches	7	13,5 %
3 approaches	2	3,8 %
4 approaches	1	1,9 %
5 approaches or more	1	1,9 %
Total	45	100,0 %

Table 7.6 shows that 11 respondents (24,4%) indicated more than one approach as priority and six respondents (11,5%) did not indicate any approach as priority.

Table 7.7 presents the approaches indicated as priority in the past two years in the hospitals (question 4 in the survey). 39 respondents have indicated the priority of the used approaches over the past two years in a hospital. Like presented in table 7.6, some hospitals indicated several approaches as priority, therefore the total number of priorities is higher than 45, namely 57.

Table 7.7 Approaches indicated as priority (N=39)

	Frequency	*Percent*
TQM	5	12,8
BPR	5	12,8
OR	1	2,6
LM	8	20,5
SS	1	2,6
LSS	6	15,4
TOC	4	10,3
CP	19	48,7
BM	4	10,3
CI	3	7,7
FF	1	2,6
Total	57	

Table 7.8 shows that 48,7% percent of the hospitals has indicated care pathways as the priority over the past two year in the hospital, followed by lean management (20,5 percent of the hospitals). Operations Research, Six Sigma and Focus Factories are rarely indicated as priority over the past two years, corresponding to table 7.8. Appendix F shows the different combination of approaches, indicated as priorities.

7.3 Success of the business improvement approach

This paragraph will provide an overview of the results of the first part of the research about the success of the use of approaches in order to provide some general information of the success. The information is needed to further explore the trends in the contextual variables in the influence of the use and success of business improvement approaches.

In the survey has been asked how the different quality aspects, efficiency, timely financial and effectiveness, are evaluated (question 20 in the survey). Table 7.9 shows if the objectives are evaluated and table 7.10 and 7.11 show how they are rated in relation to the objectives.

Table 7.9 presents if the four quality aspects (efficiency, timely, financial and effectiveness) have been evaluated or not, indicated by 34 respondents.

Table 7.9 Performing of evaluation per quality aspect (N=34)

	Evaluated		Not evaluated		Total	
	N	%	N	%	N	%
Efficiency	30	88,2	4	11,8	34	100,0
Timely	28	82,4	6	17,6	34	100,0
Financial	25	73,5	9	26,5	34	100,0
Effectiveness	24	70,6	10	29,4	34	100,0

Table 7.9 shows that the percentages of the different quality aspects that are not evaluated are proportional large, compared to the fact that all the respondents stated that they evaluated their approaches. Efficiency is evaluated the most, 88,2 percent, timely is evaluated in 82,4 % of the hospitals, financial in 73,5 of the hospitals and effectiveness in 70,6 percent of the hospitals. The results in table 7.9 shows that 26,5% of the hospitals did not evaluated the financial aspect of the used approach.

The following tables 7.10 and 7.11 show how the four quality aspects (efficiency, timely, financial and effectiveness) are scored in relation to the objectives of the hospitals. Table 7.10 presents the rating of the quality aspects in relation to the objectives, divided into above objectives, similar to objectives and below objectives. The question has been answered by 34 respondents. This table only presents how the quality aspects are evaluated compared to the objectives of the hospitals, therefore the respondents that did answered that the aspects were not evaluated are not included and the total number of respondents differs per quality aspect.

Table 7.10 Evaluation of the quality aspects in relation to objectives

	Above objectives		**Similar to objectives**		**Below objectives**		**Total**	
	N	%	N	%	N	%	N	**%**
Efficiency	4	13,3	12	40,0	14	46,7	30	**100,0**
Timely	6	21,4	7	25,0	15	53,6	28	**100,0**
Financial	6	24,0	8	32,0	11	44,0	25	**100,0**
Effectiveness	5	20,8	12	50,0	7	29,2	24	**100,0**

Table 7.10 shows that three of the four elements were often rated below objectives; efficiency 46,7%, timely 53,6% and financial 44,0%. Effectiveness is evaluated in exact 50% of the hospitals as similar to objectives. The quality aspects are evaluated above objectives in relatively small percentages of the hospitals; 13,3 % of the hospitals evaluated the results above objects for efficiency, 21,4% of the hospitals for effectiveness, 24,0 of the hospitals for financial and 20,8 for effectiveness. Below objectives could be subdivided into below objectives, but still improving, below objectives and no improvement or below objectives and deterioration.

Table 7.11 presents an overview of the subdivision of below objectives into below objectives, but improving, below objectives and not improving or detoriation. Only the respondents that indicated that the quality aspects were evaluated below objectives (in table 7.10) are included. The total number of respondents per quality aspect is presented in the second last column.

Table 7.11 Rating of the quality aspects in relations to objectives specification of below objectives

	Improving		**Not improving**		**Deterioration**		**Total**	
	N	%	N	%	N	%	N	%
Efficiency	13	92,9	1	7,1	0	,0	14	100,0
Timely	14	93,3	1	6,7	0	,0	15	100,0
Financial	7	63,6	3	27,2	1	9,1	11	100,0
Effectiveness	5	71,4	2	28,6	0	,0	7	100,0

Table 7.11 presents a slightly more positive picture. The quality aspects, efficiency, timely, financial and effectiveness are although they scored below objectives, still improving. Especially efficiency: 92,9 % of the hospitals and timely, 93,3 % of the hospitals. The other two elements, financial and effectiveness are more differentiated between improving and not improving; financial is improving at 63,6% of the hospitals and not improving at 27,2% of the hospitals and effectiveness is improving at 71,4% of the hospitals and not improving at 28,6% of the hospitals. One hospital even evaluated the results of financial as deterioration.

7.4 Hospital type

This paragraph will answer the following research question:

What are the trends in hospital types and the response and performance variables of business improvement approaches?

The paragraph is divided into the parts hospital type and response variable and hospital type and performance variable.

7.4.1 Hospital type and response variable

Table 7.12 shows the used approaches indicated as priority per hospital type, in order to provide more insight in the differences between hospital types and the used approaches. 35 respondents have indicated the used approach.

Table 7.12 Used approach (indicated as priority approach) and hospital type (N=35)

		UMC	General	Top clinical	Total
TQM	N	0	5	0	**5**
	%	, 0	14,7	, 0	**14,7**
BPR	N	1	4	0	**5**
	%	11,1	11,8	, 0	**22,9**
OR	N	0	1	0	**1**
	%	, 0	2,9	, 0	**2,9**
LM	N	0	5	3	**8**
	%	, 0	14,7	21,4	**36,1**
SS	N	0	0	1	**1**
	%	, 0	, 0	7,1	**7,1**
LSS	N	1	3	2	**6**
	%	11,1	8,8	14,3	**34,2**
TOC	N	0	4	0	**4**
	%	, 0	11,8	, 0	**11,8**
CP	N	4	9	6	**19**
	%	44,4	26,5	42,9	**113,8**
BM	N	1	2	1	**4**
	%	11,1	5,9	7,1	**24,1**
CI	N	1	1	1	**3**
	%	11,1	2,9	7,1	**21,1**
FF	N	1	0	0	**1**
	%	11,1	, 0	, 0	**11,1**
Total	N	9	34	14	**57**
	%	**100,0**	**100,0**	**100,0**	**100,0**

Table 7.12 presents that in all three hospital types, UMC, general and top clinical hospitals, care pathways is the most used approach. The table shows that general hospitals use a wider range of the approach indicates as priority, compared to UMC's and top clinical hospitals. The approaches total quality management (TQM), business process reengineering (BPR), operations research (OR) and theory of constraints (TOC) are only indicated as priority in general hospitals. Lean Management has only indicated as priority in general hospitals and top clinical, not in UMC's. Business process re-engineering has only been indicated in UMC's and general hospitals and not in top clinical hospitals and Focus Factories has only been indicated as priority approach two university hospitals (UMC's), not in the other types of hospitals.

7.4.2 Hospital type and performance variable

Table 7.13 shows if the different quality aspects are scored similar to or above objectives or below objectives per hospital type. Only hospitals that evaluated the different quality aspects are included in table 7.13. The total number of respondents differs per quality aspect. The table presents an overview of all the four quality aspects with percentages per hospital type.

Table 7.13 Evaluation of quality aspect per type of hospital

			UMC	General	Top clinical
Efficiency	Similar to/above objectives	N	1	12	**3**
		%	25,0	66,7	**37,5**
	Below objectives	N	3	6	**5**
		%	75,0	33,3	**62,5**
	Total efficiency	N	4	18	**8**
		%	100,0	100,0	**100,0**
Timely	Similar to/above objectives	N	0	10	**3**
		%	,0	62,5	**37,5**
	Below objectives	N	4	6	**5**
		%	100,0	37,5	**62,5**
	Total timely	N	4	16	**8**
		%	100,0	100,0	**100,0**
Financial	Similar to/above objectives	N	2	10	**2**
		%	66,7	66,7	**25,0**
	Below objectives	N	1	5	**6**
		%	33,3	33,3	**75,0**
	Total financial	N	3	15	**8**
		%	100,0	100,0	**100,0**
Effectiveness	Similar to/above objectives	N	1	13	**3**
		%	50,0	81,2	**50,0**
	Below objectives	N	1	3	**3**
		%	50,0	18,8	**50,0**
	Total Effectiveness	N	2	16	**6**
		%	**100,0**	**100,0**	**100,0**

Table 7.13 shows differences in the scoring of the objectives per quality aspect. The results of the UMC's shows that the scoring of the objectives differs per aspect: efficiency and timely are more often scored below objectives, financial more often similar/above objectives and effectiveness is equally scored above/similar objectives as below objectives. General hospitals have scored every quality aspect more times above/similar to objectives than below objectives. Top clinical hospitals have scored more often below objectives, except for effectiveness also equally scored on similar to/above objectives and below objectives.

In the survey has been asked to indicate whether the hospitals did evaluate the quality aspects and if the aspects have been evaluated, how they have been evaluated compared to the objectives of the hospitals. A division has been made in the scoring of the quality aspects compared to the objectives into above, similar, below but improving, below not improving. Table 7.13 presents the provided answers of whether the quality aspects have been evaluated and how they have scored compared to the objectives of the hospitals per quality aspect and per type of hospital, indicated by 34 respondents.

Table 7.14 Evaluation of quality aspects per type of hospital per quality aspect (N=34)

			UMC	General	Top clinical	Total
Efficiency	Above objectives	N	0	2	2	**4**
		%	,0	10,0	22,2	**11,8**
	Similar to objectives	N	1	10	1	**12**
		%	20,0	50,0	11,1	**35,3**
	Below objectives, but improving	N	3	5	5	**13**
		%	60,0	25,0	55,6	**38,2**
	Below objectives, not improving	N	0	1	0	**1**
		%	,0	5,0	,0	**2,9**
	Not evaluated	N	1	2	1	**4**
		%	20,0	10,0	11,1	**11,8**
	Total	N	5	20	9	**34**
		%	100,0	100,0	100,0	**100,0**
Timely	Above objectives	N	0	4	2	**6**
		%	,0	20,0	22,2	**17,6**
	Similar to objectives	N	0	6	1	**7**
		%	,0	30,0	11,1	**20,6**
	Below objectives, but improving	N	4	5	5	**14**
		%	80,0	25,0	55,6	**41,2**
	Below objectives, not improving	N	0	1	0	**1**
		%	,0	5,0	,0	**2,9**
	Not evaluated	N	1	4	1	**6**
		%	20,0	20,0	11,1	**17,6**
	Total	N	5	20	9	**34**
		%	100,0	100,0	100,0	**100,0**
Financial	Above objectives	N	1	4	1	**6**
		%	20,0	20,0	11,1	**17,6**
	Similar to objectives	N	1	6	1	**8**
		%	20,0	30,0	11,1	**23,5**
	Below objectives, but improving	N	0	3	4	**7**
		%	,0	15,0	44,4	**20,6**
	Below objectives, not improving	N	0	2	1	**3**
		%	,0	10,0	11,1	**8,8**
	Below objectives, deterioration	N	1	0	0	**1**
		%	20,0	,0	,0	**2,9**
	Not evaluated	N	2	5	2	**9**
		%	40,0	25,0	22,2	**26,5**
	Total	N	5	20	9	**34**
		%	100,0	100,0	100,0	**100,0**
Effectiveness	Above objectives	N	0	2	3	**5**
		%	,0	10,0	33,3	**14,7**
	Similar to objectives	N	1	11	0	**12**
		%	20,0	55,0	,0	**35,3**
	Below objectives, but improving	N	1	1	3	**5**
		%	20,0	5,0	33,3	**14,7**
	Below objectives, not improving	N	0	2	0	**2**
		%	,0	10,0	,0	**5,9**
	Not evaluated	N	3	4	3	**10**
		%	60,0	20,0	33,3	**29,4**
	Total	N	5	20	9	**34**
		%	**100,0**	**100,0**	**100,0**	**100,0**

Table 7.14 presents differences in whether the hospitals have evaluated the different quality aspects compared to the objectives. The table shows that effectiveness is not evaluated at 29,4 percent of the hospitals and financial at 26,5 percent of the hospitals, while the percentages of the other two aspects are relative lower; efficiency is not evaluated at 11,8 percent of the hospitals and timely at 17,6

percent of the time. Table 7.13 shows that university hospitals never evaluate the results above objectives for efficiency, timely and effectiveness and just in one hospital above objectives for financial and in one UMC there is even deterioration on the financial situation, compared to the other hospital types it seems that UMC have evaluated the different aspects more negative. Top clinical and general hospital evaluated more similar compared to the average of the different hospital types. Whether the four quality aspects are evaluated differs per hospital type. The table shows that university hospitals more often indicate that the aspects are not evaluated. Efficiency is not evaluated in 20,0% of the university hospitals, while the average of the three hospital types is 11,8 percent. Timely is not evaluated in 20,0% of the university hospitals, compared to the average of 17,6%. Financial is not evaluated in 40,0% of the university hospitals, compared to the average of 26,5%, and effectiveness is not evaluated in 60,0% of the university hospitals, compared to the average of not evaluated of 29,4% of the three hospitals types.

7.5 Maturity Phase

This paragraph will answer the following research question (2a):

What are the trends in hospital types and the response and performance variables of business improvement approaches?

The maturity phase of a hospital could be determined by the following questions in the survey: questions 5,9,10,11,12,13,14 in survey. The different questions could strengthen or verify each other. The different provided answers will be described in this paragraph.

First the development phase will be described in table 7.14 by making use of the five development phases of the EFQM Excellence model. 44 respondents have indicated the development phase of the hospital.

Table 7.14 Development phase (N=44)

	Frequency	Percent
Phase 1, activity oriented	5	11,4
Phase 2, process oriented	30	68,2
Phase 3, system oriented	7	15,9
Phase 4, chain oriented	2	4,5
Phase 5, transformation oriented	0	0
Total	44	100,0

Table 7.14 shows that no one has filled out phase 5. The majority of the hospitals are in phase two (68,2 percent of the hospitals, the process-oriented phase,) followed by 15,9 percent of the hospitals in phase three (system oriented), 11.4 percent of the hospitals in phase 1 (activity oriented) and 4.5 percent of the hospitals in phase 4 (chain oriented).

In the survey has been asked to indicate the experience with business improvement approaches on an organizational level, division or department level and individual level. The answers on the different questions, question nine to fourteen in the survey, will be presented in the following tables in order to provide some insight in the experience with the use of business improvement hospitals on different organizational level.

The next table (7.15) will present experience of the hospital with the approach of priority in number of years and the experience of the approach of the priority on division or department level in number of years. The number of years a hospital uses an approach indicated as priority has been answered by 39 respondents and the experience of the approach on division of department level in number of years is answered by 41 respondents. The table provides some insight in the possible differences in experience between different organizational levels; hospital-wide level and division or department level.

Table 7.15 Experience of hospital and division/department with approaches in number of years

	Number of years hospital uses priority approach		***Experience approach on division/department in number of years***	
	Frequency	Percent	Frequency	Percent
< 1 Year	6	15,4	7	17,1
1-5 Year	33	84,6	26	63,4
6-10 Year	0	,0	0	0
> 10 Year	0	,0	0	0
Not applicable	0	,0	8	19,5
Total	39	100,0	41	100,0

Table 7.15 shows that there are no great differences between the experience (in number of years) between the hospital level and the division or department level. Most of the hospitals have one to five years of experience with the approach (84,6 percent of the hospitals), corresponding to the experience with the approach on division/department level, also mostly one to five years (63,4 percent of the hospitals).

The experience (in number of years) with an approach, on a division or department level, could be influenced by the number of projects of a particular business improvement approach. Table 7.16 shows the frequencies of the number of projects, answered by 40 respondents.

Table 7.16 Number of projects on division or department (N=40)

	Frequency	Percent
No projects	1	2,5
1 project	3	7,5
2-5 projects	11	27,5
> 5 projects	16	40,0
Not applicable	9	22,5
Total	40	100,0

Table 7.16 shows that mostly (40,0%) more than five projects have been performed, followed by two to five projects (27,5). However 22.5 percent indicated that the question was not applicable, it could be possible that those respondents did not use the projects on a division or department level.

The number of years of experience of division or department level should match the number of projects on division of department level. Table 7.17 presents an overview of the frequencies of the number of projects and the years of experience, indicated by 39 respondents.

Table 7.17 Experience in number of projects and in years of the used approach on a division or department level (N=39)

	No projects	1 project	2-5 projects	> 5 projects	Not applicable	Total
< 1 year of experience	1	1	3	1	0	6
1- 5 years of experience	0	2	7	13	3	25
Not applicable	0	0	1	1	6	8
Total	1	3	11	15	9	39

Table 7.17 shows that there are differences in the number of projects when the division or department has less than a year of experience with the used approaches. If the experience with the approach is one to five years, the results show that there is always experience with at least two projects of a particular business improvement approach.

The following table 7.18 will present an overview of the frequencies of the individual experience in number of years on the job, answered by 39 respondents.

Table 7.18 Experience in years on the job (N=39)

	Frequency	Percent
< 1 Year	12	30,8
1-5 Year	23	59,0
6-10 Year	3	7,7
> 10 Year	1	2,6
Total	39	100,0

Table 7.18 presents that 69,3 percent has more than a year of experience, most of which one to five years of experience (59,0%). It is striking that only 7,7 percent has six to ten years of experience and only 2,6 percent (1 respondent) has more than ten years of experience.

The individual experience on the job could be influenced by the total experience of the individual. Table 7.19 presents an overview of the total experience of the individual, answered by 41 respondents.

Table 7.19 Total experience individual (N=41)

	Frequency	Percent
No experience	2	4,9
> 1 Year	1	2,4
1-5 Year	16	39,0
> 5 Year	22	53,7
Total	41	100,0

Table 7.19 shows that the majority (53,7%) has more than five years of experience and 39,0 percent has one to five years of experience. This is corresponding with the experience on the job in the previous table 7.19.

Table 7.20 presents the experience on the job and the total experience of the individual to provide insight if there are differences between the experience on the job and the total experience of 39 respondents.

Table 7.20 Experience on the job and the total experience of the individual (N=39)

	No experience	< 1 year	1-5 years	> 5 years	Total
< 1 year on the job	1	1	4	6	**12**
1-5 year on the job	1	0	11	11	**23**
6-10 year on the job	0	0	1	2	**3**
> 10 year on the job	0	0	0	1	**1**
Total	**2**	**1**	**16**	**20**	**39**

Table 7.20 shows that 12 respondents have less than a year of experience on the job, however ten of those respondents has one to five years of total experience or more than five years of experience. Of the respondents with one to five years of experience on the job, there is one with no other experiences, The other respondents indicated that they have one to five years of experience (11 repondents) or more than five years of total experience.

Years on the job could be influenced by the existence of the job in the hospital. If a hospital just recently created a specific function to manage the different operations processes, the experience of the individual on the job could be limited. Table 7.21 provides an overview of the years of existence of the function in the hospital and the year of experience on the job. The table provides insight in the possible differences between the years of experience on the job and the years of existence of the function in the hospital. 41 respondents have indicated the years of existence of the function in the hospitals, 39 respondents have answered how many years they have been on the job.

Table 7.21 Years of existence of function in hospital and year on the job

	Years of existence of function in hospital		***Years on the job***	
	Frequency	Percent	Frequency	Percent
< 1 Year	8	19,5	12	30,8
1-5 Year	23	56,1	23	59,0
6-10 Year	8	19,5	3	7,7
> 10 Year	2	4,9	1	2,6
Total	41	100,0	39	100,0

Table 7.21 present differences in the years of existence of the function in the hospital and the years of the respondent on the job. The table shows that most of the hospitals (56,1 percent) created the specific functions one to five years ago. Most of the respondents (59,0 percent) have indicated that they have one to five years of experience on the job, corresponding to the years of existence of the function in the hospitals. Table 7.21 shows that the main differences between 'years of existence of function in hospital' and 'years on the job' are differences in experience in less than a year or in six to ten years of experience. 19,5 percent of the respondents has indicated that the existence of the function in the hospital is less than a year, while 30,8 respondents has indicated that the experience on the job in less than a year. 19,5 respondents has indicated that the existence of the function in the hospital is six to 10 years, while only 7,7 respondents has indicated that their experience on the job in six to ten years.

In the next sections the maturity phase will be presented by making use of the development phases of the EFQM-Excellence model and the experience of the hospital with the particular business improvement approach.

7.4.1 Maturity phase and response variable

The maturity phase and the response variable, the choice for a specific business improvement approach, will be presented by making use of the development phase and the experience in number of years of use of the approach in a hospital.

Table 7.22 presents the approach indicated as priority per development phase, indicated by 39 respondents. Development phase five has been excluded, because none of the hospitals are in phase five.

Table 7.22 Approach indicated as priority and development phase (N=39)

		TQM	BPR	OR	LM	SS	LSS	TOC	CP	BM	CI	FF	Total
Phase 1	N	1	0	0	0	0	0	0	3	0	0	0	**4**
	%	25,0	,0	,0	,0	,0	,0	,0	76,0	,0	,0	,0	**100,0**
Phase 2	N	3	4	0	7	1	4	2	12	4	2	1	**27**
	%	11,1	14,8	,0	25,9	3,7	14,8	7,4	44,4	14,8	7,4	3,7	**100,0**
Phase 3	N	1	1	1	1	0	2	2	3	0	1	0	**7**
	%	14,3	14,3	14,3	14,3	,0	28,6	28,6	42,9	,0	14,3	,0	**100,0**
Phase 4	N	0	0	0	0	0	0	0	1	0	0	0	**1**
	%	,0	,0	,0	,0	,0	,0	,0	100,0	,0	,0	,0	**100,0**
Total	**N**	**5**	**5**	**1**	**8**	**1**	**6**	**4**	**19**	**4**	**3**	**1**	**39**

Table 7.22 presents that in all phases, care pathways is the most frequent used approach. In phases two and three, there is a wide variety of used approaches (indicated as priority). Table 7.22 shows that hospitals in phase one, only use a few business improvement approaches (three hospitals use care pathways and one hospital total quality management), compared to phase two or three. Total quality management is also one time indicated as used approach, next to care pathways. Focus factories has only been used in a hospital in phase two and operations research has only been used in a hospital in phase three.

Table 7.23 presents an overview of the approach of priority and the years of use (of the priority approach) in the hospital. The total number of respondents in table 7.23 is 51. Like earlier described, several respondents indicated multiple approaches as priority; those were split up in table 7.23. Table 7.23 only provides the answers of more than a year and one to five years, based on table 7.15 that shows that no one indicated that the hospitals uses a particular approach more than five years.

Table 7.23 Use of approach and years of experience of approach in hospital

		TQM	BPR	OR	LM	LSS	TOC	CP	BM	CI	FF	Total
< 1 year	**N**	0	1	0	3	0	0	3	0	0	0	**7**
	%	,0	14,3	,0	42,9	,0	,0	42,9	,0	,0	,0	**100,0**
1-5 year	**N**	4	3	1	5	5	4	15	3	3	1	**44**
	%	9,0	6,8	2,3	11,4	11,4	9,0	34,1	6,8	6,8	2,3	**100,0**
6-10 year	**N**	0	0	0	0	0	0	0	0	0	0	**0**
	%	0	0	0	0	0	0	0	0	0	0	**0**
> 10 year	**N**	0	0	0	0	0	0	0	0	0	0	**0**
	%	0	0	0	0	0	0	0	0	0	0	**0**
Total	**N**	**4**	**4**	**1**	**8**	**5**	**4**	**18**	**3**	**3**	**1**	**51**

Table 7.23 shows that most of the hospitals have one to five years of experience with the business improvement approach. There are no hospitals with more then five years of experience with the

business improvement approaches. A few hospitals have less than a year of experience with the use the approaches; business process re-engineering (1 hospital), lean management (3 hospitals) and care pathways (3 hospitals). When a hospital has less than a year of experience with the business improvement approach lean management and care pathways are equally used, while in general care pathways is usually the most frequently used.

7.4.2 Maturity phase and performance variable

The maturity phase and the performance variable will be presented by making use of the development phase and the experience in number of years of use of the approach in a hospital

How the objectives of the different quality aspects have been evaluated compared to the objectives of the hospitals per development phase are presented in table 7.24, indicated by 34 respondents. Because none of the hospitals is in development phase five, the phase is not included in the following table. The one hospital in phase four did not provide the answers of the evaluation of the objectives, therefore phase four is also excluded in table 7.24.

Table 7.24 Evaluation of objectives of quality aspects per development phase (N=34)

			Above objectives	Similar to objectives	Below objectives	Not evaluated	Total
Efficiency	Phase 1	N	0	0	2	2	4
		%	,0	,0	50,0	50,0	100,0
	Phase 2	N	3	9	9	2	23
		%	13,0	39,1	39,1	8,7	100,0
	Phase 3	N	1	3	3	0	7
		%	14,3	42,9	42,9	,0	100,0
	Total Efficiency	N	4	12	14	4	34
Timely	Phase 1	N	0	0	3	1	4
		%	,0	,0	75,0	25,0	100,0
	Phase 2	N	5	4	11	3	23
		%	21,7	17,4	47,8	13,0	100,0
	Phase 3	N	1	3	1	2	7
		%	14,3	42,9	14,3	28,6	100,0
	Total Timely	N	6	7	15	6	34
Financial	Phase 1	N	0	0	3	1	4
		%	,0	,0	75,0	25,0	100,0
	Phase 2	N	4	7	7	5	23
		%	17,4	30,4	30,5	21,7	100,0
	Phase 3	N	2	1	1	3	7
		%	28,6	14,3	14,3	42,9	100,0
	Total Financial	N	6	8	11	9	34
Effectiveness	Phase 1	N	0	1	3	0	4
		%	,0	25,0	75,0	,0	100,0
	Phase 2	N	4	8	4	7	23
		%	17,4	34,8	17,4	30,4	100,0
	Phase 3	N	1	3	0	3	7
		%	14,3	42,9	,0	42,9	100,0
	Total Effectiveness	N	5	12	7	10	34

Table 7.24 shows differences in the evaluation and whether they are evaluated of the four quality aspects. The able shows that in phase one, efficiency is more often not evaluated. In phase two and phase three, efficiency is proportionally more often evaluated and more often indicated as similar to objectives compared to phase one. Table 7.24 presents that the four quality aspects are never evaluated above objectives in phase one. In percentage terms phase one is most often not evaluated, compared to the other phases. However there are only a small amount of hospitals in phase one, so the percentages vary quickly. Hospitals in phase two differ more per quality aspect; efficiency has as often scored below objectives as similar (39,1 percent), timely has most often been scored below objectives (47,8), financial has most often scored below objectives as similar to objectives (30,5 respectively 30,4) and effectiveness has most often scored similar to objectives (34,8). Hospitals in phase three score relatively better compared to the other phases, however it differs per quality aspect; efficiency has often scored below objectives as similar to objectives (42,9 percent), timely has most often scored similar to objectives (42,9 percent), the financial aspect is the exception in phase three indicated;

indicated most of the times as not evaluated (42,9 percent) and effectiveness has been indicated as often similar to objectives as not evaluated (42,9 percent).

Table 7.25 present the experience with the business improvement approach of the hospital in number of years and the evaluation of quality aspects compared to the objectives of the hospitals in order to explore the trend between the experience of the hospital and the success of the use of the approach of the hospital .32 respondents have indicated the experience.

Table 7.25 Experience with approach of the hospital in number of years and evaluation of quality aspects compared to the objectives of the hospitals (N=32)

			Above objectives	Similar to objectives	Below objectives	Not evaluated	Total
Efficiency	< 1 year	N	1	3	1	0	5
		%	20,0	60,0	20,0	,0	100,0
	1-5 year	N	1	9	13	4	27
		%	3,7	33,3	48,1	14,8	100,0
	Total Efficiency	N	2	12	14	4	32
Timely	< 1 year	N	1	3	0	1	5
		%	20,0	60,0	,0	20,0	100,0
	1-5 year	N	3	4	15	5	27
		%	11,1	14,8	55,6	18,5	100,0
	Total Timely	N	4	7	15	6	32
Financial	< 1 year	N	2	0	1	2	5
		%	40,0	,0	20,0	40,0	100,0
	1-5 year	N	3	7	10	7	27
		%	11,1	25,9	37,1	25,9	100,0
	Total Financial	N	5	7	11	9	32
Effectiveness	< 1 year	N	0	3	0	2	5
		%	,0	60,0	,0	40,0	100,0
	1-5 year	N	3	9	7	8	27
		%	11,1	33,3	23,2	29,6	100,0
	Total Effectiveness	N	3	12	5	10	32

Table 7.25 shows that if the experience with an approach is less than a year the different quality aspects are often rated similar to objectives except for financial. If a hospital has one to five years of experience, efficiency, timely and financial are mostly rated below objectives (respectively 48,1%, 55,6% and 37,1%) and effectiveness is mostly rated similar to objectives (33,3%).
Table 7.25 shows that with the exception of effectiveness more hospitals have scored the quality aspects above objectives when they have less than a year of experience, compared to one to five years of experience, corresponding to the comparing of years of experience and the respondents that have indicated that the quality aspects have been scored similar to objective; more hospitals have scored the quality aspects similar to objectives when they have less than a year of experience, compared to one to

five years of experience, except for financial. Meanwhile more hospitals have scored the different quality aspects below objectives when they have one to five years of experience, compared to less than a year of experience. At last more hospitals have not evaluated to different quality aspects when they have less than a year of experience, compared to one to five years of experience, with the exception efficiency.

7.6 Operations management strategy

This paragraph will answer the following research question:

> *What are the trends in the operations management strategy and the response and performance variables of business improvement approaches?*

First the frequencies of the answers of the operations management strategy will be presented. The operations management strategy has been measured in the survey in question 5 of the survey, where has been asked to indicate the priority of the different quality aspects, efficiency, timely, financial and effectiveness. The respondents have scored the different quality aspects from highest priority to lowest priority. It was not possible to indicate the same priority to different quality aspects.

Table 7.26 presents an overview of the indicated priority of the different quality aspects, indicated by 43 respondents.

Table 7.26 Operations management strategy (N=43)

		Frequency	Percent
Efficiency	Highest priority	11	25,6
	Second highest priority	11	25,6
	Second lowest priority	11	25,6
	Lowest priority	10	23,3
	Total	43	100,0
Timely	Highest priority	16	37,2
	Second highest priority	17	39,5
	Second lowest priority	9	20,9
	Lowest priority	1	2,3
	Total	43	100,0
Financial	Highest priority	10	23,3
	Second highest priority	6	14,0
	Second lowest priority	11	25,6
	Lowest priority	16	37,2
	Total	43	100,0
Effectiveness	Highest priority	10	23,3
	Second highest priority	10	23,3
	Second lowest priority	10	23,3
	Lowest priority	13	30,2
	Total	43	100,0

Table 7.26 shows that the priorities of the four quality aspects are divided. Overall timely has most often been indicated as highest priority and as second highest priority, the second lowest priority is most often efficiency of financial and the lowest priority is most of the times the financial aspect. Efficiency is almost equally divided over the different priorities, 25,6 percent of the hospitals indicated efficiency as highest priority, second highest priority or second lowest priority and 23,3 percent of the hospitals has indicated efficiency as lowest priority. Timely is mostly indicated as second highest priority (39,5%), followed by highest (37,2%) and only at 2,3 percent of the hospitals as lowest priority. Financial has mostly indicated as lowest priority (37,2%), followed by second lowest priority (25,6%). Effectiveness is mostly indicated as lowest priority (30,2%) and dived over the other priorities; all 23,3 percent.

7.7.1 Operations management strategy and response variable

Table 7.27 shows how the priorities of the operations management objectives have been indicated and the use of approaches. It shows the different priorities per quality aspect and the different business improvement approaches that have been used in the hospitals. The total number per quality aspect in table 7.27 is 57, because the answers per used business improvement approach are being compared. The table provides information about the trends in the operations management strategy and response variable; the priorities of the different quality aspects and the choice for the use of a specific business improvement approach. The most frequently used approach per priory is dark shaded and common used approaches (>10%) are light shaded.

Table 7.27 Operations management strategy and use of approach (N=57)

			TQM	BPR	OR	LM	SS	LSS	TOC	CP	BM	CI	FF	Total
Efficiency	Highest priority	N	1	2	0	1	0	1	4	5	1	0	0	**15**
		%	6,7	13,3	,0	6,7	,0	6,7	26,7	33,3	6,7	,0	,0	**100,0**
	Second highest priority	N	0	1	1	3	1	4	0	4	1	1	0	**16**
		%	,0	6,2	6,2	18,8	6,2	25,0	,0	25,0	6,2	6,2	,0	**100,0**
	Second lowest priority	N	2	1	0	2	0	1	0	6	1	2	1	**16**
		%	12,5	6,2	,0	12,5	,0	6,2	,0	37,5	6,2	12,5	6,2	**100,0**
	Lowest priority	N	2	1	0	2	0	0	0	4	1	0	0	**10**
		%	20,0	10,0	,0	20,0	,0	,0	,0	40,0	10,0	,0	,0	**100,0**
	Total Efficiency	N	5	5	1	8	1	6	4	19	4	3	1	**57**
Timely	Highest priority	N	0	1	1	5	1	4	0	6	0	2	0	**20**
		%	,0	5,0	5,0	25,0	5,0	20,0	,0	30,0	,0	10,0	,0	**100,0**
	Second highest priority	N	2	2	0	2	0	0	3	9	2	1	1	**22**
		%	9,1	9,1	,0	9,1	,0	,0	13,6	40,9	9,1	4,5	4,5	**100,0**
	Second lowest priority	N	2	2	0	1	0	2	1	3	2	0	0	**13**
		%	15,4	15,4	,0	7,7	,0	15,4	7,7	23,1	15,4	,0	,0	**100,0**
	Lowest priority	N	1	0	0	0	0	0	0	1	0	0	0	**2**
		%	50,0	,0	,0	,0	,0	,0	,0	50,0	,0	,0	,0	**100,0**
	Total Timely	N	5	5	1	8	1	6	4	19	4	3	1	**57**
Financial	Highest priority	N	2	0	0	0	0	1	0	5	1	0	0	**9**
		%	22,2	,0	,0	,0	,0	11,1	,0	55,6	11,1	,0	,0	**100,0**
	Second highest priority	N	2	2	0	1	0	1	1	1	1	1	0	**10**
		%	20,0	20,0	,0	10,0	,0	10,0	10,0	10,0	10,0	10,0	,0	**100,0**
	Second lowest priority	N	1	1	0	3	0	0	2	4	1	1	0	**13**
		%	7,7	7,7	,0	23,1	,0	,0	15,4	30,8	7,7	7,7	,0	**100,0**
	Lowest priority	N	0	2	1	4	1	4	1	9	1	1	1	**25**
		%	,0	8,0	4,0	16,0	4,0	16,0	4,0	36,0	4,0	4,0	4,0	**100,0**
	Total Financial	N	5	5	1	8	1	6	4	19	4	3	1	**57**
Effectiveness	Highest priority	N	3	2	0	2	0	0	0	4	2	1	1	**15**
		%	20,0	13,3	,0	13,3	,0	,0	,0	26,7	13,3	6,7	6,7	**100,0**
	Second highest priority	N	1	0	0	2	0	1	0	7	0	0	0	**11**
		%	9,1	,0	,0	18,2	,0	9,1	,0	63,6	,0	,0	,0	**100,0**
	Second lowest priority	N	0	1	1	2	1	3	1	5	0	0	0	**14**
		%	,0	7,1	7,1	14,3	7,1	21,4	7,1	35,7	,0	,0	,0	**100,0**
	Lowest priority	N	1	2	0	2	0	2	3	3	2	2	0	**17**

	%	5,9	11,8	,0	11,8	,0	11,8	17,6	17,6	11,8	11,8	,0	**100,0**
Total Effectiveness	N	5	5	1	8	1	6	4	19	4	3	1	**57**

Table 7.27 shows that there are no striking differences between the different priorities of the quality aspects and the use of approaches, because of the small number of hospitals per prioritized quality aspect and chosen approach. Overall care pathways are still the most used business improvement approach. When financial has been indicated as second highest priority total quality management and business process reengineering are more often used then other approaches including care pathways (however only slightly more). Focus Facctories is used when the indicated priority is effectiveness. While Six Sigma are used when timely has the priority.

7.7.2 Operations management strategy and performance variable

How the four quality aspects are evaluated compared to the objectives (performance variable) per operations management strategy are presented the four tables in appendix G. Because of the small numbers and the widespread of the numbers there are no striking differences and no trends can be identified.

7.7 Dissemination of knowledge and information

This paragraph will answer the following research question:

What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?

The dissemination of knowledge has been measured in the survey in question 17 and 18 of the survey, where has been asked about the availability of information and the use of external parties. First the different frequencies will be presented.

Table 7.28 presents an overview of the availability of information; if specific information is standard available, need to be consulted or if the respondent does not know the availability of the information, all indicated by 36 respondents.

Table 7.28 The availability of information of waiting time, flow and capacity use (N=36)

		Standard available	Need to be consulted	I don't know	Total
Waiting time	N	27	8	1	**36**
	%	75,0	22,2	2,8	**100,0**
Flow	N	9	26	1	**36**
	%	25,0	72,3	2,8	**100,0**
Capacity use	N	19	16	1	**36**
	%	52,8	44,4	2,8	**100,0**
Total	N	55	50	3	**108**
	%	**50,9**	**46,3**	**2,8**	**100,0**

The table presents that overall 50,9 percent of the hospitals have indicated the different types of information as standard available and 46,3 percent of the hospitals as need to be consulted, while only 2,8 percent of the hospitals (one hospital) have indicated that it was not clear whether the information was available or not. Table 7.29 shows that the information of the 'waiting time' and the 'capacity use' is most of the times standard available (75,0 % percent and 52,8 percent). The information about the 'flow' is most of the times indicated as need to be consulted. Only one respondent per type of information has indicated that he or she did not know the availability of the information.

Table 7.29 presents an overview of the respondents that have indicated that the information needed to be consulted, split up in easy to consult and difficult to consult. The total number of respondents differs per type of information, because only the respondents that have indicated that the information needed to be consulted are included in table 7.29.

Table 7.29 The availability of information of waiting time, flow and capacity use

		Easy to consult	Difficult to consult	Total
'Waiting time'	N	8	0	**8**
	%	100,0	,0	**100,0**
'Flow'	N	6	20	**26**
	%	23,1	76,9	**100,0**
'Capacity use'	N	8	8	**16**
	%	50,0	50,0	**100,0**
Total	N	22	28	**50**
	%	**44,0**	**56,0**	**100,0**

Table 7.29 presents that if the information needed to be consulted most of the hospitals have indicated that the information was difficult to consult (56,0 percent). However the percentages differ per information type; waiting time is in all the hospitals included in table 7.30 indicated as easy to consult,

flow as difficult to consult at 76,9 percent of the hospitals and the capacity use is equally divided over easy to consult and difficult to consult.

Table 7.30 presents an overview of the use of external parties. The table describes if external parties are used and if the external party is involved in the analysis, implementation or education, indicated by 36 respondents.

Table 7.30 Use of external parties (N=36)

		External use	No use of external party	Total
Analysis	N	24	12	**36**
	%	51,9	33,3	**100,0**
Implementation	N	20	16	**36**
	%	55,5	44,4	**100,0**
Execution	N	13	23	**36**
	%	36,1	63,9	**100,0**
Education	N	25	11	**36**
	%	69,5	30,6	**100,0**
Total	N	82	62	**144**
	%	**56,9**	**43,1**	**100,0**

The table shows that most of the hospitals use external parties (56,9 percent of the hospitals). Except for the exception of business improvement approach external parties are more times not been used, compared to the number of hospitals that did use an external part and if the external party is involved in the analysis, implementation or education.

Table 7.31 presents an overview of the hospitals that did use an external party, divided into two types of external parties a research centre or a commercial institution. Only the hospitals that indicated that they have used external parties are included in table 7.32, the total number of respondents differs per part where the external party has been used, divided into analysis, implementation, execution and education.

Table 7.31 The use of external parties research centre of commercial institution

		Research Centre	Commercial institution	Total
Analysis	N	5	19	**24**
	%	20,8	79,2	**100,0**
Implementation	N	3	17	**20**
	%	15,0	85,0	**100,0**
Execution	N	3	10	**13**
	%	23,1	76,9	**100,0**
Education	N	5	20	**25**
	%	20,0	80,0	**100,0**
Total	N	16	66	**82**
	%	19,5	80,5	**100,0**

The table shows that if an external party has been used, most of the time commercial institutions are used; 80,5 percent towards 19,5 percent. Commercial institutions are used for analysis at 79,2 percent of the hospitals, implementation 85,0 percent, execution 76,9 percent of the hospitals and education 80,0 percent of the hospitals, while research centres are less used; 20,8 percent for analysis, 15,0 percent for implementation, 23,1 percent for execution and 20,0 percent for education. The results show that six sigma has only been used when the different types of informations are standard available and operations management and focus factories have only been used when most of the information is standard available (except for flow).

Table 7.32 presents an overview of the education within the hospital. The table describes if there is an education program and who participated in the program, indicated by 36 respondents.

Table 7.32 Education programs (N=36)

		Education program	No education program	Total
Managerial	N	25	11	36
	%	69,4	30,6	100,0
Professionals	N	16	20	36
	%	44,4	55,6	100,0
Supporting staff	N	20	16	36
	%	55,6	44,4	100,0
Total	N	61	47	108
	%	56,5	43,5	100,0

Table 7.32 shows that 56,5 percent of the hospitals have an education program (towards 43,5 percent of the hospitals that do not have an education program). Who participated in the program differs; 69,4 percent of the hospitals indicated that there is an education program for managerial staff, 44,4 percent for professionals and 55,6 percent for supporting staff. The professionals are more often not included in an education program (55,6 percent), compared to other staff of the hospital.

In the survey also has been asked about the intensity of the education programs for the different types of staff, presented in table 7.33. Only the hospitals that did have an education program are included in the table.

Table 7.33 Intensity of use of education programs

		One time	Program	Total
Managerial	N	17	8	**25**
	%	68,0	32,0	**100,0**
Professionals	N	12	4	**16**
	%	75,0	25,0	**100,0**
Supporting staff	N	12	8	**20**
	%	60,0	40,0	**100,0**
Total	N	41	20	**61**
	%	**67,2**	**32,8**	**100,0**

Table 7.33 shows that if hospitals do have an education program, the program mostly consists of a one time training (67,2 percent of the hospitals), this applies to all the programs for the different staff of the hospital.

7.7.1 Dissemination of knowledge and information and the response variable

The following three table present the dissemination of knowledge and information and the used approaches (response variable) by presenting the availability of information and the used approaches, the use of external parties and used approaches and the education programs and the used approaches.

Table 7.34 presents, on the next page, the availability of the three types of information and the used business improvement approaches, indicated by 49 respondents. The three types of information are waiting time, flow and capacity use.

Table 7.34 Availability of information and approach (N=49)

			TQM	BPR	OR	LM	SS	LSS	TOC	CP	BM	CI	FF	Total
Waiting time	Standard	N	1	4	1	7	1	5	3	12	3	2	1	**40**
		%	2,5	10,0	2,5	17,5	2,5	12,5	7,5	30,0	7,5	5,0	2,5	**100,0**
	Consult		1	0	0	1	0	1	0	5	0	0	0	**8**
			12,5	,0	,0	12,5	,0	12,5	,0	62,5	,0	,0	,0	**100,0**
	I don't know	N	1	0	0	0	0	0	0	0	0	0	0	**1**
		%	100,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	**100,0**
	Total	N	3	4	1	8	1	6	3	17	3	2	1	**49**
Flow	Standard	N	1	0	0	2	1	2	0	4	1	1	0	**12**
		%	8,3	,0	,0	16,7	8,3	16,7	,0	33,3	8,3	8,3	,0	**100,0**
	Consult	N	1	4	1	6	0	4	3	13	2	1	1	**36**
		%	2,8	11,1	2,8	16,7	,0	11,1	8,3	36,1	5,6	2,8	2,8	**100,0**
	I don't know	N	1	0	0	0	0	0	0	0	0	0	0	**1**
		%	100,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	**100,0**
	Total of	N	3	4	1	8	1	6	3	17	3	2	1	**49**
Capacity use	Standard	N	1	2	1	5	1	3	3	8	2	1	0	**27**
		%	3,7	7,4	3,7	18,5	3,7	11,1	11,1	29,6	7,4	3,7	,0	**100,0**
	Consult	N	1	2	0	3	0	3	0	9	1	1	1	**21**
		%	4,8	9,5	,0	14,3	,0	14,3	,0	42,9	4,8	4,8	4,8	**100,0**
	I don't know	N	1	0	0	0	0	0	0	0	0	0	0	**1**
		%	100,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	,0	**100,0**
	Total of	**N**	**3**	**4**	**1**	**8**	**1**	**6**	**3**	**17**	**3**	**2**	**1**	**49**

Corresponding to table 7.28 'Waiting time' is mostly standard available or needs to be consulted. There are more differences in the availability of information of the 'Flow'. If the information needs to be consulted, care pathways is still the most used approach. Care pathways is even more used if the information needed to be consulted (62,5%) compared to standard available (30,0%). In the availability of 'capacity use', there are no great differences in the use of approaches.

Table 7.35 presents the use of external parties and the used approaches, indicated by 49 respondents.

Table 7.35 Use of external parties and the use of business improvement approaches

		TQM	BPR	OR	LM	SS	LSS	TOC	CP	BM	CI	FF	Total
Total of use of external parties	N	4	8	2	15	2	14	8	37	6	4	4	**104**
	%	3,8	7,7	1,9	14,4	1,9	13,5	7,7	35,6	5,8	3,8	3,8	**100,0**
Total of no use of external parties	N	8	8	2	17	2	10	4	28	6	4	0	**92**
	%	8,7	8,7	2,2	18,5	2,2	10,9	4,3	30,4	6,5	4,3	,0	**100,0**
Total													

Table 7.35 shows that more business improvement approaches are used if the hospital that made use of an external party. The breakdown of the use of business improvement approaches is more similar; care pathways is still the most used approach, followed by lean management. However lean management is used more times when there was no use of an external party. Also total quality management is more frequently used, with no use of external parties. Theory of constraints is more times used when there was no use of external parties. In appendix H an overview of the use of external parties divided into analysis, implementation execution and education and the use of business improvement approaches are provided. Because of the small numbers and the widespread of the numbers no trends can be identified in appendix H.

Table 7.36 presents if an educations program has been used and the use of the business improvement approaches, indicated by 49 respondents. The table shows the differences between the use of business improvement approaches en the use of education. The different education programs, for the different types of staffs are added up, therefore the total number differs.

Table 7.36 Education programs and used approaches

		TQM	BPR	OR	LM	SS	LSS	TOC	CP	BM	CI	FF	Total
Total of us education	N	6	4	0	13	1	10	8	34	7	5	2	**90**
	%	6,7	4,4	,0	14,4	1,1	11,1	8,9	41,1	7,8	5,6	2,2	**100,0**
Total of no education	N	3	8	3	11	2	8	1	17	2	1	1	**57**
	%	5,2	14,0	5,2	19,3	3,5	14,0	1,7	29,8	3,5	1,7	1,7	**100,0**

Table 7.36 shows that more business approaches are use in the first categories where education programs are applied in the hospitals, compared to the hospitals that did not apply an education program (90 approaches in the first category towards 57 approaches in the second category). In both categories care pathways is still the most used approaches (41,1 percent and respectively 29,8 percent of the hospitals), followed by lean management. Lean management however is more times used in percentage in the second category; 19,3 percent towards 14,4 percent in the first category. Also Business process re-engineering is more often used in percentage in the second category; 14,0 towards 4,4 percent.

7.7.2 Dissemination of knowledge and information and the performance variable

The dissemination of knowledge has been measured by the availability of information, the use of external parties and the existence of an education program. The performance variable is still the success of the use of business improvement approaches in hospitals, by evaluating the four quality aspects (efficiency, timely, financial and effectiveness) compared to the objectives of the hospitals. Because of the small numbers and the widespread of the numbers and the quantity of the tables, no trends can be identified.

Chapter 8. Conclusions, limitations and implications

In this chapter the research question will be answered. First an overview of all the research questions is presented in table 8.1, followed by the answers divided into the described paragraphs. There after the limitations and implications for further research will be described and the implications for the Dutch hospitals.

Table 8.1 Research questions and corresponding paragraphs

Research question	***Paragraph***
1 Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?	*8.2*
2 What are the trends in the selected contextual variables and the response and performance variables of business improvement approaches in Dutch Hospitals?	
a What are the trends in hospital types and the response and performance variables of business improvement approaches?	*8.3*
b What are the trends in the maturity phase of the hospital and the response and performance variables of business improvement approaches?	*8.4*
c What are the trends in the operations management strategy and the response and performance variables of business improvement approaches?	*8.5*
d What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?	*8.6*

The different research questions will be answered in the corresponding paragraphs. First the use of business improvement approaches in Dutch hospitals in general will be described, followed by the success of the use of business improvement approaches. This are results of the first part of the research, however they are needed in order to understand the different trends of the contextual variables and the use of business improvement approaches and the success of the use of those approaches. Thereafter an overview of the most important contextual variables that could influence the response variable and the performance variable will be presented. Followed by an overview of the most important trends of the four selected contextual variables.

8.1 The use of business improvement approaches in Dutch hospitals and the success of the use of those approaches.

The use of business improvement approaches of hospitals has been explored, however only the approaches indicated as priority over the past two years have been included in this research. The results show that most of the hospitals have indicated care pathways as the approach of priority over the past two years, followed by lean management. The fact that most hospitals have been using care pathways raises the question whether hospitals are actually engaged in business improvement approaches or that they are just improving current processes, with no special attention to business operations management and applied the approaches more often as supportive tools.

The success of the business improvement is determined by how the four quality aspects: efficiency, timely, financial and effectiveness are evaluated in relation to the objectives of the hospitals. Not all the hospitals have evaluated the four aspects of the used business improvement approaches, however when they are evaluated, almost over 50% of the hospitals evaluated their results of three of the four aspects below objectives (effectiveness is evaluated in exact 50% of the hospitals as similar to objectives). Although they scored below objectives, they are still improving. There are two possible reasons causing this distorted image; on one hand it could be possible that the objectives of the hospitals were too demanding, so it is difficult to achieve the objectives. On the other hand it could be possible that the four quality aspects were being scored very low before the start of the use of business improvement approaches, so improvements easily occur.

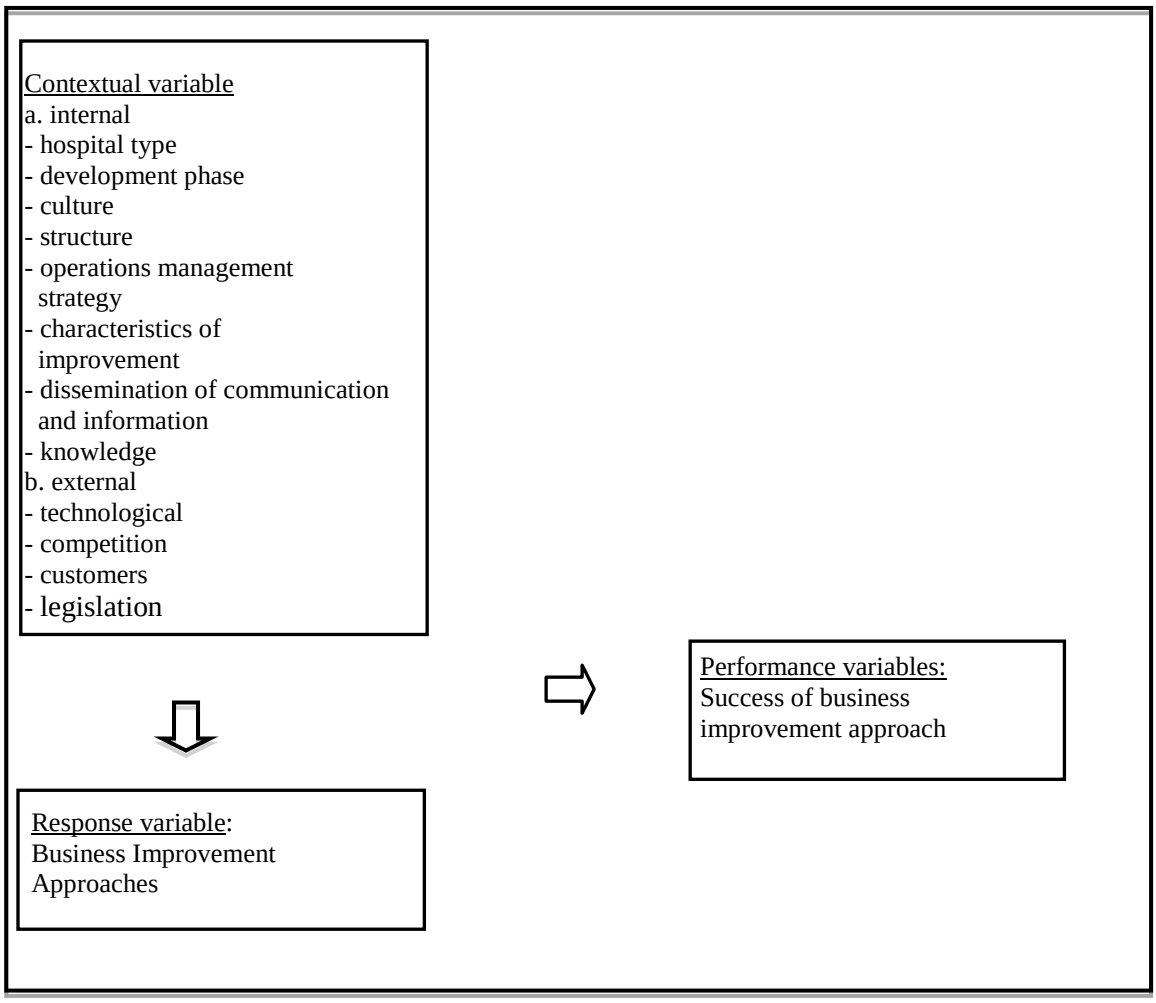
8.2 Overview of contextual variables

This paragraph will answer the first research question:

Which variables that possibly influence the response and performance variables of business improvement approaches in hospitals are known in the literature and which ones will be included in this research and how could the selected variables influence the response and performance variables based on the literature?

The results of the literature research in chapter five and six can be summarized in the following model, based on the model of Sousa and Voss (2008).

Model 8.1 Model of variables influencing the success of a particular business improvement approach



Model 8.1 presents the three building blocks of this research: contextual variables, response variable and performance variable. In this research the contextual variables hospital type, operations management strategy, dissemination of knowledge and information has been further explored. The variables have been selected based on the extent to which there is an opportunity to examine the variable in the context of the research, the extent to which the hospital or the manager could influence the variable and the extent tot which earlier research has examined the variable. The response variable is in this research the choice for a specific business improvement approach indicated as priority and the performance variable is the success of the use of the chosen business improvement approach. The use of an approach is succesfull when a hospital achieves the objectives of the hospitals.

8.3Hospital type

This paragraph will answer the following research question (2a):

What are the trends in hospital types and the response and performance variables of business improvement approaches?

In the research three types of hospitals have been included; university hospitals (UMC's), general hospitals and top clinical hospitals. The results show that general hospitals have been using a wider range of approaches, compared to the other types of hospitals. In all three hospital types, care pathways is the most used approach. It seems that in general the approaches that are harder to use, because they require more knowledge or are harder to implement, are more often used or only used in general hospitals, compared to UMC's and top clinical hospitals. It could be possible that general hospital use a wider range of business improvement approaches, because they are more influenced by the changes in the Dutch health care and the more competitive environment.

The results show that the evaluation of the use of the business improvement approach differ per hospital type. It is remarkable that university hospitals never evaluate the results above objectives for efficiency, timely, financial and effectiveness. Top clinical and general hospital evaluated more similar compared to the average of the different hospital types. General hospitals have scored every quality aspect more times above/similar to objectives than below objectives. This contradicts the statement of Shortell et al. (2004), who concluded that larger size hospitals have more difficulties in creating a culture that that supports quality improvements and developing an improvement approach that encourages flexible implementation. Top clinical hospitals have scored more often below objectives, except for effectiveness also equally scored on similar to/above objectives and below objectives. The negative outcomes of the evaluation reinforce the conclusion of Fok et al. (2003) that health-care managers and executives are still struggling to cope with the challenges in the health care industry.

Whether the four quality aspects are evaluated differs per hospital type. It is striking that university hospitals (UMC's) more often indicate that the aspects are not evaluated.
The differences in the results in whether the four quality aspects are evaluated as in how they are evaluated reinforce the argument that the publications of the results by of university hospitals provide a distorted view of the use and the success of business improvement approaches in the Dutch hospitals. The results show that there are many differences in the evaluation of the four quality aspects (efficiency, timely, financial and effectiveness); whether they are evaluated and how they are evaluated compared to the objectives of the hospitals per hospital type. University hospitals evaluate

the aspects less frequently, compared to the other hospital types and the university hospitals evaluate the different aspects in relation to the objectives of the hospitals more often inferior compared to the other hospital types. Therefore the publications of the results of the business improvement approaches in university hospitals are not representative for all the Dutch hospitals. .

8.4 Maturity phase

This paragraph will answer the following research question (2b):

What are the trends in development maturity phase of the hospital and the response and performance variables of business improvement approaches?

The results concerning the maturity phase of the hospitals reinforce the opinion of the relative young field of the use of business improvement approaches in hospitals. Based on the five phases model of EFQM, the majority of the hospitals are in phase two, the process-oriented phase. No one indicated their hospital as being in phase five (transformation oriented) and only one hospital indicated their hospital in phase 4 (chain oriented). This could also indicate the relative young field of the use of business improvement approaches in Dutch hospitals. The results of the relatively little experience of the hospitals corresponds to the little individual experience. In the differences in the individual experience, it is remarkable that the results show that 12 respondents have less than a year of experience on the job while they have more experience in their total individual experience. This could indicate that hospitals attract people with more experience. However the results also show that there are a lot of respondents that are a shorter amount of years on the job compared to the existence of the function in the hospital (while the functions in the hospitals are only existing for a short aount of time). This could indicate that people might not remain long in the same function and rapidly change and therefore knowledge may be lost. The lack of distribution of scientific and experience knowledge could cause problems in the future (Schrijvers et al., 2003).

The results of the use of business improvement approaches per development phase show that in all phases care pathways remains the most frequent used approach. This could indicate that the approach is relatively easy to apply and not a lot of experience of knowledge is required. It could raise the question why the approach has not been applied in more hospitals. In phases two and three, there is a wide variety of used approaches (indicated as priority). Focus factories has only been used in a hospital in phase two and operations research has only been used in a hospital in phase three. This could indicate that it are relatively more complicated approaches or are harder to apply. The results of the experience and the use of business improvement approaches show that most of the hospitals have

one to five years of experiences with the approaches. This corresponds to the results of the development phases and the fact that the use of business improvement approach in hospitals is a relatively new field.

The results of the development phases and the evaluation of the quality aspects show that proportionally in phase one, efficiency is more often not evaluated. In phase two and phase three, efficiency is proportionally more often evaluated compared to phase one. This could indicate that when hospitals have more expierence the focus of the use of business improvement shifts to efficiency. The four quality aspects are never evaluated above objectives in phase one, while the aspects score relatively better in phase three compared to the other phases. It seems like the development of the hospital could influence the success of the use of approaches. However the results show that if the experience with an approach is less than a year the different quality aspects are often rated similar to objectives, except for financial. If a hospital has one to five years of experience efficiency, timely and financial are mostly rated below objectives and effectiveness is mostly rated below objectives. This is contradicting to the earlier findings of the development phase. It evens seems that the hospitals with less than a year of experience have better results. The results show that with the exception of effectiveness more hospitals have scored the quality aspects above objectives when they have less than a year of experience, compared to one to five years of experience. Corresponding to the comparing of years of experience and the respondents that have indicated the quality aspects similar to objectives; more hospitals have scored the quality aspects similar to objectives when they have less than a year of experience, compared to one to five years of experience, expect for financial. Meanwhile more hospitals have scored the different quality aspects below objectives when they have one to five years of experience, compared to less than a year of experience. At last more hospitals have not evaluated to different quality aspects when they have less than a year of experience, compared to one to five years of experience, with the exception efficiency. The results show that is it difficult to determine trends in the maturity phase, the ‘readiness’ of the hospital, and the success of the use of the business improvement approaches, contradicting the statements of Sousa and Voss (2008) it therefore does not correspond with the statements of the research of Olson et al. (2008) who emphasize on the influence of the stage of development.

8.5 Operations management strategy

This paragraph will answer the following research question (2c)

What are the trends in operations management strategy and the response and performance variables of business improvement approaches?

The results show that the priorities of the four quality aspects are divided. Overall timely has most often been indicated as highest priority and as second highest priority, the second lowest priority is most often efficiency or financial and the lowest priority is most of the times the financial aspect. The fact that timely is most often rated as a high priority corresponds to the fact that care pathays is the most used approach. Based on the changes in the Dutch Health care and the pressure to cut costs, (Schut, Wynand, van de Ven, 2005;Care Institutions Quality Act, 1996) a higher priority of financial could be expected.
There are no striking differences between the priority of the quality aspects and the use of approaches. Overall care pathways is still the most used business improvement approach. However when financial has been indicated as second highest priority, total quality management and business process reengineering are more often used than other approaches, including care pathways.
No trends could be determined in the operations management strategy and the success of the business improvement approaches.

8.6 Dissemination of knowledge and information

This paragraph will answer the following research question (2d):

What are the trends in the dissemination of knowledge and information and the success of the response and performance variables of business improvement approaches?

The results show that most of the information is standard available. A difference could be indentified in the availability of information and the kind of information: ‘Waiting time’ and ‘capacity use’, are mostly indicated as standard available, while ‘flow’ is more often indicated as difficult to consult. This could be explained by the fact that information about the flow in hospitals could be more difficult to measure. However the information could be important in order to improve the different processes.
Most of the hospitals use external parties and if they use external parties most of the time commercial institutions are used. The results show that more business improvement approaches are used if an external party has been included. However lean management and total quality management are more

often used when there was no external party included. The use of external parties could be explained by the lack of experience and knowledge of the hospital about business improvement approaches.

The results of the use of educations program show that most of the hospitals have an education program, however who participates in the program differs. The professionals are more often not included in the program, which could be logical when the program consists of more process management training for improving the business processes. On the other hand it remains important to involve all the employees in order to improve the total business operations processes. Schrijvers (2002) emphasize on the importance of enough educational programs about the innovations for the professionals. Greenhalgh et al. (2004) have described that in order to increase the performance objectives, human resource management and training should be involved.
The results show that business improvement approaches are being applied in hospitals where education programs have been applied, except for lean management and business process reengineering. Especially the last one could raise some question, because it is a radical approach which requires a lot of knowledge, however it could be possible that more external parties have been included instead of applying an education program to train employees. The results of this research are consistent with earlier finding of Consortium (2004) and Sluijs & Wagner (2000) who emphasize that not enough process has been made with the spread of knowledge of best practice.

No trends could be determined in the dissemination of knowledge and information and the success of the business improvement approaches and therefore the statements of Schrijvers et al. (2003) about the lack of distribution of scientific and experience knowledge could cause problems, can not be confirmed. However the hospitals should guard the lack of distribution of scientific and experience knowledge, presented in the results, to prevent future problems.

8.7 Limitations and implications further research

The most important limitation of this research remains the use of the different business improvement approaches. Despite the made efforts for the first study with the literature research, the expert-meetings and the pilots, it remains difficult to distinct the different business improvement approaches. In the current literature there are many descriptions and definitions of business improvement approaches (mostly in the commercial field), however they rarely are compared to each other and there are no guidelines about how the distinct the different approaches. For this research the opinions could differ about which business improvement approaches to compare or select. For example the use of care pathways or focus factories could raise the question whether they should belong to business improvement approaches or not.

Another limitation of the research is the number of respondents per hospital. The answers of one manager per hospital are included in the dataset. The choice for one manager has been made in order to collect as many information of different hospitals instead of one hospital, following the research of Yasin et al. (2002). This research is a first exploration of the field and therefore the perception of the manager is important and the answers of managers of different hospitals are more interesting than the answers of different managers at one hospital. There is tried to reach the right manager per hospital, who has insight in the (change) process, the strategies and choices and the implementation-process. Therefore the manager should have a lot of information about the process and what is going on, however the answers of one manager could be very subjective and it is possible that the answers are not representative for the whole hospital. It could be interesting for further research to examine the answers of the managers of one hospital in order to compare the answers and to provide a more representative view of the hospitals.
Thereby is the total number of respondents to small in order to examinine different influences and relations between the variables. Because of the enormous amount of data of the different constructs and the many reponse options it was hard to explore trends and therefore it hard to form an opinion about the different contingency variables. The different constructs of the survey could provide some discussion. However the design of the study has ben chosen consciously in order to collect as much interesting data as possible, being a first exploration of the field. The results provide many opportunities for next research.

Another field for further research could be the success of the business improvements. The results of this research show that most of the quality aspects are evaluated below the objectives of the hospitals. It would be interesting to examine why they are evaluated below objectives. Did the hospitals apply the business improvement approaches in the wrong way or were the demands too high?

8.8 Implications for hospitals

Because this is a first step in exploring the field of the use of business improvement approaches in Dutch hospitals, it is difficult to provide practical recommendations for Dutch hospitals based on this research. Further research into the use of these approaches should provide more understanding of the different contingency variables in the use of the business improvement approaches in (Dutch) hospitals. Though the results show some interesting insights that could have implications for hospitals. The results show that there is a long way to go for the hospitals in the relatively young field of the use of business improvement approaches in the hospitals. The results seem to be consistent with the

statement of Fok et al. (2003); were is stated that health-care managers and executives are struggling to cope with the challenges in the health care industry. The results confirm that the use of business improvement approaches in hospitals is relatively new, therefore hospitals need to gain more experience with the use of those approaches. In order to make the right choice for a particular business improvement approach and to implement to approach in the right manner, it is important to have standard access to different sets of information. The results shows that most of the information only about 50% of the hospitals is standard available, here are a lot of chances for improvement in hospitals. The results also show possible loss of knowledge. It is very important for an organization to maintain a certain level of knowledge. The research indicates that it seems hospitals attract people with more experience, which in itself is good for the organzation, however the results also show that the managers might not remain in the same function for a long period of time and therefore knowledge may be lost. A first step to improve the use of business improvement approaches it is very important to make use of the resources that are already in the organization; to recognize knowledge and experience, to involve the employees and to train the different stakeholders. A next step should be to collaborate together with other organizations to work together. Other organizations include external parties, like research centres and commercial institutions in order to attract more knowledge and experience. As well as working together with other hospitals in order to share knowledge and experience and collaborate together to improve the processes. The results show that there are differences between the different types of hospitals in use of approaches and the success of approaches. This only strengthens the idea that there are a lot of opportunities to learn a lot from each other in the use of business improvement approaches.

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Appendices

Appendix A - Business improvement Approaches

The following approaches will be described; Total Quality Management, Business process re-engineering, Operations research, Lean management, Six sigma, Lean sigma, Theory of constraints, Benchmarking, Collaborative improvement and Focused factories. Rhe business improvement approaches are selected, based on the most common used business improvement approaches in hospitals in the literature, validated by expert-meetings.

Total Quality Management (TQM)

Definition:

Total Quality Management is an approach to improve the effectiveness and flexibility of organizations as a whole. It is essentially a way of organizing and involving the whole organization: every department, every activity, and every single person at every level. For an organization to be truly effective, each part of it must work properly together, recognizing that every person and every activity affects and in turn is effected by others' (Egan, 1995).

'TQM is an approach for ridding people's lives of wasted effort by involving everyone in the processes of improvement; improving the effectiveness of work so that the results are achieved in less time' (Oakland, 1989). The methods and techniques used in TQM can be applied throughout the organization. They are equally useful to finance, sales, marketing, distribution, development, manufacturing, public relations, personnel, to every one of a company's activities' (Oakland, 1989).

Characteristic:

Prevention of errors

Cause and effect relations

Organization as whole involved

Business process re-engineering (BPR)

Definition: Business process re-engineering is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed (Hammer, 1990).

Early consultants prescribed business process re-engineering as 'principles' that demanded radical change. BPR projects typically include attempts to transform the organizational subsystems of management (style, values, measures), people (job, skills, culture), information technology, and organizational structures, including team and coordination mechanisms. The goal of process

transformation is improved process products and services measured in terms of cost, quality, customer satisfaction or shareholder value (Kettinger, Teng, Guha, 1997).

Characteristic:
Fundamental/radical (process) re-engineering
Measurements of performance

Operations Research (OR)

Definition: Operations research is 'a scientific approach of providing executive departments with a quantitative basis for decisions regarding the operations under their control' (Morse & Kimball, 2003). Operations research uses tools like simulation, queuing theory and mathematical modelling to study the effects of changes of to optimize the system's performance (Harling, 1958). Operations Research is an approach that provides information about the different opportunities, though the approach does not provide information about the design of the implementation-process.

Characteristics:
Calculating of different alternates
Input for decision makers

Lean management (LM)

Definition: 'Lean production is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer and internal variability' (Shah and Ward, 2007).
Lean thinking is described as a philosophy to organise processes (Womack, 2003). Lean thinking investigates the potential to remove non- value adding activities from the process. It is a data driven approach, which respond to the requirements of the 'customer' (Smith, Rhines, Crowley, 2006). Important properties of lean thinking according to Womack and Jones are: correctly specify value so you are providing what the customer actually wants, identify the value stream for each product family and remove the wasted steps that don't create value but do create waste, make the remaining value-creating steps flow continuously to drastically shorten throughput times, allow the customer to pull value from your rapid- response value streams as needed (rather than pushing products toward the customer on the basis of forecasts)

Characteristics:
Eliminate waste
Value stream mapping (each activity must add value for patient)
Flow (service delivery without stoppages or backflows)

Pull (deliver when it is needed)
Perfection

Six sigma (SS)

Definition: Six Sigma stands for Six Standard Deviations from mean**.** Six Sigma attempts to improve the activities that must be done (Smith et al. 2006). **'**Six Sigma methodologies provide the techniques and tools to improve the capability and reduce the defects in any process' (Koning 2006.). Six Sigma methodologies improve business processes by constantly reviewing and re-tuning the process. To achieve this, Six Sigma uses a methodology known as DMAIC (Define opportunities, Measure performance, Analyze opportunity, Improve performance, Control performance) (Ehrlich, 2002; Sewing et al, 2008). 'Six Sigma relies heavily on statistical techniques to reduce defects and measure quality' (Koning 2006).
'Six sigma is an organized, parallell-meso structure to reduce variation in organizational processes by using improvement specialists, a structured approach, and performance metrics with the aim of achieving strategic objectives'. 'Six Sigma is an integrate approach for pursuing continuous improvement of customer satisfaction as well as organizational profits' (Schoeder et al., 2008).

Characteristics:
Reduce variation
Using improvement specialists (on different levels)
Well-structured approach (DMAI)

Lean Six Sigma (LSS)

Definition: Lean Six Sigma is a combination of Lean Management and Six Sigma. 'Lean Six Sigma is a approach that maximizes shareholder value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed, and invested capital' (George, 2002). Lean Six Sigma eliminates defects, addresses variation, and requires data-driven decisions (George, 2003).
The fusion of lean and six sigma is required because: lean cannot bring a process under statistical control and six sigma alone cannot dramatically improve process speed or reduce invested capital (George, 2002). The combination is even more powerful because Six Sigma offers a complete quality improvement program and Lean tools can be integrated neatly within this' (van den Heuvel, Hoes and Koning 2006)

Characteristics:
Combination lean management and six sigma
Eliminate waste

Value stream mapping (each activity must add value for patient)
Flow (service delivery without stoppages or backflows)
Pull (deliver when it is needed)
Perfection
Reduce variation
Using improvement specialists (on different levels)
Well-structured approach (DMAI)

Theory of Constraints (TOC)

Definition: 'Theory of constraints (TOC**)** is a management approach that emphasizes the importance of managing constraints. A constraint or bottleneck limited throughput and thus negatively affected plant productivity and efficiency (Pegels and Watrous, 2005)**.** Study of constraints or bottlenecks, keeping their record and taking necessary steps to improve them is also known as bottleneck capacity. The TOC process seeks to identify the constraint and restructure the rest of the organization around it, through the use of the focusing steps' (Goldratt, 1997).

Characteristics:
Identifying specialist (on different levels)
Value stream mapping (each activity must add value for the patient)

Care pathways (CP)

Definition: 'Integrated care pathways are structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem. They have been proposed as a way of encouraging the translation of national guidelines into local protocols and their subsequent application to clinical practice. They are also a means of improving systematic collection and abstraction of clinical data for audit and of promoting change in practice' (Campbell, Hotchkiss, Bradshaw, Porteous, 1998).

Characteristics:
Information of treatment needed (medical clinical)
Multidisciplinary project teams
Patient Pathways (subject)

Benchmarking (BM)

Definition: Benchmarking in the healthcare sector is defined by Gift & Mosel (1994) as following: 'benchmarking is the continual and collaborative discipline of measuring and comparing the results of key work processes with those of the best performer'. It is learning how to adapt these best practices to

achieve breakthrough process improvements and build healthier communities". (Camp, 1995; Gift, Mosel, 1994) At the company level, benchmarking is helpful for identifying the critical success factors that set the most successful firms apart from their competitors (Cooper, Kleinschmidt, 1995)
Bogan and English (1994) describe that benchmarking is the systematic process of searching for best practices, innovative ideas and highly effective operating procedures that lead to superior performance.

Characteristics:
Best practices
Multiple organizations
Comparing and copying (other organizations)

Collaborative Improvement (CI)

Definition:' A collaborative brings together groups of practitioners from different healthcare organizations to work in a structured way to improve one aspect of the quality of their service. It involves them in a series of meetings to learn about best practices in the area chosen, about quality methods and change ideas, and to share their experiences of making changes in their own local setting' (Øvretveit et al. 2002 in Duckers, 2009).
Collaborative improvement brings diverse organizations together in order to learn and improve It codifies existing knowledge from disparate sources and employs that knowledge in demonstrable improvement (Kilo, 1998).

Characteristics:
Multiple organizations
Best practices
Collaborating (with multiple organizations)

Focused Factories (FF)

Definition: Skinner (1974) described the focused factory as one which: Can become a competitive weapon because its entire apparatus is focused to accomplish the particular manufacturing task demanded by the company's overall strategy and marketing perspective. A key step in devising policies for a multifacility organization is choosing how to specialize or focus each facility.
Herzlinger (1997) defines the focused factory as following: A focused factory is thus characterized by a multidisciplinary group of people who work together to achieve a clear, limited objective. The team members are guided by thoughtful operating procedures and continually monitor their success in achieving their objectives, using objective, quantitative measures. The large volume of work performed in a focused factory, the harmony and fluidity achieved by its team members, and the

attention paid to improving the operational processes result in continual process refinements, quality improvements, and cost reductions.

Characteristics:

Multidisciplinary project teams

Special focus on patient/process/services

Appendix B – Survey (in Dutch)

Enquête naar het gebruik van procesverbetering op het gebied van logistiek in de zorg in de zorg.

I Demografische gegevens

In dit onderdeel wordt gevraagd naar een aantal achtergrondgegevens.

1. Wat is de naam van uw ziekenhuis?

   …….. (invullen)
2. Welke functie bekleedt u binnen het ziekenhuis?

   …….. (invullen)
3. Op welk organisatieniveau is uw functie? (aankruizen)

	ziekenhuisbreed
	divisie
	afdeling

II Ontwikkeling en ervaring methodieken

In dit onderdeel wordt gevraagd naar de ontwikkeling van het ziekenhuis en naar de ervaring met de verschillende operations management technieken op het gebied van efficiency en (patiënten)logistiek.

4. Hoe zou u de wijze waarop het ziekenhuis de afgelopen 2 jaar met procesverbetering bezig geweest is, karakteriseren uit de volgende lijst?

   Geef in de volgende tabel aan of het ziekenhuis een bepaalde methode heeft gebruikt (meerdere antwoorden mogelijk).
   Geef hierbij aan bij welke methode de prioriteit/voorkeur heeft gelegen de afgelopen twee jaar, door het vakje prioriteit aan te vinden. Hierbij mag u maximaal 1 keer prioriteit aanvinden.
   Definities van de verschillende methodieken staan in bijlage I.

	Gebruikt	Prioriteit
Total Quality Management		
Business Process re-engineering		
Operations Research		
Lean Management		
Six Sigma		
Lean Six Sigma		
Theory of Constraints (TOC)		
Care Pathways/Zorgpad/Zorgprogramma		
Benchmarking		

Collaborative Improvement (doorbraakprojecten)		
Focused Factories		

Ruimte voor opmerkingen:

……

5. In weke fase plaatst u uw ziekenhuis, vooral kijkend naar logistieke zorgprojecten? (aanvinken)
   De omschrijvingen van de verschillende fasen, bevinden zich in bijlage II.

	Fase 1 Activiteit georiënteerd
	Fase 2 Proces georiënteerd
	Fase 3 Systeem georiënteerd
	Fase 4 Keten georiënteerd
	Fase 5 Totale zorg voor kwaliteit

<u>Nu volgen een aantal vragen over de methode waar de prioriteit lig, eerst op organisatieniveau, vervolgens op afdelings/divisieniveau en ten slotte op individueel niveau.</u>

<u>Eerst volgen een aantal vragen op organisatieniveau.</u>

6. Wat was de doelstelling van de gebruikte methode in volgorde van prioriteit? Vul achter de volgende elementen de getallen 1 tot 4 in, met 1 als hoogste prioriteit en 4 als laagste prioriteit.

Efficiency (bezettingsgraad/benuttingsgraad)	
Tijdige behandeling (verkorten van toegangstijden, wachttijden, doorlooptijden)	
Financieel (kosten, meer inkomsten/marktaandeel)	
Effectiviteit van de zorg (bijvoorbeeld zorgpaden)	

7. Op welk organisatieniveau wordt de methode gebruikt?
   Ziekenhuisbreed/meerdere divisies/ 1 divisie/ meerdere afdelingen/ 1 afdeling / ik weet alleen van het onderdeel waar ik zelf werkzaam ben (kiezen)
8. Op welke wijze is de afgelopen twee jaar de methode toegepast?
   pilotprojecten (is het wat voor het ziekenhuis)/ projectmatig / structureel
9. Hoe lang gebruikt het ziekenhuis deze methode?
   korter dan 1 jaar – 1 tot 5 jaar – 6 tot 10 jaar – langer dan 10 jaar (kiezen)
10. Hoe lang bestaat uw functie al binnen dit ziekenhuis?*)*
    korter dan 1 jaar – 1 tot 5 jaar – 6 tot 10 jaar – langer dan 10 jaar (kiezen)

Nu volgen een aantal vragen op afdelings/divisieniveau.

11. Hoe lang gebruikt uw afdeling/divisie deze methode? *(kiezen)*
    korter dan 1 jaar – 1 tot 5 jaar – 6 tot 10 jaar – langer dan 10 jaar (kiezen)
12. Is er aan meerdere projecten (met deze methode) meegedaan op uw afdeling/divisie?
    Niet eerder – 1 keer – 2 tot 5 keer – meer dan vijf keer (kiezen)

Nu volgen een aantal vragen op individueel niveau.

13. Hoe lang bekleedt u al deze functie in dit ziekenhuis?
    korter dan 1 jaar – 1 tot 5 jaar – 6 tot 10 jaar – langer dan 10 jaar (kiezen)
14. Hoeveel jaar ervaring heeft u met procesverbeteringsprojecten op het gebied van logistiek in de zorg in uw gehele arbeidsverleden?
    Geen ervaring – minder dan een jaar – 1 tot 5 jaar – meer dan vijf jaar ervaring (kiezen)

Gebruik van methode

15. Hoe zou u de manieren waarop het ziekenhuis bezig is met procesverbetering op het gebied van logistiek karakteriseren op de volgende punten: (eigenschappen aanvinken schaalverdeling: nooit – zelfden - soms – regelmatig - altijd) *(2 tabellen rij met prioriteit en rij welke gebruikt)*

    NB Er worden in de volgende tabel een aantal zeer specifieke tools en technieken gebruikt, indien u niet weet wat de tool of techniek inhoudt dient u deze niet aan te kruisen.

Er wordt gebruik gemaakt van een processchema of een procesbeschrijving
Er wordt onderscheid gemaakt tussen procesbeschrijving en value stream
Er wordt gebruik gemaakt van 5S
Is vooral gericht op het doorrekenen van de gevolgen van de veranderingen, voordat er een daadwerkelijke beslissing wordt gemaakt
Er wordt gebruik gemaakt van methoden om de oorzaak-gevolg relaties te analyseren? (ishikawa/visgraat, cuase & effects diagrams, 5 why, Pareto analyse……)
Niet waarde toevoegende activiteiten worden elimineerd
Met de methode wordt (geprobeerd) variatie in aangeboden capaciteit te beheersen (bijvoorbeeld het aantal aangeboden poli-spreekuren)
Met de methode wordt (geprobeerd) variatie in de zorgvraag te beheersen (het voorspellen van de vraag)
Met de methode wordt (geprobeerd) variatie in de duur van een verrichting (diagnostiek/behandeling) te beheersen (behandelduur + wachttijden) (process time variability)
Met de methode wordt (geprobeerd) variatie van het gehele zorgtraject of zorgpad te beheersen

(standaardisatie van de stappen van de behandeling)
Bij verbeteringsprojeten wordt gebruik gemaakt van control charts
De capaciteit van het beperkende process is bekend
Is vooral gericht op knelpunten (bottlenecks) te identificeren in het proces (line balancing) De bottleneck is kwantitatief onderbouwd
Het kritieke pad voor uw proces is of wordt berekend (PERT/CPM/critical path analysis)
Er wordt gebruik gemaakt van Drum-Buffer-Rope of Simplified Drum-Buffer-Rope principes om de bottlenecks in uw proces te indentificeren en op te heffen
Er wordt bij het verbeteren gebruik gemaakt van (een van) de volgende modellen: Decision trees, multivariate analysis, optimisation techniques, petri nets, queueing theory, survival analysis
Er wordt bij het verbeteren gebruik gemaakt van (een van) de volgende typen simulatie: agent based simulation, discrete event simulation, gaming simulation, hybrid simulation, inverse simulation, monte carlo simulation, real time simulation, system dynamics
De prestaties worden gemeten en vergeleken (outcome en input) door samen te werken met meerdere organisaties om verbetermogelijkheden te identificeren.
Er wordt gekeken naar de onderliggende processen bij het meten en vergelijken van prestaties door samen te werken met meerdere organisaties om verbetermogelijkheden te identificeren.
Diverse organisaties komen bij elkaar om samen te beoordelen wat de best-practices zijn op logistiek gebied.
Er wordt gebruik gemaakt van DEA-analyse
Het ziekenhuis heeft een keuze gemaakt voor een bepaalde patiëntengroep of een bepaalde dienst. Voor keuze voor een bepaalde patiëntengroep of een bepaalde dienst worden aparte capaciteiten gereserveerd die niet voor andere doeleinden worden ingezet. In projecten in de afgelopen periode zijn soortgelijk behandeling bij elkaar gevoegd om bijvoorbeeld omsteltijden te kunnen verkorten (batch processing, variablitiy pooling)

IV Kennis

Nu volgen een aantal vragen over de kennis en beschikbare informatie binnen uw organisatie.

16. Is de volgende informatie standaard beschikbaar of is er extra informatie nodig?
    - wachttijden (toegangstijden)
    - doorlooptijden
    - bezettingsgraad (benuttingsgraad)

	Standaard beschikbaar	Makkelijk opvraagbaar	Moeilijk opvraagbaar	Weet ik niet
Wachttijden				
Doorlooptijden				

Benuttingsgraad				

17. Zijn er trainers dan wel consultants ingehuurd…..

	van een onderzoeks-centrum	van een commercieel bedrijf	nee
voor de analyse van het proces			
voor de implementatie van de methode			
voor de uitvoering van de methode			
om mensen intern op te leiden			

NB. Het is mogelijk dan consultants ondersteuning hebben verleend bij de invoering (de implementatie dan wel het uitrollen) van het project om vervolgens zelf verder te gaan met het project waarbij er geen externe partijen meer betrokken zijn.

18. Is er een intern opleidingsprogramma of een programma van kennisdeling op het gebied van logistieke procesverbetering?

	Kennisdeling eenmalig	Kennisdeling programma	Opleiding eenmalig	Opleiding programma	Geen opleiding/ kennisdeling
Leidinggevend personeel					
(zorg) Professionals					
Ondersteunend personeel					

Cultuur *ACHTERAF VERWIJDERD*

19. Bij de volgende statements moet u aangeven in hoeverre u het met de statement eens bent op de volgende schaal: Sterk mee eens – mee eens – neutraal – mee oneens – sterk mee oneens.

Er is veel informeel overleg
Er is een nauwe collegiale band tussen de artsen
Er is een sterk gevoel van verbondenheid met de groep
Wij zijn sterk afhankelijk van computer-based informatie bij patientenconsulten.
We hebben zeer goede methoden om ervoor te zorgen dat onze artsen in hun praktijken nieuwe technologieën

en onderzoeksresultaten betrekken
We moedigen de interne rapportage van ongewenste voorvallen patinent zorg (bijwerkingen)
Er is een open discussie over klinische fouten
Wij tevredenheid van de patiënt speelt een belangrijke rol
Het bedrijfskundige en administratieve kant van het ziekenhuis worden beschouwd als een zeer belangrijk onderdeel van ons ziekenhuis.
Wij verwachten te worden voorzien van informatie die helpt ons bij het verbeteren van de kosten-effectiviteit van onze patiëntenzorg (van administrators).
Er is brede consensus over de meeste morele en ethische kwesties.
Er treedt een snelle verandering op in de klinische praktijk bij onze artsen wanneer studies mogelijkheden aangeven om kwaliteit te verbeteren/ kosten te verlagen.
Bij de aanschaf van medische apparatuur zijn financiële overwegingen een belangrijke factor zijn.
Er wordt alleen een extra arts aangenomen indien hij / zij kosteneffectief is.
Onze compensatie plan beloont artsen die hard werken voor ons ziekenhuis.
Er is een hoge mate van vertrouwen in de beslissingen van de Raad van Bestuur.
Innovaties van onze medici worden gepubliceerd in hoogstaande wetenschappelijk tijdschriften.
Ons beleidsplan vermeldt innovatieve gezondheidszorg.
Er is een gevoel dat artsen autonoom zijn, maar de praktijk ondersteunende diensten voor het ziekenhuis levert.
De professionele autonomie van artsen is een belangrijke voorwaarde voor het kwaliteitssysteem van de gezondheidszorg

Evaluatie

20. Zijn de uitkomsten van de gebruikte methode positief voor uw ziekenhuis op het gebied van :

	Boven doelstelling	Gelijk aan doelstelling	Beneden doelstelling, maar positief	Beneden doelstelling, negatief	Niet geëvalueerd
Efficiency					
Tijdige behandeling					
Financieel					
Effectiviteit van de zorg					

21. Is er sprake geweest van een.. (bij de meest gebruikte methode)

	ja	nee
kwantitatieve evaluatie		
kwalitatieve evaluatie		
voormeting/nulmeting		
tussentijdse meting		

eenmalige nameting		
structerele (na)meting		
evaluatie eindresultaat		
evaluatie process		

22. Heeft u ergens resultaten gepubliceerd? Indien ja, waar heeft u deze resultaten gepubliceerd?

    Ja: Intern/extern wetenschappelijk/extern niet wetenschappelijk, namelijk in:….

    nee

BIJLAGE I SURVEY - Definitions of Operations Management Methods

Eleven business improvement approaches will be considered in this research. The eleven approaches are defined in the following table.

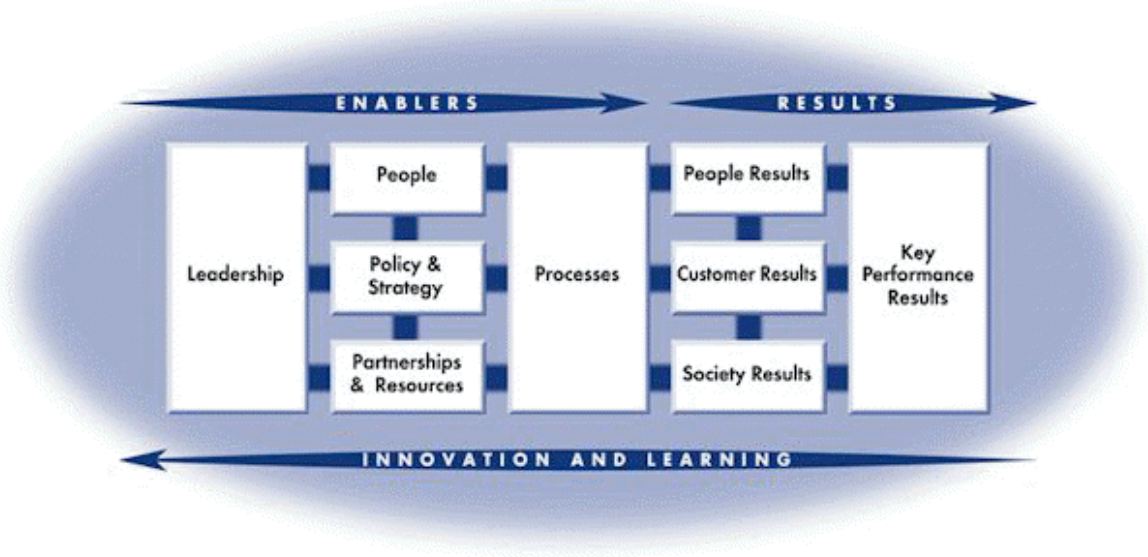
Business Improvement Approach	***Definition***
Total Quality Management	*TQM is a method for ridding people's lives of wasted effort by involving everyone in the processes of improvement; improving the effectiveness of work so that the results are achieved in less time. The methods and techniques used in TQM can be applied throughout the organization. They are equally useful to finance, sales, marketing, distribution, development, manufacturing, public relations, personnel, to every one of a company's activities (Oakland, 1989)*
Business Process Re-engineering	*BPR is defined as the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed (Hammer,1990)*
Operations Research	*Operations research is a scientific method of providing executive departments with a quantitative basis for decisions regarding the operations under their control (2).*
Lean Management	*Lean production is an integrated socio-technical system whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer and internal variability. (Shah, 2007).*
Six Sigma	*Six Sigma methodology provides the techniques and tools to improve the capability and reduce the defects in any process. Six Sigma methodology improves any existing business process by constantly reviewing and re-tuning the process. (koning 2006)*
Lean Sigma	*A combination of lean management and six sigma* *Lean six sigma is a methodoly that maximizes shareholder value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed, and invested capital.* (George, 2002)
Theory of Constraints	*Theory of constraints (TOC) is a management approach that emphasizes the importance of managing constraints. A constraint or bottleneck is any thing that prevents you from getting more of what you want..* (Goldratt, 1984)
Care Pathways	*Integrated care pathways are structured multidisciplinary care plans which detail essential steps in the care of patients with a specific clinical problem.* (Campbell, Hotchkiss, Bradshaw, Porteous, 1998)
Benchmarking	*One of these is benchmarking, which can be defined as 'the search for- and implementation of best practices'. (Camp, 1995; Mosel, 1994)*
Collaborative Improvement	*'A collaborative brings together groups of practitioners from different healthcare organizations to work in a structured way to improve one aspect of the quality of their service. (Øvretveit et al. 2002 in Duckers, 2009)*
Focused Factories	*Its entire apparatus is focused to accomplish the particular manufacturing task demanded by the company's overall strategy and marketing perspective* Skinner (1974)

BIJLAGE II SURVEY - INK MODEL

Overzicht van de vijf ontwikkelingsfasen

Fase I Activiteit georiënteerd	In een activiteit georiënteerde ziekenhuis ligt de nadruk op de afzonderlijke activiteiten. De werkzaamheden van de ziekenhuis worden bepaald door werkinstructies en huisregels of door individueel werkende professionals. Het resultaat van het proces staat centraal. Problemen worden opgelost nadat ze zijn ontstaan en op basis van klachten. De onderlinge afhankelijkheid tussen afdelingen, functies en onderdelen binnen de processen krijgt weinig aandacht.
Fase II Proces georiënteerd	In een proces georiënteerde ziekenhuis staan het voortbrengingsproces en de beheersing daarvan centraal. Op basis van metingen en kennis van processen vinden verbeteringen plaats. Taken, verantwoordelijkheden en bevoegdheden zijn helder geformuleerd.
Fase III Systeem georiënteerd	Ziekenhuis in deze fase richten zich op de totale ziekenhuis, inclusief de ondersteunende processen, en de beheersing daarvan. Beheersing van processen staat in het teken van interne en externe klantgerichtheid. Samenwerking tussen disciplines is vanzelfsprekend. Metingen in het gehele proces zijn gericht op het signaleren van trends en ontwikkelingen. Op basis van trends neemt de ziekenhuis preventieve maatregelen.
Fase IV Keten georiënteerd	Ziekenhuis in deze fase brengen beheersing van de totale ziekenhuis in relatie met (toe)leveranciers, klanten en andere belanghebbende partijen en partners in de keten. Kennis, ervaringen en capaciteiten in de voortbrengingsketen worden maximaal benut door systematische principes van zelfreflectie toe te passen. In samenwerking met genoemde partijen wordt een win-win situatie voor de hele keten gerealiseerd.
Fase V Totale zorg voor kwaliteit	Ziekenhuis zijn in deze fase erin geslaagd het proces van continue verbetering intern en extern te verankeren in alle lagen van de ziekenhuis. Op een consequente manier wordt in alle lagen van de ziekenhuis voortdurend gemeten of het gewenste resultaat bereikt is. Metingen in de hele keten zijn gebaseerd op voortdurende zelfreflectie en gericht op het signaleren van trends en ontwikkelingen. Daarbij kan de ziekenhuis de vergelijking met excellente ziekenhuis doorstaan. Op basis van trends neemt de ziekenhuis maatregelen ter preventie en verbetering met aantoonbare positieve resultaten. De ziekenhuis kan zich meten met de beste ziekenhuis in de markt, nationaal en internationaal. Het lange termijn beleid is gebaseerd op een brede maatschappelijke visie.

Appendix C – EFQM Excellence Model



Appendix D - Overview of the responses

Content	Number of respondents
Total number of Dutch hospitals	94
Number of managers approached	130
Total number of responses	83
Number of respondents declared no participation	4
Number of (started) filled out surveys	79
Number of unique respondents that filled out the surveys	52
Number of 'usable'* answers	45

** 'Usable answers': like described at the results in chapter 7, the respondents that answered question 4 are included in this research, because question 4 contains content information about the use of business improvement approaches.*

Question	*Completed*	*% Of total*	*% Of question 4*
1	52	100,0	-
2	52	100,0	-
3	52	100,0	-
4	45	86,5	100,0
5	44	84,6	97,8
6	43	82,7	95,5
7	43	82,7	95,5
8	43	82,7	95,5
9	39	75,0	86,7
10	41	78,8	91,1
11	41	78,8	91,1
12	40	76,9	88,9
13	39	75,0	86,7
14	41	78,8	91,1
15	37	71,1	82,2
16	36	69,2	80,0
17	36	69,2	80,0
18	36	69,2	80,0
19	34	65,4	75,6
20	34	65,4	75,6
21	35	67,3	77,8
22	35	67,3	77,8
Total	**52**	**100,0**	**100,0**

Appendix E – Overview job descriptions

	Frequency
	1
adviseur	2
Adviseur Kwaliteit & Organisatie	1
Adviseur logistiek	1
Afdelingshoofd Patiëntens	1
Bedrijfsleider	1
Beleidsmedewerker Logisti	1
Bestuursadviseur kwalitei	1
clustermanager	1
hoofd bedrijfsbureau	1
Hoofd Innovatie & Organis	1
hoofd patientenlogistiek	1
Hoofd specialismen orthop	1
Hoofd Zorglogistiek	2
KIV Manger	1
kwaliteitsfunctionaris	1
Lean Six Sigma Master Bla	1
magazijn beheerder	1
Manager Business Intellig	1
Manager goederenlogistiek	1
Manager Innovatie	1
Manager Kwaliteit en Veil	1
Manager Kwaliteit veiligh	1
Manager patientenlogistie	1
manager patiëntenlogistie	1
manager sectoren Zorglogi	1
Manager zorg en bedrijf	1
opname en patientenlogist	1
Organisatieadviseur	1
Planningscoördinator	1
Procesmanager Lean	1
Programma Manager Zorglog	1
Programmaleider BPR	1
Programmaleider expertise	1

Programmamanager	2
projectleider	1
projectmanager patiëntenl	1
Projectmanager Rvb	1
projectmedewerker	1
Sectormanager	1
senior adviseur concernst	1
Senior Adviseur Informati	1
Senior adviseur Patiëntlo	1
Stafadviseur & promovenda	1
Stafadvisuer	1
staffunctionaris patiente	1
Stafmedewerker procesverb	1
zorggroepmanager	1
Zorgmanager	1
zorgmanager patientenlogi	1
Total	53

Appendix F – Combinations of approaches indicated as priority

		TQM	BPR	OR	LM	LSS	TOC	CP	BM	CI	FF	Total	
TQM	N	5	1	0	0	0	0	0	2	1	0	0	**5**
	%	12,8	2,6	,0	,0	,0	,0	,0	5,1	2,6	,0	,0	**12,8**
BPR	N	1	5	1	1	0	1	1	1	3	1	1	**5**
	%	2,6	12,8	2,6	2,6	,0	2,6	2,6	2,6	7,7	2,6	2,6	**12,8**
OR	N	0	1	1	0	0	1	0	0	0	0	0	**1**
	%	,0	2,6	2,6	,0	,0	2,6	,0	,0	,0	,0	,0	**2,6**
LM	N	0	1	0	8	0	0	1	2	1	0	0	**8**
	%	,0	2,6	,0	20,5	,0	,0	2,6	5,1	2,6	,0	,0	**20,5**
SS	N	0	0	0	0	1	1	0	0	0	0	0	**1**
	%	,0	,0	,0	,0	2,6	2,6	,0	,0	,0	,0	,0	**2,6**
LSS	N	0	1	1	0	1	6	0	0	0	0	0	**6**
	%	,0	2,6	2,6	,0	2,6	15,4	,0	,0	,0	,0	,0	**15,4**
TOC	N	0	1	0	1	0	0	4	1	1	0	0	**4**
	%	,0	2,6	,0	2,6	,0	,0	10,3	2,6	2,6	,0	,0	**10,3**
CP	N	2	1	0	2	0	0	1	19	1	2	1	**19**
	%	5,1	2,6	,0	5,1	,0	,0	2,6	48,7	2,6	5,1	2,6	**48,7**
BM	N	1	3	0	1	0	0	1	1	4	1	1	**4**
	%	2,6	7,7	,0	2,6	,0	,0	2,6	2,6	10,3	2,6	2,6	**10,3**
CI	N	0	1	0	0	0	0	0	2	1	3	1	**3**
	%	,0	2,6	,0	,0	,0	,0	,0	5,1	2,6	7,7	2,6	**7,7**
FF	N	0	1	0	0	0	0	0	1	1	1	1	**1**
	%	,0	2,6	,0	,0	,0	,0	,0	2,6	2,6	2,6	2,6	**2,6**
Total	N	5	5	1	8	1	6	4	19	4	3	1	**39**
	%	**12,8**	**12,8**	**2,6**	**20,5**	**2,6**	**15,4**	**10,3**	**48,7**	**10,3**	**7,7**	**2,6**	**100**

Appendix G Operations management strategy and evaluation

Table G.1 Efficiency and evaluation

		Above objectives	Similar to objectives	Below objectives, but improving	Below objectives, no improving	Deterioration	Not evaluated	Total
Highest priority	**N**	1	3	3	1	0	0	**8**
	%	12,5	37,5	37,5	12,5	,0	,0	**100,0**
Second highest priority	**N**	2	3	4	0	0	0	**9**
	%	22,2	33,3	44,4	,0	,0	,0	**100,0**
Second lowest priority	**N**	1	4	2	0	0	1	**8**
	%	12,5	50,0	25,0	,0	,0	12,5	**100,0**
Lowest priority	**N**	0	2	4	0	0	3	**9**
	%	,0	22,2	44,4	,0	,0	33,3	**100,0**
Total	**N**	4	12	13	1	0	4	**34**
	%	**11,8**	**35,3**	**38,2**	**2,9**	**,0**	**11,8**	**100,0**

Table G.1 Timely and evaluation

		Above objectives	Similar to objectives	Below objectives, but improving	Below objectives, no improving	Deterioration	Not evaluated	Total
Highest priority	**N**	5	3	6	1	0	0	**15**
	%	33,3	20,0	40,0	6,7	,0	,0	**100,0**
Second highest priority	**N**	0	3	5	0	0	4	**12**
	%	,0	25,0	41,7	,0	,0	33,3	**100,0**
Second lowest priority	**N**	1	0	3	0	0	2	**6**
	%	16,7	,0	50,0	,0	,0	33,3	**100,0**
Lowest priority	**N**	0	1	0	0	0	0	**1**
	%	,0	100,0	,0	,0	,0	,0	**100,0**
Total	**N**	6	7	14	1	0	6	**34**
	%	**17,6**	**20,6**	**41,2**	**2,9**	**,0**	**17,6**	**100,0**

Table G.3 Financial and evaluation

		Above objectives	Similar to objectives	Below objectives, but improving	Below objectives, no improving	Deterioration	Not evaluated	Total
Highest priority	**N**	1	2	3	0	1	0	**7**
	%	14,3	28,6	42,9	,0	14,3	,0	**100,0**
Second highest priority	**N**	1	1	0	0	0	2	**4**
	%	25,0	25,0	,0	,0	,0	50,0	**100,0**
Second lowest priority	**N**	0	2	3	1	0	3	**9**
	%	,0	22,2	33,3	11,1	,0	33,3	**100,0**
Lowest priority	**N**	4	3	1	2	0	4	**14**
	%	28,6	21,4	7,1	14,3	,0	28,6	**100,0**
Total	**N**	6	8	7	3	1	9	**34**
	%	**17,6**	**23,5**	**20,6**	**8,8**	**2,9**	**26,5**	**100,0**

Table G.4 Effectiveness and evaluation

		Above objectives	Similar to objectives	Below objectives, but improving	Below objectives, no improving	Deterioration	Not evaluated	Total
Highest priority	**N**	2	4	0	0	0	2	**8**
	%	25,0	50,0	,0	,0	,0	25,0	**100,0**
Second highest priority	**N**	2	1	1	2	0	2	**8**
	%	25,0	12,5	12,5	25,0	,0	25,0	**100,0**
Second lowest priority	**N**	1	4	3	0	0	2	**10**
	%	10,0	40,0	30,0	,0	,0	20,0	**100,0**
Lowest priority	**N**	0	3	1	0	0	4	**8**
	%	,0	37,5	12,5	,0	,0	50,0	**100,0**
Total	**N**	5	12	5	2	0	10	**34**
	%	**14,7**	**35,3**	**14,7**	**5,9**	**,0**	**29,4**	**100,0**

Appendix H - Use of external parties and used approaches

			TQM	BPR	OR	LM	SSS	LSS	TOC	CP	BM	CI	FF	Total
Analysis	Research Center	N	0	1	0	0	1	1	0	2	0	0	0	**5**
		%	,0	20,0	,0	,0	20,0	20,0	,0	40,0	,0	,0	,0	**100,0**
	Commercial	N	1	3	1	4	0	3	3	10	2	1	1	**29**
		%	3,4	10,3	3,4	13,8	,0	10,3	10,3	34,5	6,9	3,4	3,4	**100,0**
	No use of external parties	N	2	0	0	4	0	2	0	5	1	1	0	**15**
		%	13,3	,0	,0	26,7	,0	13,3	,0	33,3	6,7	6,7	,0	**100,0**
	Total	N	3	4	1	8	1	6	3	17	3	2	1	**49**
Implementation	Research Center	N	0	0	0	0	0	0	0	2	0	0	0	**2**
		%	,0	,0	,0	,0	,0	,0	,0	100,0	,0	,0	,0	**100,0**
	Commercial	N	1	2	1	3	0	3	2	7	2	1	1	**23**
		%	4,3	8,7	4,3	13,0	,0	13,0	8,7	30,4	8,7	4,3	4,3	**100,0**
	No use of external parties	N	2	2	0	5	1	3	1	8	1	1	0	**24**
		%	8,3	8,3	,0	20,8	4,2	12,5	4,2	33,3	4,2	4,2	,0	**100,0**
	Total	N	3	4	1	8	1	6	3	17	3	2	1	**49**
Execution	Research Center	N	0	0	0	1	0	0	0	1	0	0	0	**2**
		%	,0	,0	,0	50,0	,0	,0	,0	50,0	,0	,0	,0	**100,0**
	Commercial	N	0	1	0	2	0	2	1	3	1	1	1	**12**
		%	,0	8,3	,0	16,7	,0	16,7	8,3	25,0	8,3	8,3	8,3	**100,0**
	No use of external parties	N	3	3	1	5	1	4	2	13	2	1	0	**35**
		%	8,6	8,6	2,9	14,3	2,9	11,4	5,7	37,1	5,7	2,9	,0	**100,0**
	Total	N	3	4	1	8	1	6	3	17	3	2	1	**49**
Education	Research Center	N	0	0	0	0	1	2	0	3	0	0	0	**6**
		%	,0	,0	,0	,0	16,7	33,3	,0	50,0	,0	,0	,0	**100,0**

Commercial	N	2	1	0	5	0	3	2	9	1	1	1	**25**
	%	8,0	4,0	,0	20,0	,0	12,0	8,0	36,0	4,0	4,0	4,0	**100,0**
No use of external parties	N	1	3	1	3	0	1	1	5	2	1	0	**18**
	%	5,6	16,7	5,6	16,7	,0	5,6	5,6	27,8	11,1	5,6	,0	**100,0**
Total	**N**	**3**	**4**	**1**	**8**	**1**	**6**	**3**	**17**	**3**	**2**	**1**	**49**