ONE STEP CLOSER TO LEAN

THE IMPLEMENTATION OF KR8 AT WATER MANAGEMENT CENTRE THE NETHERLANDS

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Master thesis

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Deltares
Enabling Delta Life

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SUMMARY

Background

This thesis concerns the role of Lean Management and organisation factors in crisis management in Water Management Centre the Netherlands (WMCN). KR8, which is based on Lean Management, is being implemented since 1st of January 2012 to optimise the processes of WMCN. Lean originates from a production philosophy invented by Toyota and is focused on the activities which have value for the 'product'. The motivation of this research is that WMCN stated that their organisation lacks a structure to total quality management (TQM) within their organisation in times of crisis. In addition, WMCN mentioned that they wanted to be a reliable partner within their network and advise to improve their level of quality.

Goal

This master thesis analyses the (potential) implementation gap issues of KR8 within WMCN. This analysis is done by examining the characteristics of the KR8-model and organisational factors which could hinder the implementation of a quality model.

Method

Three different methods have been used to conduct this research. First of all, a scientific literature review is done to evaluate four different quality models (Lean, KO-model, Six Sigma and ISO9000) and to compare them with each other. This method is also used to find the organisational factors that could hinder the process of implementing Lean effectively. The second method concerns qualitative research. The degree of implementation is determined using interviews, based on the theory of Lean Management for governmental organisation (Huguenin, Binnerts & van Gestel, 2011). As a third method, a survey has been used as a quantitative research method. The survey aims to retrieve data which could indentify factors which are responsible for the delay of the implementation. For the comparison between WMCN and two other organisations (KNMI and Water Board Rivierenland) an interview and survey are used for the KNMI and only the survey for the Water Board Rivierenland.

Results

The interviews showed that there are good intentions for implementing Lean, but that the implementation of Lean is quite low. This could be explained by the fact that KR8 is implemented since January 2012. However, the results of the survey showed that a successful implementation of Lean can be achieved by looking at four aspects: the personal, groups, organisation level and by looking at barriers. The criteria which scored extreme were: lack of support from (top) management, the way of communication is not set right and there is a lack of understanding of the concepts of Lean. The interview at KNMI showed a strong focus on customers and the good relationship between management and work floor. The survey at the KNMI showed the same results. This good evaluation in regard to leadership is also shown in the results of the survey at Water Board Rivierenland.

Conclusion

The main bottlenecks at WMCN in regard to a good quality system are:

- Although a start is made to put more effort in customers relations and support, this is should be increased.
- Within the organisation there should be more cooperation between the different groups. WMCN should act more as one organisation. This is necessary to bond the employees, but also for the corporate image.
- Lack of communication between management and employees. This is not only desirable for the management so that they know what happens on the work floor, but for the employees as well.
- Employees do not understand the meaning of KR8/Lean.

PREFACE

This master thesis is the result of my graduation project at Deltares and Water Management Centre the Netherlands, done in completion of my master track Policy and Governance from Public Administration at the University of Twente. The subject of this thesis is about Lean Management and critical organisation factors which could hinder the process of implementation.

I would like to thank everyone who was involved in this research, without them I could not have made this report. Therefore I would like to thank some people in particular. First of all, I would like to thank Eric Huijskes for giving me the opportunity to do this research and even more important: for coaching me during my research. Second, my thanks go out to my supervisors of the University of Twente, Dr. Tatiana Filatova and Prof. Hans Bressers for their support and good comments. Third, I would like to thank Wim Hoogenboom en Stefan Nieuwenhuis from WMCN for all their support and help during my research. They were always available for questions and helped me to conduct the necessary data. And finally, I would like to thank my partner Jochem Ooijevaar for his support.

Enschede, 28th August 2012,

Amy Maduro

ABBREVIATIONS

Abbrev.	Dutch	English
DCC	Departementaal Coördinatiecentrum Crisisbeheersing	Coordination Centre Crisis management of a ministry
INK-model	Instituut Nederlandse Kwaliteit – model	Institution Dutch Quality
ISO		International Standardisation Organisation
JIT		Just In Time
KNMI	Koninklijk Nederlands Meteorologisch Instituut	Royal Netherlands Meteorological Institute
KO-model	Kwaliteitsmodel voor Overheidsorganisaties	Quality model for Governmental organisators
LC	Landelijke Coördinatiecommissies	National Coordination Committee
LCM	Landelijke Coördinatiecommissie Milieuverontreiniging Water	National Coordination Committee for Water Pollution
LCO	Landelijke Coördinatiecommissie Overstromingsbedreiging	National Coordination Committee Threat of Flooding
LCW	Landelijke Coördinatiecommissie Waterverdeling	National Coordination Committee Water Distribution
MCCB	Ministeriële Commissie Crisisbeheersing	Ministerial Committee Crisis Control
MIE	Ministerie van Infrastructuur en Milieu	Ministry of Infrastructure and the Environment
OTO-plan	Opleiding, Training & Oefening – plan	Education, Training & Practice – plan
PIN		Performance Indicator Norm
PDCA-circle		Plan Do Check Act circle
RWS		Rijkswaterstaat
SVC	ScheepvaartVerkeersCentrum	National Vessel Traffic Management Centre
TQM		Total Quality Management
TPS		Toyota Production System
VCNL	VerkeersCentrum Nederland	Rijkswaterstaat National Traffic Management Centre
VWM	Dienst Verkeer- en Watermanagement	Traffic and Water Management Institution
WD	Waterdienst	Centre for Water Management
WBRL	Waterschap Rivierenland	Water Board Rivierenland
WMCN	Watermanagementcentrum Nederland	Water Management Centre the Netherlands

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1. INTRODUCTION

Since the 18th century Rijkswaterstaat (RWS) is responsible for constructing and maintaining the nation's roads and waterways. It started in French-Batavian times when river beds and dikes were in such poor condition that disastrous floods were frequent. Until this, the responsibility regarding water was fragmented over the national government, the provinces, water boards and municipalities. RWS was created to tackle the problem of water nationwide. This is still one of the main tasks of RWS. Since WOII, the duties of RWS increased by growing welfare and the responsibility of the nation's road that has been added to their duties. Nowadays, these tasks have not change. The various floods in the past and climate change in the future make the subject of controlling water remain important and put this very much at the top of the nation's agenda.

However, with the installation of the Rutte government in 2010, this government is encouraging RWS to be more efficient, which results in a more effective and a closer focus on achieving the promised results (Rijkswaterstaat 2010a). As stated in the Annual Report 2010 of RWS, the projects aim to be on time, on budget, transparent and in the public interest. Because of this, in 2010, the management of the Ministry of Infrastructure and Environment (MIE) has decided, after the success of the pilot of a new quality system by Water Board IJsselmeer in 2008, to renew all the procedures within RWS in a systematic way. This relates to problems in the past, where procedures have not always worked perfectly. Besides, in case of crisis, the roles of the different parties involved were not well defined, causing them all to meddle with the problem in times of crisis (Rijkswaterstaat, 2010e).

The method used in the pilot is the KR8 model, which is an interpretation of the Lean Manufacturing Model. However, elements of the INK-model are present as well in WMCN at the present time. WMCN, part of RWS, stated that the organisation lacks a structured approach to total quality management (TQM) within their organisation in times of crisis. In addition, WMCN mentioned that they wanted to be a reliable partner within their network. Therefore, research regarding possible quality models and their implications for WMCN is carried out by Deltares at the request of WMCN. Deltares is one of the main suppliers in regard to (water) models to WMCN (see appendix III for the cooperating partners of WMCN).

The main goal of this research is to assess the current quality system and other quality models, and to identify potential factors that hinder their implementation. The results of this research can be used for further research in regard to Lean Management at WMCN, but could also be useful for policy makers concerning the optimalisation of Lean. Policy makers will have knowledge about the current situation at WMCN and could use the recommendation to improve the effectiveness of the organisation and to decrease the waste of the organisation. This could help WMCN in an efficient and effective way, so that they can provide their services with better quality. Theories are drawn from the Lean Management theory and organisational theory, which are used to interpret the situation at WMCN.

1.1.   Boundaries

Crisis management within MIE focuses on water, traffic and ship transport. Crisis management regarding water can furthermore be divided into flooding, drought and the environment (e.g. pollution). The scope of this thesis limits the research boundaries to crisis management in times of water flooding (LCO), one of the key responsibilities of WMCN. Inclusion of traffic management and ship transport would involve different settings of crisis situations and would make the research unnecessary complex.

Also, this thesis will focus on the micro level of quality, instead of the macro level. This means that the focus does not lie on the indirect effects upon the civilians and government, but on the effects of the direct customers of WMCN (Schedler & Felix, 2000, p. 134).

1.2.   Research Questions

In the business plan of RWS it is stated that the KR8-model will be implemented within the organisation. The implementation of the KR8-model appears to be very complex and needs further development. On this basis, I pose the following research question:

> What are the (potential) implementation gap issues of KR8 and how are they explainable by the characteristics of the K8-model and the organisational factors?

The dependent variable of this research question is the degree of (potential) implementation, while the independent variables are the organisational factors (the factors that refrain an organisation from applying the KR8-model) and the characteristics of the KR8-model (8 types of waste and the building blocks in the Lean Management model). The unit of analysis, the 'who' or 'what' that is being analysed, is WMCN. Because of time constraints, this research will focus on WMCN (where the research is being conducted) and two other organisations. The unit of observation are the individuals working in the selected organisations.

Furthermore, is it necessary to envisage the variables in four research activities. Every colour (yellow, red, orange, and grey) represents a research activity (see figure 1). The explanation of the research activities can be found under the research question on the next page.
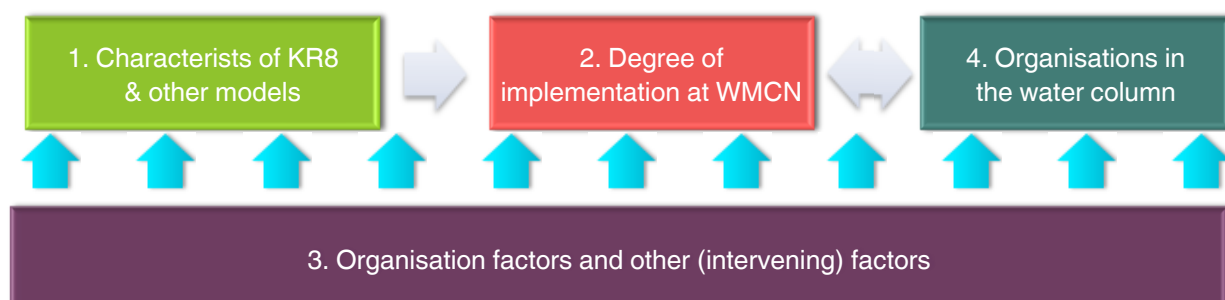
FIGURE 1: VARIABLES

The study has four sub-questions for guiding the research:

1. What are the characteristics of the KR8–model (including pros and cons) and how do these compare to other quality models.

The first part is to know what the theoretical knowledge about the concepts of the KR8 model and other quality management models are.

2. What is the degree of implementation i.e. the current status of WMCN regarding quality management and the KR8-model?

The second part is to observe in an empirical manner to what extent the current KR8-model is implemented at WMCN.

3. Which organisational factors are identified in scientific literature as potentially relevant and to what extent do these - in combination with the KR8 characteristics – (potentially) influence the implementation status as identified under question 2.

First, it is important to establish to what extent the organisation factors influence the quality indicators. Also, this question contains an empirical element, because an assessment is needed to explain how the factors attribute to the (partial) failing of the implementation with respect to the characteristics involved. Thus, what is the influence of organisation settings on the degree of implementation. This knowledge is important to identify what aspects need to be measured.

4. How do these results compare to the implementation of quality management systems in two other organisations within the network of WMCN?

The last part is about comparing the results with two other organisations.

1.3.   Reader
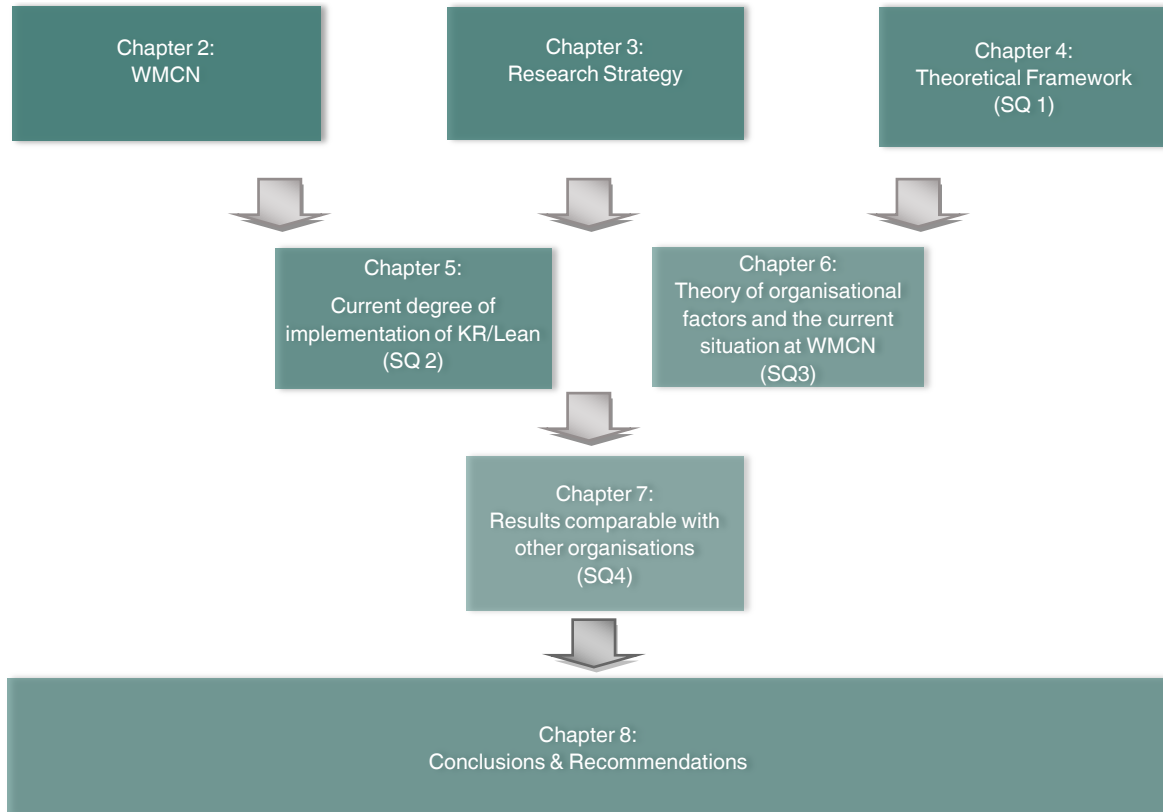
Chapter 2 starts with the description of WMCN and their partners. This information is used through the entire thesis, because the environment of WMCN can sometimes be difficult to understand. If this information is not already known, it is advisable to read this chapter before reading the rest of the chapters. In chapter 3 the research strategy is explained. Furthermore, chapter 4 is about sub question 1 and deals with the theoretical framework, which concerns the most important quality models. This chapter is readable without any prior and extra knowledge. Next in chapter 5 the current situation of WMCN is evaluated. This is done using the Lean Management model for governmental organisation which is a theory of Huguenin, Binnerts & van Gestel (2011). This will answer sub question 2. Sub question 3 is answered in chapter 6. First a short overview of different organisation settings that influence the implementation of a quality system is given. Central in the second part of this chapter are the survey results which answers which organisation settings could hinder the implementation of Lean. Furthermore, in chapter 7 sub question 4 is discussed and two organisations are examined by redoing the survey two times and the interview about Lean one time. These results are compared with WMCN. Finally, in the conclusion an answer is given to the central research questions and recommendations for WMCN are given.

The next paragraph deals with the subject of WMCN and their partners in their network.

2. WMCN

In order to answer the research questions it is important to understand what kind of organisation WMCN is. First, an overview is given about the development of crisis management in the Netherlands. In the second paragraph, an introduction of WMCN is given, including their mission, goals and ambition. In the third paragraph, the five divisions within WMCN are elaborated. This chapter ends with an overview of the network partners of WMCN and their main tasks.

2.1.   Crisis management in the Netherlands

The Netherlands has a long history of adapting the natural water and river systems to user functions such as housing, agriculture and shipping (Stokkom, Smits & Leuven, 2005, p.34). Although the adaptation to water has its merits, it also exposes the Netherlands to serious threats of flooding. Dikes have been built to reduce the risk of flooding.

In 1953, a major flood caused by a heavy storm, resulted in a disaster in terms of loss of life and damage to infrastructure (Gerritsen, 2005, p.1271). As a response to this tragic event, the government took actions to protect the Netherlands from further floods. The first action was the establishment of the Delta Committee. Their task was to develop measures to prevent such a disaster from ever happening again. In May 1953, the Delta Plan was commissioned to close a part of the three inlets in the province of Zeeland. Since then, measures have been taken to reduce the probability of flood risk. At present, the probability of coastal flooding is extremely low (e.g. 1 in 10,000 years return period).

The consequences of these measures are that the public and government are less alert to floods. However, the flood of New Orleans in 2005 raised the government awareness for the danger of water. This alertness resulted in a proposed concept in 2009 in the National Water Plan, which introduced the so-called Multi Layer Safety approach as a flood risk management strategy. The goal is to prevent floods and to limit their impact. This approach consists of three layers:

- prevention (through safer dikes);
- limiting consequences of flooding through the allocation of land use (spatial planning);
- organising crisis management.

However, dealing with risks is a difficult task, because risks are intangible. In the Netherlands, the development towards more adaptive and integrated flood management strategies adds to a shift from a technocratic state-oriented implementation logic towards a more collaborative governance logic in which many governmental actors together with private and societal actors look for integrated solutions to water challenges (van Buuren, Klijn & Edelenbos, 2011). This shift is visible in the new goals and ambitions of RWS.

2.2.   Mission, goals and ambitions

The mission is formulated for the whole organisation of RWS. RWS has formulated four different missions for society, where the first, second and fourth are relevant and especially important for WMCN (Rijkswaterstaat, 2011c):

1. dry feet (applicable for LCO);
2. sufficient and clean water (applicable for LCW);
3. smooth and safe flows of transport on the nation's roads and waterways (applicable for SVC and VCNL);
4. reliable and useful information (applicable for LCO, LCW, LCM, SVC and VCNL).

However, the society makes heavy demands on RWS. Therefore, the goal of RWS is to keep innovating their procedures, knowledge, attitude and behaviour:

- *working in one team*: working together is the solution for solving problems. Clear and short control lines, standardised processes and pooled tasks are helpful tools for achieving these goals;
- *working closely together*: not only internally, but also with colleagues within the section, co-administrators and partners within the network;
- *continued improvement of the organisation*: by using the KR8-model ineffectiveness can be eliminated which increases professionalism.

RWS has four ambitions related to the matter of managing the main motorway network, main shipping network and main water system. These four ambitions to enhance their stronger points are: (Rijkswaterstaat, 2011c):

- *network management with a focus on the community*: RWS is aware of the situation, how the different networks are being used and what the wishes of the users are. The employees of RWS are focused on the public and are cooperating with co-workers and private organisations.
- *leading project management*: sharing knowledge internally and cooperating with other contractors.
- *decisive crisis management*: RWS is a partner in solving crises and contributing on both operational and administrative levels. This is done in close cooperation with other partners.
- *providing information*: reliable information is the foundation that RWS needs to execute their tasks.

The next figure shows how the goals and ambitions together results in the mission of RWS:

Mission:
- dry feet;
- sufficient and clean water;
- reliable and useful information;
- smooth and safe flows of transport on the nation's roads and waterways.

Goals:
- working in one team;
- working closely together;
- continued improvement of theorganisation

Ambitons:
- network manager with a focus on the community;
- leading project management;
- decisive crisis management;
- providing information.

FIGURE 3: AMBITIONS + GOALS = MISSION (RIJKSWATERSTAAT, 2011C, P. 19)

2.3. History of WMCN

Evaluations in the past have shown that more cooperation during disasters as well as in the "water column" (see paragraph 2.5 for an explanation) is desirable. At almost the same time, the impact of the hurricane Katrina in New Orleans has been immense on the new developments. On October 1st 2007, WMCN was established within the Centre for Water Management (Waterdienst, WD), combining three other organisations: a part of DWW (Road and Hydraulic Engineering Institute), RIZA (National Institute for Inland Water Management and Waste Water Treatment) and RIKZ (National Institute for Coastal and Marine Management).

After these reorganisations, the current five pillars of WMCN were built. However, regarding new developments, it is not exactly clear what the new activities of each of these pillars will be.

In the business plan 2015 from the MIE a new section is mentioned: de Dienst Verkeer en Watermanagement (RWS VWM, i.e. Traffic and Water Management Institution) which is operative since January 1st 2012. This new section will combine WMCN with National Traffic Management Centre (VCNL) and National Vessel Traffic Management Centre (SVC). However, this research will still only focus on the WMCN. This is in line with the network centric approach of RWS: each organisation has an entity with their own specific tasks; however, there is a focus to the umbrella organisation as well. This is not only done because of budget cuts, it is also expected that it will be easier to provide more and reliable information in the line with public demand.
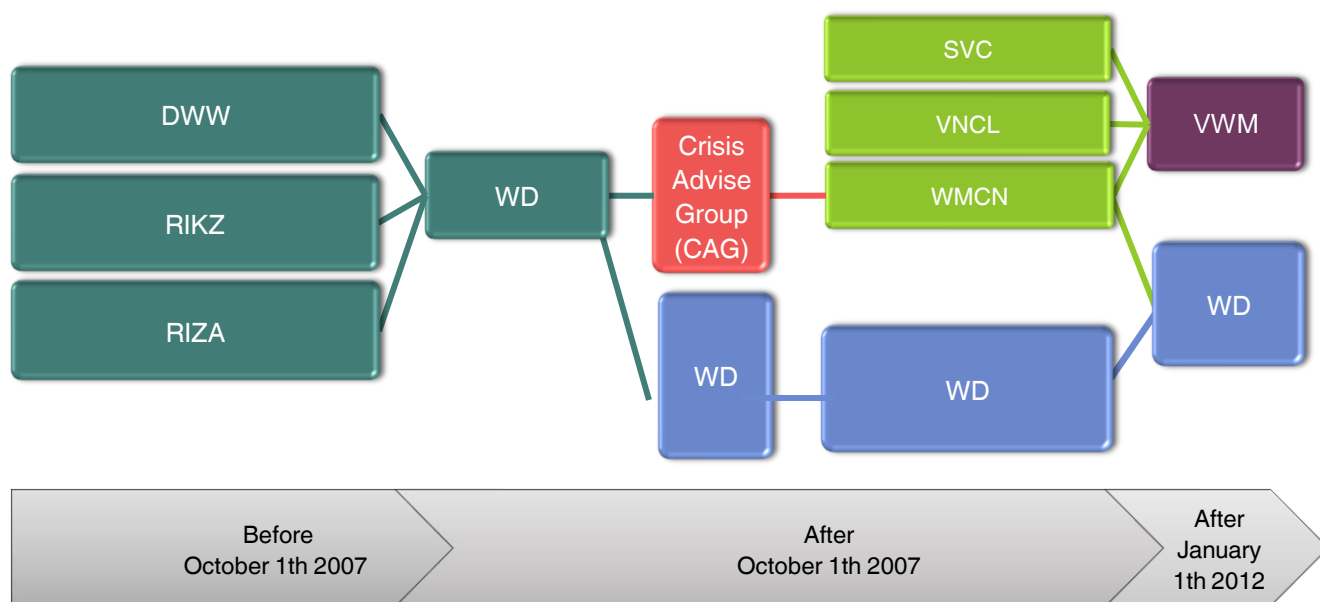
FIGURE 4: ESTABLISHMENT OF VWM

2.4. WMCN five divisions

WMCN has been responsible for national crisis and emergency management tasks, and giving reports and information in relation to (high and low) water on the coast, the rivers and the IJsselmeer. These tasks are allocated between the different divisions of WMCN. As stated in the Overdrachtdossier (2011, Hillen), until 1st of January 2012 there were five divisions at WMCN. Three of these five divisions will be included in the RWS VWM, the remaining two divisions remain with the Centre for Water Management. The five divisions are:

1. **Water chamber (**Waterkamer) → part of VWM

This division is responsible for providing reliable and useful information about water levels, flood risk and water quality (Rijkswaterstaat, 2011c). This information is given 24/7 under every weather conditions. In extreme situations, such as water flooding, dryness and water pollution, the task of providing information is transferred to the National Coordination Committee (LC). However, even in extreme situations, the responsibility of obtaining and disseminating information stays with the Water chamber.

2. **National Coordination Committees** (Landelijke coordinatiecommissies) → part of VWM

In case of extreme situations this committee will come into action and coordinate news reports and arrange reliable information about the current and future conditions of the water. They also advise national and regional water authorities about decisions that have to be made and arrange the coordination within the network. There are three committees:

- National Coordination Committee Threat of Flooding (LCO): gives an early warning about increased chance of flooding and information about the threatened areas. Also, the LCO analyses obtained information. Based on this information the national water policy is formulated.
- National Coordination Committee Water Distribution (LCW): if the demands of water surpasses the supply in periods of dryness or low tight of rivers, this committee formulates the national water policy and gives advice about the measures that should be taken to allocate the available water.
- National Coordination Committee Water Pollution (LCM): in case of nuclear, biological or chemical water pollution, this committee will come in action.

3. **Water Helpdesk** → part of Centre for Water Management

Helpdesk Water is a knowledge institute for professionals who are involved in water related businesses. The Water Helpdesk is also consulted by professionals to retrieve the latest news regarding to water.

4. **Reception & presentation** → part of Centre for Water Management

This is the public meeting area where professionals and press are welcomed.

5. **Training & Innovation** → part of VWM

In this division, training courses in primary processes of crisis management are given to professionals. Also, the opportunity for innovation and technology in water management and water safety is offered.
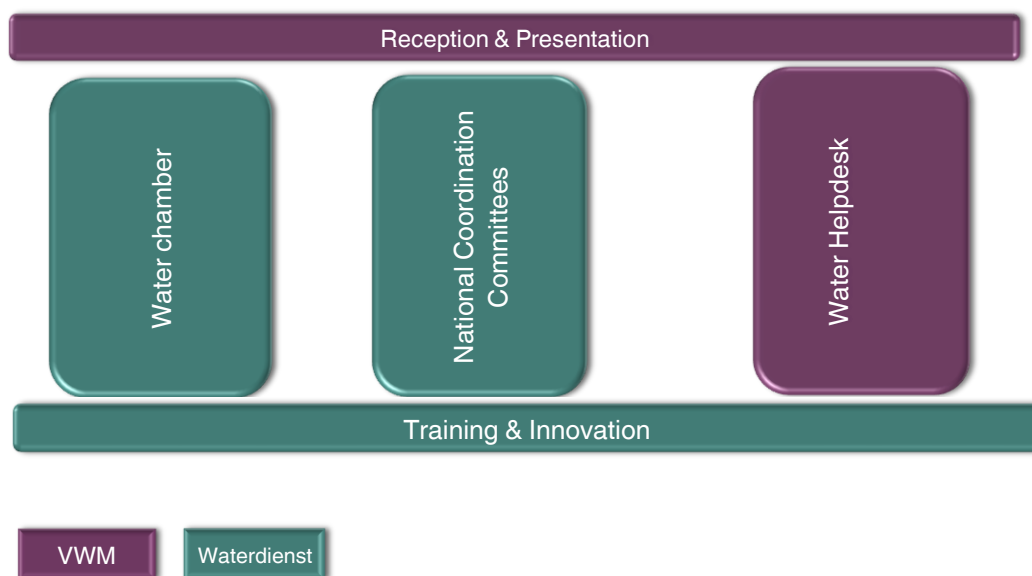

FIGURE 5: THE DIVISIONS OF WMCN AFTER 01-01-2012

2.5.   WMCN and other crisis management organisations

RWS is the executive body of the Dutch Ministry of Infrastructure and the Environment and ensures the safe and smooth flow of traffic on roads and waterways, protects against flooding, provides sufficient, clean water and supplies reliable and useful information (Rijkswaterstaat, 2011b). WMCN, part of RWS, is an organisation that provides daily reports to users of public water. In case of extreme situations such as water shortage, water pollution and risk of floods, WMCN will provide information and advice to national and regional water managers about the expected water situations (Rijkswaterstaat, 2010d). However, in times of crisis in the water sector, RWS is not alone, but is a partner in a network.

A distinction should be made between the so called 'water column' and 'general column'. The functions from the Minister of the Interior and Kingdom Relations, the Queen's Commissioner, mayors and emergency services (fire departments, police and medical aid) are found in the 'general column'. In the 'water column' the functions are found from the Minister of Infrastructure and the Environment, the provincial executive and dike reeves. The 'water column' monitors the water and informs the 'general column'. In addition to these tasks, the 'water column' takes measures concerning water to decrease the threat of a flood (Rijkswaterstaat, 2010c) and the 'general column' tackles the effects.

In broad lines the other crisis management partners, besides VCNL and SVC, of WMCN are visualized in figure 6:
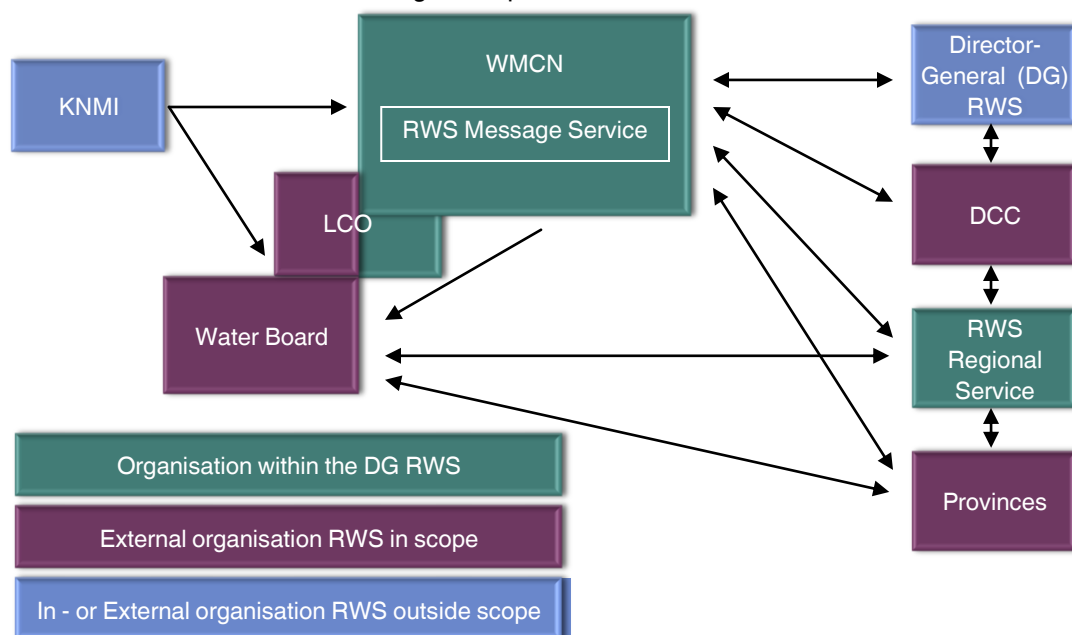
FIGURE 6: COMMUNICATION LINES LCO (PWC, 2011, P.27)

The national flood policy manual has four levels, which represent four different coordination levels:
Level 0: normal situation; everything is under control.
Level 1: in case of crisis the province handles the situation.
Level 2: in case of crisis there is a national coordination in the "water column".
Level 3: (threatening) flooding because of higher levels of water.

In the purple shaded tables on the next page, a description is given of the tasks and responsibilities of the various partner in the water and general column in relation to the different coordination levels indicated before.

Organisations in water column	Roles – Scaling up level 1	Roles – Scaling up level 2	Roles – Scaling up level 3
RWS Message Service (WMCN)	- Puts information about the predicted water levels on the website of RWS.	- Makes water level forecasts and for the coastal areas this is done in cooperation with KNMI; - Informs and alarms water boards, regional services, safety regions, DCC and LCO over the water level forecasts.	- Makes water level forecasts and for the coastal areas this is done in cooperation with KNMI; - Informs and alarms water boards, regional services, safety regions, DCC and LCO over the water level forecasts.
KNMI	- Makes (long) term weather forecasts and provides an assessment of the expected water levels for the coastal zone; - informs and gives advice to RWS- forecast centre about the weather forecasts and expected water levels; - supports LCO with their tasks.	- Makes (long) term weather forecasts and provides an assessment of the expected water levels for the coastal zone; - informs and gives advice to RWS- forecast centre about the weather forecasts and expected water levels; - supports LCO with their tasks.	- Makes (long) term weather forecasts and provides an assessment of the expected water levels for the coastal zone; - informs and gives advice to RWS- forecast centre about the weather forecasts and expected water levels; - supports LCO with their tasks.
LCO	- Monitors information from the regions, to the RWS forecast centre & KNMI; - evaluates the received information and translates these to advice and makes the national water situation and informs the involved parties; - informs if necessary the DCC, RWS and water boards about the national water situation.	- Makes the national water situation and informs the involved parties; - informs the DCC if necessary, RWS, water boards and safety regions about the national water situation.	- Makes the national water situation and informs the involved parties; - informs if necessary the DCC, RWS, water boards and safety regions about the national water situation.
Water board	- Implements measures, if necessary, in cooperation with other water managers; - supports and if necessary informs the safety regions by crisis management; - informs LCO about the flood defences; - informs the province.	- Implements measures, if necessary, in cooperation with other water managers; - supports, informs and gives advice to the safety regions by crisis management; - informs LCO about the flood defences; - the dike reeve consults the HID (Hoofd Inginieur Directeur, ie the Director) from the Regional service RWS; - Supports LCO; - Informs the province.	- Implements measures, if necessary, in cooperation with other water managers; - supports, informs and gives advice to the safety regions by crisis management; - informs LCO about the flood defences; - the dike reeve consults the HID from the Regional service RwS and if necessary, the HID from DG-Rijkswaterstaat; - supports LCO; - Informs the province.

	Scaling up level 1	Scaling up level 2	Scaling up level 3
Regional Service RWS	- Implements measures, if necessary, in cooperation with other water managers; - supports and if necessary informs the safety regions by crisis management; - informs LCO/DCC; - if necessary, stops shipping through national waters, in cooperation with SVC.	- Implements measures, if necessary, in cooperation with other water managers; - supports and if necessary informs the safety regions by crisis management; - if necessary the HID consulates with the dike reeve; - informs LCO/DCC; - if necessary, stops shipping through national waters, in cooperation with SVC.	- Implements measures, in cooperation with other water managers; - supports and informs the safety regions by crisis management; - the HID consults with the dike reeve; - informs LCO/DCC; - supports LCO with their tasks; - if necessary, stops shipping through national waters, in cooperation with SVC.
DCC	- Provides the communication with the dike reeves, the ministry of MIE and other involved partners in VandW, NCC and others'; - monitors and facilitates the process of crisis management within the national water column;	- Provides the communication with the dike reeves, the ministry of MIE and other involved partners in VandW, NCC and others'; - monitors and facilitates the process of crisis management within the national water column;	- Provides the communication with the dike reeves, the ministry of MIE and other involved partners in VandW, NCC and others; - monitors and facilitates the process of crisis management within the national water column; - supports the Minister of MIE in the role as ultimate responsibility; - takes a part in the advice team and/or ICCB
DG RWS		- Has the national responsibility for crisis management within Ministry of MIE; - consults the dike and measures wardens about information.	- Has the national responsibility for crisis management within Ministry of MIE; - consults the dike and measures wardens about information.
Minister of MIE		- Has final responsibility for crisis management; - takes the decisions, if necessary.	- Has final responsibility for crisis management; - takes the decisions, if necessary.

TABLE 1: ORGANISATIONS IN THE WATER COLUMN (RIJKSWATERSTAAT, 2010C; PWC, 2011)

Organisations at the borderline between water & general column	Roles – Scaling up level 1	Roles – Scaling up level 2	Roles – Scaling up level 3
Province	- Monitors the actions of the Water Boards (art. 2.26 Water law)	- Monitors the actions of the Water Boards (art. 2.26 Water law)	- Monitors the actions of the Water Boards (art. 2.26 Water law)

TABLE 2: ORGANISATIONS AT THE BORDERLINE BETWEEN WATER & GENERAL COLUMN (RIJKSWATERSTAAT, 2010C; PWC, 2011)

Organisations in general column	Roles – Scaling up level 1	Roles – Scaling up level 2	Roles – Scaling up level 3
Safety regions	- Is a cooperation between the police, fire department and medical aid organisations; - Inventory of risks regarding to fire, disasters and crisis; - Gives advise to local governments regarding the risks of fire, disasters and crisis.	- Adapts their measures with the water boards and if necessary with the Regional Service RWS; - receives the national water situation from the LCO - receives information about the water levels from RWS message service; - discusses with the water boards about the interpretation of the national water situation; - discusses with the water boards and Regional Service RWS about the way of crisis control	- Adapts their measures with the water boards and if necessary with the Regional Service RWS; - receives the national water situation from the LCO - receives information about the water levels from RWS message service; - discusses with the water boards about the interpretation of the national water situation; - discusses with the water boards and Regional Service RWS about the way of crisis control
NCC		- Informs similar organisations across national borders about flood defences, if the situation in the Netherlands influences the possible of threats in Germany or Belgium. The information will be sent to the DCC, as well.	- Informs similar organisations across national borders about flood defences, if the situation in the Netherlands influences the possible of threats in Germany or Belgium. The information will be sent to the DCC, as well.

TABLE 3: ORGANISATIONS IN GENERAL COLUMN (RIJKSWATERSTAAT, 2010C; PWC, 2011)

2.5.1. REGIONAL ORGANISATION

In the Netherlands there are 25 water boards, 10 regional services of the Directorate-General for Public Works and Water Management, 25 safety regions and over 400 municipalities (Rijkswaterstaat, 2010c, p.11). Information about the actual situation near water is collected by the water boards, municipalities and safety regions. However, the responsibility of safety in municipalities lies with the mayor, as he has command over the emergency services. If an emergency requires management with effects exceeding the borders of the municipalities, the responsibility then lies with the safety regions.

2.5.2. NATIONAL ORGANISATION

In case of emergency Coordination Centre Crisis management of a ministry (DCC) is activated by the Ministry of MIE. This organisation coordinates WMCN and LCO and supports the Minister of MIE, who is responsible for the water management measures. However, in case of a national crisis the responsibility lies by the MCCB, where the prime minister or the minister of the Interior and Kingdom Relations is the chairman and the Minister of MIE is a member.

2.5.3. NETCENTRIC APPROACH

To improve the way how information is being provided in crisis management, a net centric approach has been chosen. By using the net centric approach all the actors that are involved get the relevant information on time and all at once. Being able to use the latest and most up to date information, better decisions can be made. As can be seen in figure 6, information is shared among each other, rather than following a hierarchic process.
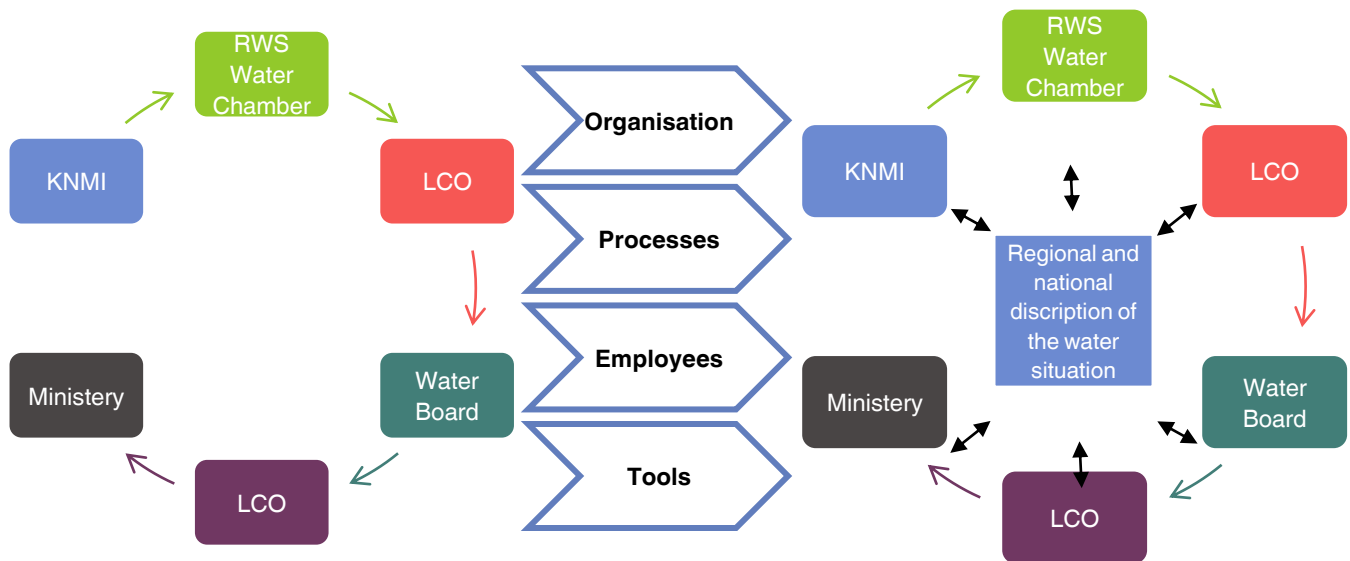
FIGURE 7: NETCENTRIC APPROACH (RIJKSWATERSTAAT, 2011C)

3. RESEARCH STRATEGY

The previous chapter was about WMCN and their partners in the network. This chapter describes the research strategy. The first paragraph will discuss the method which will be used in this research. In the second paragraph the method of data collection will be outlined and the choice of two organisations other than WMCN will be elaborated. Subsequently, the third paragraph contains a short description about the literature review. Next, follows a short paragraph about the open questions and the survey. This chapter ends with a description of the reliability and validity of this research.

3.1. Research method

Various methods exist for conducting research. Examples are experiments, survey methods, archival analysis, histories or case studies (Yin, 2003, p.5). An experiment is not applicable for this research because it requires control over behavioural events and it is impossible to organise a flood. History is not applicable as well, because it does not focus on contemporary events which is the case with this research. Now it depends on the conditions of the three remaining research methods (survey method, archival analysis or case study). According to Yin (2003, as cited in Baxter & Jack, 2008) one should consider the following to determine if a case study is the most feasible for this research:

1. the focus of the study is to answer "how" and "why" questions;
2. the behaviours of those involved in this study cannot be manipulated;
3. coverage of contextual conditions is relevant to the phenomenon under study; or
4. the boundaries are unclear between the phenomenon and context.

The first condition is met in my research. The research questions are mainly focused on answering "why" questions. The second condition is met as well in this research. The behaviour of the employees is not controlled in this research, because the main focus is about the employees working at WMCN and the decisions which could influence their way of working. The third condition is also met. WMCN wants to know which of the conditions are important and influence their organisation's quality system. The last condition is met as well. Currently the extent in which the KR8 model has been applied at WMCN is not clear. Therefore the boundaries between the phenomenon and context have to be defined.

Given the considerations that are all present in this research, a case study seems the most appropriate type of research method. This means an extensive research in one case: WMCN.

3.2. Method of data collection

This research is a qualitative study, based on theory and field research, which means it deals with meaning, rather than analysing numbers. According to Babbie (2004, p.271), the best way to do a qualitative research is by conducting a case study. In this research a case-oriented analysis will be done. A case-oriented analysis aims to understand a particular case or several cases by looking closely at the details of each case. Qualitative research does not need to have a big number of research units, whereby the disadvantage is that the conclusions cannot be generalised. However, this has also an advantage, because it allows for a more in-depth analysis. The qualitative part of this thesis will cover the results of a semi-structured open interview, document research and a literature study.

There is also a quantitative study, which contains an analysis from surveys which are related to the potential factors which could hinder the implementation of a quality system.

As stated before, the data is collected following the line of the four research questions using three methods (literature review, open questions and a survey):

The first sub question is about the characteristics of the KR8-model and Lean Management. To answer this question, *a (scientific) literature study* will be carried out.

For the second sub question it is important to get a full understanding of the case study. Not only the opinion of those who are interviewed, but the actions expressed in documents are important as well. These documents (reports of meetings, (policy) documents, agenda, annual reports, reports of research on what is already done by WMCN/MIE) will be delivered by contacts at WMCN.

To determine the opinions of the interviewees regarding the KR8-model*, individual face-to-face-interviews* will be done, where individuals responses and opinions will be asked. The goal is to compare the answers of the different interviewees and to make conclusions in regard to the degree of implementation within WMCN.The interviewees have been informed that their names will not be mentioned. The interview questions will not be structured as a survey, but will be less structured. This is a qualitative interview which is, according to Babbie (2004, p.300), based on a set of topics that will be discussed in depth, rather than based on the use of standardised questions. This is because a lot of information is on paper, but most of the processes are not found in documents and are only available by interviewing employees and managers of WMCN.

The first part of the third question is a *scientific literature review* where factors which could hinder the implementation of KR8 are defined. The second part is to investigate how far these factors play a role in the implementation. This will be done by carrying out a *survey* under 25 employees of WMCN. The survey will correspond with the four levels which are elaborated in the first part of this question. The results of these surveys will be compared with each other and eventually analysed with the factors found in the literature.

For the fourth question, an adjusted version of the interview of WMCN will be used. In order to determine if the quality model or organisational factors will influence the implementation, extra data is necessary to check which factors can hinder the implementation. Therefore, the focus lies on one organisation which is similar to WMCN, but has a different quality model and another organisation that is different from WMCN but has similar organisation factors. One important aspect which should be kept in mind is duration (time) of the implementation of the quality model, because this could explain a potential gap issue in regard to the implementation of a quality model.

Each organisation has a (well) defined role to play in this process. The interdependency is critical for the overall success. In order to investigate the research question, in particular in view of this interdependency, it is desirable to have a general understanding of (some of) these organisations. Furthermore it is of interest to get an understanding of their approach to quality management and how this aligns with the approach of WMCN. In the Netherlands a distinction is generally made between the water column and the general column of crisis management. The water column side concerns the organisations WMCN, KNMI (the Dutch National Meteorological Institute) and the various Water boards. The general column side involves the various so-called "safety regions" and the involved ministries.

To get a better understanding of these organisations and in particular their approaches to continuous improvement, several selection criteria have been formulated to select two organisations, the organisation is:

1. part of the water column, i.e. organisations with whom WMC has a strong interdependency;
2. a "forecasting" organisation;
3. representative for their sub sector;
4. active in quality management (i.e. initiatives are ongoing);
5. an organisation which has a different type of quality system;
6. an organisation which has the same type of quality system.

The time aspect is also taken into account, because it would make a difference whether an organisation has a longer history of quality management or not.
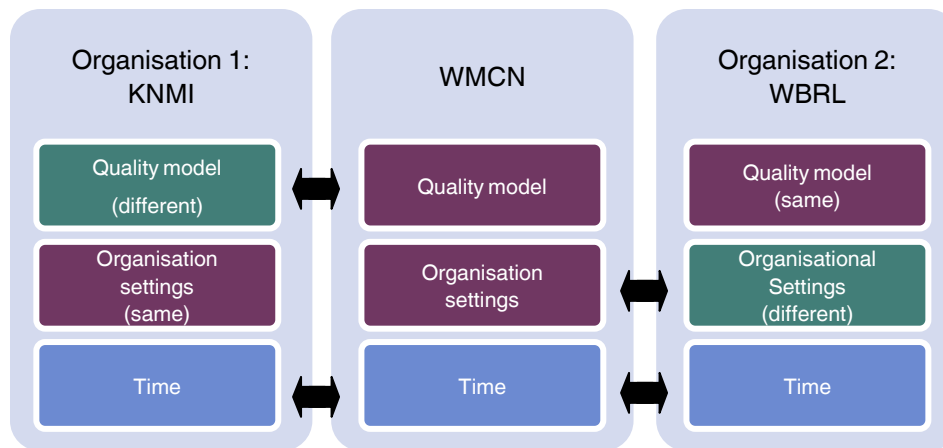
FIGURE 8: SELECTION OF ORGANISATIONS IN THE WATER COLUMN

This resulted in the following choices:

- KNMI (based on considerations 1, 2, 3, 4, 5 and with a long history of quality management);
- Water board Rivierenland (based on considerations 1, 3, 4, 6 and with a short history of quality management).

Rivierenland has been chosen in particular because they are one of the largest Water Boards in the Netherlands and their domain is both river and coastal flooding. By selecting these two organisations, all conditions are accounted for in this research.

3.3.   Literature review

The literature review about the most important definitions and organisation factors is based on scientific articles found using Scopus and Google Scholar. The chapter about quality systems is derived from a combination of scientific articles found using Scopus and Google Scholar, but also in recently published books in the field of quality management ad Google Books.

Chapter 2 "WMCN" — WMCN, crisismanagment Netherlands, strategic report RWS, KR8, Lean (Management), different roles of RWS in ragard to situations where a crisis occure, regional organisation, national organisation.

Chapter 3 "Research Strategy" — (Multiple) case study, qualitative interview, case analysis, research method, data collection.

Chapter 4 "Theorectical framework" — Quality system, quality management system, QMS, crisis, quality in governmental organisations, ISO9000, crisis and quality system, Lean Management, Toyota , muda, KO-model, PDCA-circel, Six Sigma, DMAIC-cycle, INK-model.

FIGURE 9: CHAPTER 5 WITH THE CORRESPONDING KEYWORDS

3.4.   Open Questions

The open questions have been set up using the theory of Huguenin, Binnerts & van Gestel (2011) who designed questions based on the building blocks of Lean Management for governmental organisations. These questions have been used in an interview that has been conducted at three different organisations: WMCN (6 interviewees), KNMI (1 interviewee) and Water Board Rivierenland (1 interviewee). The eight interviews took about 1,5 hour and the questions can be reviewed in appendix VIII (in Dutch).

3.5.   Survey

The questions used in this survey are based on statements and questions used in the theories of Radnor and Walley (2008), Ahmed, Loh & Zairi (1999), Irani, Beskee & Love (2004) and Näsland (2008). However, in addition some statements have been set up by the writer of this thesis and some questions have been added to the survey to deal with the specific character of the organisation. The survey can be found in appendix X (in Dutch).

3.6.   Validity and reliability

Yin (2003, p. 34) distinguishes four factors which could influence the quality of a research. These factors are: construct validity, internal validity, external validity and reliability.

3.6.1. CONSTRUCT VALIDITY

Construct validity is important in the data collection phase. It is questionable if the study investigator fails to develop a sufficiently operational set of measures and that ´subjective´ judgments are used to collect the data (Yin, 2003, p.35). Before the data collection started, the most important concepts have been discussed in the theoretical framework. These concepts are used during the entire research. According to Yin (2003, p. 34) construct validity can be enhanced by using multiple sources of evidence. For this research there are different methods used (so called 'triangulation') for enhancing the quality, namely, the semi-structured interview, survey, documentation research and literature study. These different methods have their own sub studies and conclusions, which will eventually lead to the final conclusion.

3.6.2. INTERNAL VALIDITY

Internal validity is a vital part in the data analysis. The main questions of internal validity are if the inferences are justified by the research and if all the rival explanations and possibilities been considered (Yin, 2003, p.36). The most important aspect is the reasoning behind the scientific reasoning. In this research this is pursued by linking the research questions, theoretical framework, analysis and results.

3.6.3. EXTERNAL VALIDITY

The external validity is important for the research design and is about the problem of knowing whether a study's findings are generalisable beyond the immediate case study (Yin, 2003, p.37). This research is a single case study, which offers a poor basis for generalisation (Yin, 2003, p.37). The survey results within WMCN are based on statistical generalisation, however, the survey is held within the department of VWM, which is a small part of WMCN. Eventually six people have cooperated with an interview, which makes it difficult to generalise the results. Following a pilot with fellow students, the survey was conducted at WMCN. From the 25 surveys which have been distributed, 10 have been filled in. The responses at the two other organisations were lower: in total 5 people turned their survey in at WBRL and 5 at the KNMI. The lower response rate at KNMI can be explained by the fact that the main research is not held at KNMI, resulting in a lower bond between the researcher and the organisation compared to WMCN. It could also be explained by the length of the survey, since it took valuable time without apparent benefit for KNMI as an organisation. with no apparent benefit for KNMI as an organisation.

An additional problem is that there are a lot of internal changes within the organisation of WMCN, which could lead to different answers when this research is redone. In order to clarify whereas the findings at WMCN are 'normal', two organisations (KNMI and Water Board Rivierenland) are selected to compare these results with WMCN.

3.6.4. RELIABILITY

Reliability is central issue in the data collection phase. The goals are to minimize the errors and biases in the study (Yin, 2003, p.39). Reliability could be enhanced applying a systematic approach. Because of the challenges of the research a flexible method was required. However, by using different research techniques an attempt is made to increase the reliability. However, due to strong changes at WMCN, different aspects in the results could emerge. The interviews are written out as well, to minimise the chance of misinterpreting the interviewee.

In order to get the right answer after an interviewee misunderstood a question, the question was repeated. Also, when an interviewee answered using only yes or no, the question was reformulated in an open question. In this manner the interviewee was challenged to give a comprehensive answer. However, a bias in the research is still possible, because the interviewees answer could miss some important aspects or their meaning of their answer is misinterpreted by the researcher.

For a next study it is may be advisable to make a different selection of interviewees because sometimes the interviewees did not know how to answer a question. One reason could be that this study came too early in the implementation process and the interviewees did not have enough experience with Lean. Another reason could also be that some interviewees are more involved in the implementation of Lean than others.

4.   THEORETICAL FRAMEWORK

The theoretical framework is necessary to argue the academic basis of the research. Relevant literature is an essential feature for an academic project (Webster & Watson, 2002). According to Webster & Watson (2002) an effective review will lead to a solid foundation for advancing knowledge, and would also uncover areas where (new) research is needed. They argue that a literature review is concept-centric, which means that the concepts determine the organising framework of a review. This technique is also used in this research.

In the first part of this chapter the concepts quality, quality system, crisis and continuous quality improvement are explained. In the second part of this chapter an overview of the different quality models is given. Various models are investigated to understand the pros and cons and put Lean into perspective (the choice for this model is a given: RWS has already chosen for this model). The third part is about the organisational requirements with the focus on Lean management.

4.1.   Definitions

In order to get a full understanding in the subject of quality management, four central concepts are defined in this chapter. These concepts are frequently used throughout the thesis and need clear formulation.

1. *Quality*: one of the reasons why the KR8-model is implemented is to enhance the quality of the procedures. Quality is a broad concept and therefore a crucial aspect to distinguish the concept quality in general from the concept quality in quality management. The conceptualisation of quality will be explained in paragraph 4.1.1.
2. *Quality system*: the research is mainly focused on quality systems. In order to understand if the system is well implement, it is important to identity the conditions which are necessary to maintain a good quality system. In paragraph 4.1.2 the conceptualisation of a quality system will discussed in detail.
3. *Crisis:* the research is conducted in the field of crisis management. In order to understand what crisis management exactly is, it is necessary to elaborate the concept. This elaboration is explained in paragraph 4.1.3.
4. *Sustainable quality improvement:* improvement is one of the fundaments of all quality systems. A full understanding of this concept is essential. The discussion of sustainable quality improvement is presented in paragraph 4.1.4.

4.1.1.   QUALITY

The concept of 'quality' is a broad concept and can have different meanings to different people. There does not exist a global definition, but there are different definitions appropriate under different circumstances (Reeves & Bednar, 1994, p. 419). Besides, every time period has its own definition of the concept. Reeves & Bednar (1994) distinguish four categories of quality:

Reeves & Bednar (1994, p. 420) first mention that the Greek philosophers were the first one who discussed about this matter. Their ideal of quality was 'excellence', although what can be seen as excellent for each particular situation depends on the context. However, Tuchman (1938, p. 38) argued that quality "means investment of the

best skill and effort possible to produce the finest and most admirable results possible". This meaning of quality is abstract and therefore not measurable.

Second, Feigenbaum (1951, p.1 as cited in Reeves & Bednar) argued quality as value is related to the consumer in the open market. This implies consumers still buy their products (which are less than perfect), because of the price. The quality is dependent on the price consumers want to pay. Feigenbaums definition of quality was that quality "does not have the popular meaning of best in any absolute sense. It means the best for certain customer conditions". Watkins (2006, p.23) acknowledge this by stating that "quality is .. the customer defines value (performance relative to costs)".

Third, quality as conformance to specifications. This idea is based on Fords idea of mass production, where parts need to be specified in order to reduce costs. Also, if customers' expectations are to be met, the quality of a product should be consistent. Gilmore (1974, as cited in Garvin, 1988, p. 41) defines quality as "the degree to which a specific product conforms to a design or specification." When a product meets the specifications, it fulfils the criteria of quality, when it does not, there is no quality.

The fourth and last category defines quality as meeting and/or exceeding expectations. Service quality regains more importance in the scholarly field. Grönroos (1990, p. 37) stated that "it should always be remembered that what counts is quality as it is perceived by the customers." Quality here is defined from the customers' viewpoint (Reeves & Bednar, 1994, p. 427).

Quality as excellence	Achieving the highest standard (Tuchman, 1938)
Quality as value	The best for certain customer conditions (Feigenbaum, 1951)
Quality as conformance to specifications	The product conforms to a design or specification (Gilmore, 1974, cited in Garvin, 1988)
Quality as meeting and/or exceeding expectations	Quality defined from the customers viewpoint (Reeves & Bednar, 1994)

TABLE 4: SUMMARY OF DEFINITIONS OF QUALITY WITHIN REEVES & BEDNARS (1994)

It depends on the mission or goal of an organisation, which definitions suits the organisation best. The RWS has a goal, mission and ambition and according to these there is not one kind of definition that suits RWS/WMCN best. However, in the business plan 2015 RWS stated that they wanted to focus more on the efficiency of the organisation (intern) and on the public by providing better information (extern). The first category of quality is too vague, because it is not measurable. The second category is not applicable for RWS. Since there is no question of price and quality. The third category is not applicable as well, because RWS does not deliver a standardised product. The last category is better suitable for RWS, because it is based on what its customers (the public and other partners in the network) want. Therefore the following definition of quality of Grönroos (1990 as cited in Reeves & Bednar, 1994, p. 427) will be used in this research:

> **Quality:** *"it should always be remembered that what counts is quality as it is perceived by the customers."*

4.1.2. QUALITY SYSTEMS

A quality system is a management system to control and steer an organisation concerning quality. According to ISO 9000 (as cited in Jorissen, 2007, p. 23) there are four elements in every quality system:

1. activities are the tasks that are achieved as one of the elements in the overall process;
2. processes are coherent activities that interact with each other. Resources are used to translate input to output;
3. procedures are a specialised method for carrying out the activities or a process;
4. products are the result of a process and can be tangible or intangible.

The definition of a quality system by Bouckaert & Thijs (2003, p.144) support this formulation by defining a quality system as a standardisation of production processes, by applying rules, procedures and written instructions, so that these processes proceed properly. Van Ool (2001, as cited in Bouckaert & Thijs, 2003, p.144) stated that for a good quality system, a couple of conditions are necessary:

- the system is understood by the employees;
- the system is effective;
- the system ensures that the demands of the society (intern and extern) are satisfied;
- the system is focused on the occurrence of problems.

4.1.3. CRISIS

As with quality, the concept crisis does not have a universally accepted definition. According to Oxford Dictionary crisis is defined as "a time of intense difficulty or danger". This definition is often used in news headlines to indicate the scale of an event. Jacques (2009) recognized after conducting a comparative analysis a difference between crisis as an event and crisis as part of a process. The main difference between these two is that the first is seen as a single event and the second one deals with the preparations and the evaluation afterwards. On this basis, Jacques (2007, as cited in Jacques, 2009) developed four types of clusters of actions in times of crisis:

1.	**Crisis preparedness**	Planning process, systems and manuals, documentation, training/simulation.
2.	**Crisis prevention**	Early warnings, risk and issue management, social forecasting, environmental scanning, emergency response.
3.	**Crisis Incident Management**	Recognition, activation, damage mitigation, implementation.
4.	**Post-Crisis Management**	Recovery/resumption, post crisis issue impacts, judicial inquiries, evaluation, modification.

TABLE 5: CLUSTERS OF ACTIONS IN TIME OF CRISIS (JACQUES, 2009)

Ulmer, Sellnow and Seeger (2011, p.7) give a more specific definition of organisational crisis: "an organisational crisis is a specific, unexpected, and nonroutine event or series of events that create high levels of uncertainty and simultaneously present an organisation with both opportunities for and threats to its high-priority goals." In the following table Ulmer, Sellnow and Seeger (2011) specify the key components of this definition:

Unexpected	An event comes as a surprise. This surprise may be something for which the organisation could not have anticipated or planned. It could result from conditions that exceed even the most aggressive crisis management plans.
Nonroutine	Crises are events that cannot be managed by routine procedures. Instead, a crisis requires unique and often extreme measures.
Produces uncertainty	Because they are unexpected and beyond the routine actions of organisations, a crisis produces tremendous uncertainty.
Creates opportunities	A crisis creates opportunities that may not be available during normal business opportunities. Crisis creates opportunities to learn, make strategic changes, grow, or develop new competitive advantages.
Threat to image, reputation, or high-priority goals	A crisis can produce an intense level of threat to the organisation and its affiliates. This threat is often described as damage to the image or reputation of an organisation.

TABLE 6: COMPONENTS OF THE DEFINITION OF CRISIS (ULMER, SELLNOW & SEEGER, 2011, P.8)

RWS has his own definition of crisis management in the Manual Crisis Management (Handleiding Crisisbeheersing):

> ***Crisis according to Rijkswaterstaat:*** *a crisis occurs when the national security is endangered because vital elements are compromised and existing structures and resources are insufficient to stabilize the situation. In other words, when a significant part of the Dutch society is being threatened and action from the government is needed to resolve the threat or to reduce its effects.*

The Netherlands can also been seen as an organisation. The task of WMCN is to take action if the national security is under threat. However, this definition is still vague. Therefore, the definition of Ulmer, Sellnow and Seeger is used:

> ***Crisis:*** *an organisational crisis is a specific, unexpected, and nonroutine event or series of events that create high levels of uncertainty and simultaneously present an organisation with both opportunities for and threats to its high-priority goals.*

To structure the process, necessary changes lead to quality improvement. Deming (1981) has set up a model, in which he states that four different steps need to be followed.

Deming circle (PDCA-model)

This circle consists of four phases, which enables organisations to formulate a standardised way to improve the processes in their own organisation. The PDCA-model acts out the processes as follows (van der Waldt, 2004, p.5)

1. *Plan*: establish the objectives and processes necessary to deliver results in accordance with customer requirements and organisation's policies;
2. *Do*: implement the processes;
3. *Check*: monitor and measure processes and products against policies, objectives and requirements for the product and report the results;
4. *Act*: the actions necessary to keep improving process performance.

This model can be seen as an ongoing process. This means that after the fourth step of the PDCA-model, the cycle starts over again. Every time the steps of the PDCA-model are followed, the quality of the organisation will increase.

The PDCA-model has the ability to keep improving itself. However, what it lacks is a control system to guarantee a continuous improvement of quality. This means that over time the level of quality might not be maintained and will decrease again. Therefore a control system is needed to set a level of quality standards that has to be met. With every cycle of the PDCA model the bar of the quality standards can be set higher, reducing the risk of a fallback.
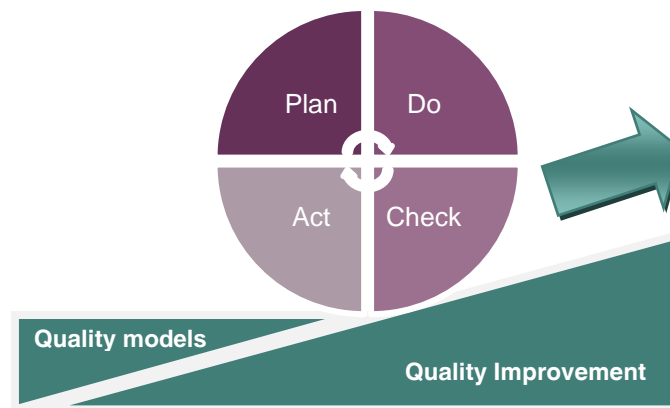

FIGURE 10: PDCA-MODEL INTEGRATED IN QUALITY MODELS (DEMING,1981)

4.2   Overview quality management systems

Since the public sector has an increased focus on quality management, a growing number of quality models are available in this sector. A lot of these models originate from the industry. However, it is impossible to adapt these business models to governmental organisations without adjustments, because of the special characteristics and needs of governmental organisations.

In this paragraph the quality models are reviewed. However, before this review, the criteria which are used to evaluate the quality models are described first. Second, a general description of the quality models is given. The models: Lean, KO-model, Six Sigma and ISO 9000 are reviewed. Because Lean is the leading method, the Lean chapter is described more extensively. Also, the pros and cons of each model are assessed to get an understanding of the applicability of quality models in general. This paragraph will end with a conclusion regarding the relevance of the models with respect to the criteria. The aim of this paragraph is not to provide an extensive overview of all models, but to limit this to relevant models that are frequently used in the Netherlands. Also, the objective of this chapter is to frame the KR8-model in perspective to other models.

4.2.1   CRITERIA

In order to evaluate the different quality models it is important to set criteria to see if a model fits in the organisation. These criteria will be assessed based on concepts which are commonly found in the different theories. Hereafter, these concepts were grouped and formulated into statements that were used as criteria to evaluate the quality systems described in this thesis. Some of these criteria are applicable and some are non-applicable to the relevant quality system. Not all criteria are explained in this chapter, however in the advantage and disadvantages the explanation of some criteria can be found. The criteria are sorted in two categories: suitability and user-friendliness. Suitability is about how well the system fits in the organisation and user-friendliness is the degree in which the employees are able to work with the quality system.

Suitability	
1. **Applicable or adapted to governmental organisations or more business focused.**	There is a difference between monitoring quality as a governmental organisation or as business organisation. For example: business organisations have a profit focus which results them to function in a different way.
2. **Focus on customer service (external) or focus on the organisation (internal).**	A quality system should have an internal and external focus. There should not only be a focus on customer service, but a focus should also be on the employees and their needs. This results in an environment where employees are able to develop themselves.
3. **Is well known by partner organisations or not.**	In order to get the credibility and trust of partner organisations (the organisations with which WMCN is cooperating in the water column), it is important that they know what kind of quality system WMCN adopts and how this system is maintained.
4. **Broad focus areas or small focus areas.**	Does the quality model focus only on a small area of the organisation, or does it focus on the whole environment and surrounding the organisation.

5.	**Suitable for complex processes or suitable for standardised processes**.	Most of the models are made for standardised processes, for example the mass production of a product or applications for governmental services. However, the quality model should also be applicable on situations which could be complicated and in which a standardised process does not function properly.
6.	**Top down or bottom up.**	Both have their advantages an*d disadvantages. If management chooses for a top down approach, they choose for speed efficiency where less time is wasted on meetings. However, employees can feel less committed to an organisation. With the bottom up method, employees feel committed and their knowledge and input is used in the process. Management should be motivated and steer the employees. A disadvantage is that this approach costs more time.
7.	**Faster processes or not.**	Quality models can make processes more efficient and effective. This could be done by finding the bottlenecks in the process. Some models are more focused on this subject than others.
User friendliness		
1.	**Gives structure by describing processes or gives a philosophy on how quality should be improved.**	Quality systems have different approaches on how to realise an increase in quality. Where some provide a set of rules to enhance quality, other systems provide a philosophy on how an organisation should function to increase the quality. The latter results in a more open approach on how to realise this.
2.	**Easy to understand for employees or not.**	The success of a quality system depends on the ability of the employees to adapt to the system. In order to do so, employees have to be able to understand how the quality system works and how they can use it in their everyday work.
3.	**Asks little resources of the organisation or asks a lot resources.**	This statement is about how much an organisation should invest in applying a quality model in terms of money and manpower.
4.	**Possible to implement by the organisation themselves or external parties are needed for implementing the model into the organisation.**	Applying a quality model demands a lot of knowledge and strategic thinking regards to quality management. When this is not present within an organisation, training and education is necessary.
5.	**Promoting communication or not.**	Communication is an important factor in quality management. There are two types: internal and external. The external communication should not only focus on the customer, but also on the stakeholders. Internal communication is important, because otherwise internal processes cannot be coordinated and the quality can decrease.
6.	**Flexible or controlled.**	Organisations reside in a dynamic environment. Especially in the case of WMCN it is important to be flexible and to adapt to wishes of the customers. There is also a degree of control; however, a lot of uncertainties arise during crisis situations, requiring flexibility to resolve a crisis.

In this paragraph, two versions of Lean are discussed. First, the original Lean Management theory (including the version of KR8) and the Lean Management Model for governmental organisations.

The philosophy of Lean Management is derived from the Toyota Production Systems (TPS), which later in the '90 became known as "Lean production" (Holweg, 2007). The core idea of TPS is high quality, low costs coupled with fast throughput times. The TPS has two pillars: just in time (JIT) and jidoka (autonomation, or automation with a human touch (Ohno, 1988, p.4). Jidoka focused on the causes of problems. When a problem is evident for the first time, the production is stopped, until the problem is solved. This leads to an enhancement of the processes, because the mean causes of the failures are improved. Just in time means that in a flow process, the right parts in the assembly reach the assembly line at the time they are needed and only in the right amount needed (Ohno, 1988, p. 4). This concept goes back in the 1920's, where as a result of innovations, machines stopped automatically when a thread broke. The quality of cloths was improved, because defective cloths were detected. The employees spend more time on other work which was better for the quality of the production than only monitoring the machines. Eventually, this concept was used in every assembly line.

FIGURE 11: HOUSE OF TOYOTA PRODUCTION SYSTEM (THE NOTHWEST LEAN NETWORKS, N.D.)

Yet, the main idea of Lean Management is to enhance the customer value to the maximum while 'waste' (muda) is reduced to a minimum. Waste is everything that does not add value to a customer, which means that the customer gets exactly what he or she wants. Nowadays Lean is a widely applied method in governmental organisations, because of the focus on customer, professionalism and quality, efficiency, learning process and improvement and integrity and corporation (Huguenin, Binnerts & van Gestel, 2011, p.9). There are three types of waste: muda, mura and muri.

Muda is an activity that produces a lot of waste, does not add value or is unproductive, which makes an organisation less efficient. Muda recognises eight types of waste (Huguenin, Binnerts & van Gestel, 2011, p.31):

1. *doing too much:* producing more than a customer wants;
2. *waiting:* wasting time by not working on a product;
3. *transportation and transfer:* products cover unnecessary distances;
4. *putting too much effort in a product:* products are made better than the consumer wants;
5. *searching:* wasting too much time looking for products;
6. *motion:* wasting time by unnecessary relocations of products;
7. *correcting your work:* wasting time by correcting products that do not meet the specifications;
8. *untapped talent:* loss of learning opportunities by not including professions in the improvement of the processes.

As stated before, the concept of "KR8" arises from the MIE-version of Lean. The most important principles of Lean are here interwoven in this concept. Namely:

- **K**lantwaarde voorop (customer satisfaction is leading);
- **R**espect voor mensen (respect for people);
- **8** types of waste that should be eliminated.

The last point is central in Lean, because Lean is focused on the elimination of 'waste' in the work process. The production process in the organisation should be focussed on efficiency and the emphasis by doing this is on consumer satisfaction. All processes which are not linked to the consumer satisfaction are seen as 'waste' and should be eliminated. Therefore, the focus of Lean manufacturing is the reduction of the 'waste'.

According to Huguenin, Binnerts and van Gestel (2011, p.22) it is presumed that when work irregularity reaches the employees (*mura*), people get overloaded (*muri*). Huguenin, Binnerts, van Gestel (2011, p. 17) introduces the "Lean house for governmental organisations". This is a model that is specifically designed to be applied to government organisations and who want to implement Lean and is therefore more suitable for WMCN.

FIGURE 12: LEAN HOUSE FOR GOVERNMENTAL ORGANISATION (HUGUENIN, BINNERTS & VAN GESTEL, 2011, P.17) SEE FOR THE ELABORATION OF THIS HOUSE APPENDIX III

Advantages

First, using the model of Huguenin, Binnerts & van Gestel (2011, p.17) the model of Lean is adjusted to the environment of the government. Second, by implementing Lean, there are faster response times and processes, reduction in waste and avoidable work (Bagley & Lewis, 2008, p.10). Third, because of the faster response times and reduction of waste, financial savings can be achieved. Fourth, the second advantage leads to an increased customer satisfaction (Bagley & Lewis, 2008, p.17) as well, and by using feedback of these customers, the efficiency of the organisation can be improved. Fifth, by implementing the Lean house, Lean gives more structure in describing the processes, and although it is not emphasised in the model, organisations are currently moving to a more process based thinking (Radnor & Walle, 2008, p.16). Six, by learning and improving, there is a improvement of quality. Seventh, Lean management is more bottom up than top down. As Womack and Jones (2003, p.97) stated, teams of employees are responsible for getting the job done and must have from the beginning both the authority and resources from the management. Finally, because the model does not only look at the business processes, but to the employees and network as well, it is also usable for complex situations within the process.

Disadvantages

The first disadvantage is that the change of routine could cause stress for employees. A second disadvantage is that the focus is not on the project, but on the optimisation of one's own job and therefore only the responsibility for their own input. Third, the organisation should find the tools for enhancing quality by themselves. Fourth, the vocabulary could be difficult to understand for employees, because the most concepts are in Japanese and it is a philosophy which could be difficult to understand. This could be a larger issue for the adjusted version for governmental organisations, because this model is less well known. Therefore, some effort of the employees should be expected and an investment of the organisation to give the employees the flexibility to do this. At last, because a third party could be needed to implement the model properly.

4.2.3   KO-MODEL

This model is derived from the INK-model, which is designed specifically for governmental organisations. The INK-model and the KO-model are similar to each other but differ in some aspects. First, 'policy and strategy' is the central point of interest in the KO-model, which is termed 'leadership' in the INK-model. This is because of the social context wherein a government operates. Second, the INK-model has a point of interests which focuses on the 'customer and supplier' and 'society'. In the KO-model, they split these points differently, because there is a point of interest focussed on the appreciation of the target group (e.g. citizens, the National government), but also third parties (e.g. other councils or parties who are not directly the target group but with whom the organisation collaborates). And finally, the finances have a different role, because governmental organisations have to be characterised by both integrity and openness.

An organisation is successful if there is a cohesion on and growth in all ten areas (see fig. 13 on the next page). This model is a tool for dealing with the dynamics and complexity inside and outside an organisation and has different uses in practice. The model serves four different functions (INK, 2011):

1. reference framework: which means that the model is used to classify aspects of an organisation;
2. diagnosis model: to reveal the strengths and points of improvement within an organisation;
3. model of development: on the basis of ambitions and strategic goals, the model is applied for setting in improvements;
4. management model: here the model is used as planning- and control tool to regain grip on the process and development within an organisation.

This model has 10 points of interests, which are illustrated in the figure on the following page. The main question in the organisation area is: what are the goals and what the means are for achieving these goals. The result area is focused on evaluation and producing input for improvement and renewal. The connection between these two areas is the basis of improvement and eventually success.
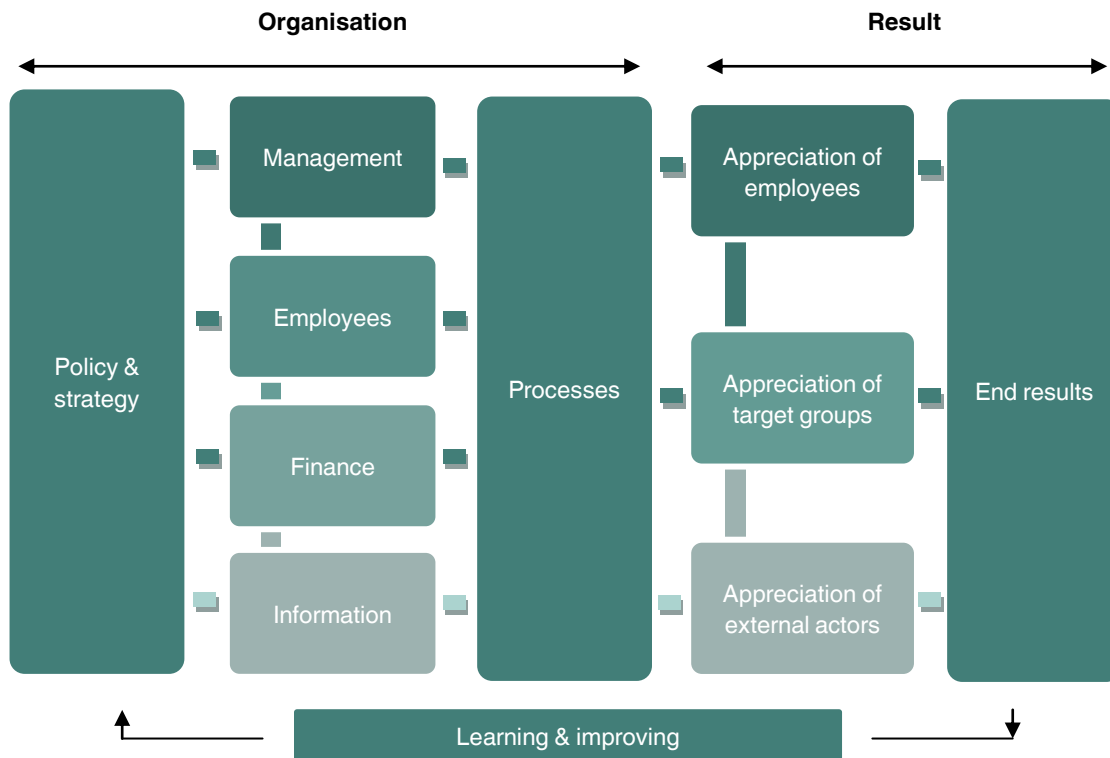
FIGURE 13: KO-MODEL (BESTUURSACADEMIE NEDERLAND, N.D.)

The development of quality takes time. The development in an organisation involves a number of different stages:

Phase 1: activity oriented: The emphasis is on the implementation of the activities. There is no shared vision and control on the internal quality of the organisation. A description of the organisation processes is possible in this phase.

Phase 2: process oriented: The primary processes are controlled. The organisation has a clear and shared vision about the way its processes are controlled, how the employees are involved and how the means are used. The separated process steps are described and the tasks and responsibilities are set out. Performance indicators are established for the primary process, on basis of these measurements improvements will be made.

Phase 3: system oriented: People on all levels work in a systematic way to improve the primarily process. The PDCA-cycles is applied on both the primary process and in the support and steering processes. The performance indicators are established for all the processes, which are regularly evaluated and modified. The appreciation of clients, management, financiers and society influences the policy of an organisation significantly. The main focus of this phase is the prevention of problems instead of fixing problems.

Phase 4: network oriented: The policy of an organisation is established in close cooperation with its partners. Partners are compared to select the one most suitable to the task. Also, the evaluation of the policy is done together with the partners. Innovation is the most important element of this phase.

Phase 5: improvement and renewal: The process of improvement of the organisation is rooted in the organisational structure and culture. There is an anticipation in new trends (social changes and new legislation). Because of the wide vision, innovation can start in an earlier stage and the cooperation with partners can be adjusted. Quality is not only the responsibility of the organisation itself, but of its partners as well.

(INK, 2011)

Advantages

First of all, the KO-model is adapted to the governmental organisation setting. Second, the KO-model is focused on various stakeholders and complex processes because not only ten points of interest are taken into account, but the development of implementation is closely monitored as well. Second, by setting out the current position of the organisation using these ten points of interest, areas of improvement can be defined and the strategy can be adapted to the new situation. It is a convenient tool to evaluate the situation, which could eventually lead to faster processes. Third, the KO-model focuses on the process-, input- and output steering as well as en points of interests and therefore has a broad range of application. Fourth, the model looks at both the network and employees and gives more flexibility and creativity to the employees. Fifth, the KO-model is a widely used model in governmental organisations in the Netherlands. The KO-model is both bottom up and top down. Hardjono & Bakker (2006, p.31) argue that everyone should have the possibility to hold anyone accountable (vertical and horizontal), because in such a way a collective success is a collective performance as well. Finally, the KO-model has developed a common language, which makes it easier for employees to discuss the model.

Disadvantages

First, the model provides only a diagnosis of the organisation and does not provide the tools to convert the points to development in concrete points of action to improve the quality of the organisation (Kerklaan en Hoogendijk, 2004). It is difficult for an organisation to develop their own tools of improvement by themselves. Because of this, the focus is more on the organisation itself than on the customer. Consequently, it is almost impossible to succeed with the continuous quality improvement. As a result it is almost impossible to get the certificate for continuous improvement, because an organisation cannot prove that they fulfil the requirements for passing the certificate. Second, the KO-model is a complex model with the 10 points of interests and 5 development stages. It costs a lot of time, energy and discussion to translate the KO-model to a specific organisation and needs external help as well.

4.2.4   SIX SIGMA

The name "Six sigma" (6σ) is derived from statistics. Six Sigma is a methodology for enhancing quality within an organisation and is developed in the '80's by Motorola (Wiklund & Wiklund, 2002, p.233). Six Sigma has three main aims: first, just like Lean, Six Sigma puts the customer first. However, by Six Sigma facts and data are used to achieve better solutions and improve the quality in the organisation. Second, it reduces the cycle time. And finally, it reduces the number of defects (Pande & Holpp, 2002, p.3). To sum up, by reducing the errors in the whole route (from the beginning to the public services) and declining the customer satisfaction will be enhanced.

Six Sigma closely follows the DMAIC-mode with four stage: measuring, analysing, improving and controlling, with sometimes an up-front stage: defining added (Wiklund & Wiklund, 2002, p.236). The implementation of the DMAIC-model is based on statistical tools and statistical design of experiments.
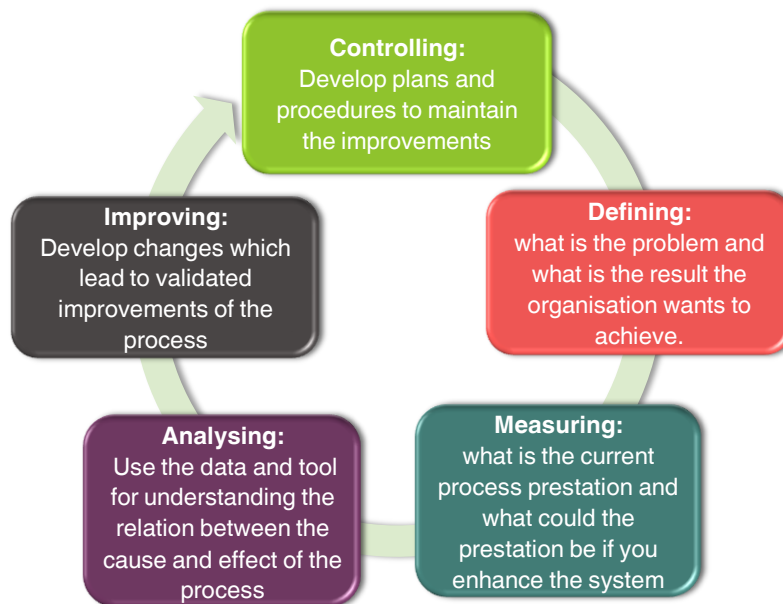
Advantages

The first advantage is that the improvements are evidence based. This is done by exposing the relation between customers' demands and critical points in the internal processes. Second, the model is focused on the customer and the improvement of customer satisfaction, because the Six Sigma model is to improve the internal processes and to reduce the variations of their input (Antony, 2006, p.236). Third, reduced number of non-value added operations through systematic elimination, leading to faster delivery of service (Antony, 2006, p.237). Fourth, reporting accuracy is improved (Aboelmaged, 2010, p.281). Fifth, knowledge of various tools and techniques for problem solving is improved, leading to employee job satisfaction (Antony, 2006, p.237). Sixth, the focus area of Six Sigma is relatively broad, because it focuses on customers and internal processes to improve customer satisfaction. Finally, by using the DMAIC-model the processes are described in a structured manner, resulting in a clear view of the road to improvement.

Disadvantages*

First of all, it is difficult to quantify every service, since the services provided by governmental organisations are not standardized. Second, the model is a rather complex. The employees will have difficulties to understand the subject and external help is needed to implement the model. Extra expenses (e.g. employees and money) have to be made to implement the Six Sigma model. Third, Six Sigma is not well known by governmental organisations. Furterer & Elshennawy (2005, p.1180) stated there are only a couple of local government entities found which used Sig Sigma. Although, it should be emphasised that this research is several years old. Fourth, by emphasizing the strictness of a process and its control in the model, it contradicts with innovation and creativity which are also important factors within a complex working environment. According to Antony (2006, p.245) Six Sigma emphasises the importance of data and decision-making based on facts and data rather than assumptions and hunches, which also leaves no room for flexibility. Fifth, Six Sigma has a top-down management style (Antony, 2006, p. 245). Finally, it measures what customers want, but does provide the organisation with the tools to enhance the quality.

4.2.5 ISO-9000

ISO (International Organisation for Standardisation) is an international recognised standard for quality guarantee. This system coordinates different sections of an organisation and forms the publication of norms. The ISO-9000 family is the most widely-known version of all ISO norms, which represent an international consensus on good quality management practices (ISO, 2011). This system can be implementing in all sort of organisations: regardless its size or whether the organisation is public or private. The aim of this quality system is 'customer satisfaction', or 'satisfaction perceived by society'. It questions if the organisation meet their promises. The main task of the ISO-norms is to develop a quality system in an organisation by giving the requirements. However it does not dictate how an organisation should implement the ISO-9000 norms.

The ISO-9000 (2000) is a second revision of the ISO norms, which now has one norm and two directives. The choice of the ISO-9000 family depends if an organisation wants to have a certification or not. Because the directives cannot be certified.

ISO	Norm/ Directive	Certification	Content	Purpose
9000	Norm	No	Fundamentals and vocabulary	Establishes a starting point for understanding the standards and defines the fundamental terms and definitions used, in order to avoid misunderstandings in their use.
9001	Directive	Yes	Requirements	The requirement standard used to assess the ability to meet customer and applicable regulatory requirements and therefore address customer satisfaction.
9004	Directive	No	Managing for the sustained success of an organisation	Guideline for continual improvement of the quality management to benefit all parties through sustained customer satisfaction. (a quality management approach)

TABLE 7: OVERVIEW ISO-9000 (ISO, 2011)

Advantages

There are advantages with ISO-9000 certifying. First, there is a competitive advantage through enhancement of business processes. Second, by enhancing business processes, an increase product sales is established. Third, one big advantage is that the ISO is a well known model. A lot of information is available and a lot of research has already been done. Fourth, although the implementation could be done by the organisation itself, the certification is done by an external organisation. Fifth, ISO 9000 gives more tools for enhancing the quality than other models, because of the guidelines in the directives. Sixth, decisive management changes are based on facts. At last, by getting a certification, the confidence of the important users in the network is increased.

A critical comment should be made about these advantages. These arguments are only partly related to the public sector, because the organisations in public organisations are less dependent on customers and the open market. Therefore, the main advantages for the public sector are more adjusted to their situation. First, the customer is central. Second, the processes are more effectively and efficiency. Third, the ISO-9000 ensures a more uniform framework, which makes the implementation of the model easier for the employees. Bouckaert & Thijs (2003, p.177) stated that most public organisations working with ISO 9000 are organisations who are used to customers, suppliers and contracts. Another reason for working with ISO 9000 is that other partners in a network are using this model.

Disadvantages

There are also a number of limitations and shortcomings in this model. First, the model is focused on a status quo and pays no attention to the development of the learning process within an organisation and quality improvement, which hinders innovation and creativity. Second, the certification is perceived more important than quality, although certification is not equal to quality. Third, the focus is too much on a documented quality system and governance of the process instead of the enhancement of quality, which results in extra costs. Fourth, it could lead to bureaucratisation, which creates more organisational overhead. Fifth, the public sector is more a service sector, where standardized processes do not exist.

4.3 Conclusion quality models

In order to put Lean management into perspective, value is added to various fundamental aspects of the model which are important for WMCN. The four models discussed in this chapter are listed in table 8. First of all, Lean is reviewed in two versions of Lean (the original model of Toyota where KR8 is based on and the adjusted version for governmental organisations from Huguenin, Binnerts and van Gestel (2011, p.17). KR8 is not discussed separately, because it is just a small part of the original Lean and therefore only the original Lean is discussed in this paragraph. Subsequently, the following models are discussed in the table: the KO-model, Six Sigma and ISO-9000. The four models are a lot alike, using similar concepts with a corresponding meaning. All four models state that a process should have as less variations as possible and should be standardised. They also use the concept of continuous improvement. This is being done with the PDCA-circle, with the exception of Six Sigma which uses the DMAIC-circle. The KO-model is the odd one out, because it is the only model using a self evaluation principle.

In this paragraph the values are also summarized in table 8. The statements marked in light purple, are the statements that RWS is considering as important, because these statements are found in their business plan 2015. Each criteria has two opposite statements which have the following values:

- The statement suits the first part of the statement the best, than the statement is rated with ++
- If the statement is less evident, the statement is scored with +
- When statement does not suite either of the statements, the statement is estimated with +/-
- If the second statement suits the quality model bester, the criteria is marked with -
- If the second statement suits the model the best, the quality model is rated with –

Criteria / Quality model	Lean (original)	Lean (government)	KO	Six sigma	ISO 9000
Suitability					
1. Applicable to governmental organisations (++) or more business focused (--)	--	++	++	-	+
2. Focus on customer service (extern) (++) or focus on the organisation (intern) (--)	++	++	+/-	+/-	+
3. Is well known by partner organisations (++) or not (--)	+	-	+	+/-	++
4. Broad focus areas (++) or small focus areas (--)	+/-	--	++	+/-	-
5. Suitable for complex processes (++) or suitable for standardised processes (--)	+	++	+	--	--
6. Bottom up (++) or top down(--)	++	++	+/-	--	-
7. Faster processes (++) or not (--)	++	++	+/-	++	+
User friendliness					
1. Gives structure by describing processes (++) or gives a philosophy on how quality should be improved (--)	+	+	++	+	++
2. Easy to understand for employees (++) or not (--)	-	--	+	--	+
3. Ask little recourses (e.g. employees) of the organisation (++) or a lot of recourses (--)	-	+	--	--	-
4. Possible to implement by yourself as an organisation (++) or external parties are needed for implementing the model into the organisation (--)	-	--	--	-	+/-
5. Promoting communication (++) or not (--)	+	+	++	+/-	++
6. Flexible (++) or controlled (--)	++	+	+	--	--

TABLE 8: OVERVIEW QUALITY MODELS WITH CRITERIA

It is important to know if Lean is the best model on basis of the preferences of WMCN. Studying the goals, ambitions and mission of RWS which are presented in the Business Plan 2015 it is clear that some of the criteria's are more important for WMCN.

The first thing to look at is if the model suits the structure of a governmental organisation. Lean Management and KO-model both score high in this regard. These two models are adapted to the environment of governmental organisations. A next criteria is the focus on customer service. This is a new development within RWS. In the Business Plan 2015 is stated that this is an important issue for the next few years. Again, Lean scores high on this criteria. Following, RWS tries to enhance primary work processes with a ´bottom up´ approach (Rijkswaterstaat, 2010e). This (empowerment) is most present in the Lean model. Nonetheless, it is important to note that the beginning of the process is ´top down´, because the management should set the goals. Later the process is ´bottom up´. Furthermore, is it important that the employees can understand the system, not only so that they can implement the system by themselves, but also that they can trust their management. The last important criteria is how flexible an organisation is. Again, Lean and Six Sigma score both high on these criteria. Six Sigma is flexible because the production process is described in detail with cause and effect. In Lean flexibility it is doing the right amount of effort at the right moment, in this way there is less waste in the process.

To conclude, although ISO 9000 scores the most plusses in the table, Lean scores the highest regarding the most important criteria. Besides these criteria, there is the question if Lean could learn from other quality models. The various models have many similarities and the pros are most of the time also applicable on Lean. Although, there are elements from other models that could be useful for Lean. One important factor what Lean could learn from other models is the fact that ISO-9000 has a well document structure for processes. However, the pitfall of a bureaucratic organisation should be kept in mind.

The most important conclusion is that every model has its own purpose, and the different models could be used side by side. The KO-model is a good model to spot weakness in your organisation and to known in which phase of development your organisation is. Six sigma could enhance the credibility by creating a uniform process. Whereas ISO-9000 could help an organisation with the documentation of the process, such that the organisation can operate robustly in the event of changes (e.g. employee leaves the organisation). After reviewing literature on what could influence the implementation of a quality model, the most factors are valid for all quality models and not specific for Lean. It is important to make use of the elements that could enhance the quality and efficiency of the organisation concerned.

5. DEGREE OF IMPLEMENTATION OF KR8/LEAN AT WMCN

In the previous chapter the theoretical part of quality systems have been discussed. This chapter goes into further detail regarding the criteria for quality systems. This chapter is about the results of the open questions done at WMCN, that was carried out in May 2012 and concerned questions about Lean Management. In the first paragraph the meaning of the definition of quality systems according to the interviewees at WMCN will be discussed. In the second paragraph the second research question will be elaborated: *What is the degree of implementation i.e. the current status of WMCN regarding quality management and the KR8-model?* Lean is more extensive than KR8, and because KR8 is based on Lean, this chapter will be illustrated with the model of Lean Management for governmental organisations (Huguenin, Binnerts & van Gestel, 2011, p.17).

5.1 Field Research about quality systems

The definition of a quality system formulated by Bouckaert & Thijs (2003, p.144) "a quality system is a standardisation of production processes, by applying rules, procedures and written instructions, so that these processes proceed properly", is generally consistent with the definition given by the employees that have been interviewed. Almost everyone shares the opinion that a quality system is a standardisation of work processes, so that the quality can be maintained at an equal level or even a higher level. Although sometimes a quality system is only perceived as a PIN (performance indicator) or as written manuals (instructions how to deal in crisis situations). Also, WMCN did not choose to use ISO9000 because *"it would involve too much time and in practice you do not need all the information, we can spent our time better".* This perception is logical because the employees within WMCN work with the PIN's and are busy with (re)writing manuals in case of a crisis.

Bouckaert & Thijs (2003, p.144) also stated that for *a good quality system* paragraph 4.1.2 , four criteria should be met:

1. The system is understood by the employees
   RWS now works with KR8 as quality system and although the concept is well known within VWM, section WMCN, the meaning and implication of KR8 is not clear. In the planning of RWS (2011b, p.65) it is visible that for 2012 only training is scheduled and 'doing it by yourself' is planned for 2013. However, the head of section is one of the first managers within VWM who followed the training KR8 for managers and he is keen to apply his knowledge to his section. However, the employees think that more information should be given about this subject.
   The PIN's are clear to the employees and these PIN's give clarity to them in such a way that the employees knows what can be expected from them. Most of these PIN's are about the reports for water levels.

2. The system is effective
   KR8 is already implemented as a pilot in the service area IJsselmeer and because of the success of this pilot, KR8 is implemented in the whole organisation of RWS. It is proposed that by eliminating 'waste', the overall process will be more efficient. Also, the idea is that by involving employees in the process of improving RWS, the chance of accepting the model by the employees is larger. There have been small successes and

instances of progress. Employees thinking about their own working process and how these processes can be improved.

Although most employees are not sure of how KR8 could be implemented in the task as crisis manager. The product of these situations is communication, and each crisis needs another plan of approach because there is no standardisation in the process. Although manuals are used, it is impossible to write the manuals and processes in detail.

3. The system ensures that the demand of the society (intern and extern) is satisfied.

By using the KR8-model, the demand of the extern society is satisfied. More than ever, the focus lies on questions like: what do these customers want? And can WMCN satisfy the expectations of the partners? These questions are not yet adapted to the quality system, however, the employees are aware of the need from the extern society. It is still a growing process. Also, the employees are aware of the different types of customers: the political, alliances and the civilians and the influence of these types of customer on their quality level.

Nevertheless, there are also intern societies, which are the employees themselves. The work manuals are seen as important elements of a quality system, although these should not be too strict, so that employees can improvise when a crisis occur. A lot of employees who have been interviewed have (different) tasks which are related to enhancing the quality of the organisation of WMCN. These tasks are mostly their own idea about how they can improve WMCN. These people see that their wishes are included in the quality system.

4. The system is focussed on preventing problems.

The way WMCN is operating in regard to quality is evaluating situations afterwards. This is been done in both activities (reporting about the water levels and coordination in case of crisis). Although some employees initiate meetings to improve for example the report of water levels, most improvements are done by recommendations in evaluations or changes are made if something in the past went wrong.

5.2 Field Research about Lean Management

In this paragraph the results of the interviews and document study for WMCN are discussed. This chapter begins with how Lean is measured. The second until the eight paragraphs is based on the building blocks of Lean Management for governmental organisations. There are seven building blocks: focus on customer service, strategic goals, professionalism, quality, efficiency, learning and improving and integrity and collaboration. The combination or foundation of these seven building blocks, the basis, is strong teams.

5.2.1 MEASURING LEAN WITH PIN'S

In order to measure the performance of an organisation, PIN (Performance Indicator Norm) is used. On organisation level the achievements which the organisation should meet, are defined. These achievements are convert into goals (PIN's) which the work floor should met. The focuses of PIN in Lean Management are mainly on quality, time (which is needed for a product) and waste.

The PIN's at WMCN are mainly focused on the operational processes within the organisation.

5.2.2 THE FOCUS ON CONSUMER

WMCN has a lot of customers to pay attention to. In the business plan 2015 (Rijkswaterstaat, 2010b, p.11-12) five types of customers are visible:

1. Politicians
2. The civilians
3. Market players
4. Partners in the network
5. The employees of RWS

Per task there are different customers, which lead to different answers in the interviews. This could be explained by the different jobs people do with different goals. However, most employees see maintaining the contact with customers as an additional task. Because of this, there is no standardised approach regarding the communication with customers and the type of customer is not mentioned in the description about the work activities from each employee. Moreover, each type of customer needs a different approach for satisfying their needs. Based on the interview results, most employees agree on the fact that implementing a quality system is essential in improving the customer services. Due to the variety of the different types of customer groups, is it important to properly specify when services are being offered to a certain type of customer, because in some occasions certain customer groups are combined or represents another customer group. Also, some employee's state that some type of customer are more important than others, which could lead to mixed products. "*We have professional and non professional customers. However, personally I find the professional more important. It is also harder to get a uniform image of the non professional customer (for example civilians).*" However, this decision is not to be made by the employee, and should be defined by the management. When the management is more decisive on this matter, they can also become more aware of what their employees are doing. "*I have the problem that I do not have an overview of all the processes*". Because of this other customer groups such as the civilians and the politics are not as involved in the everyday tasks.

This makes it unclear for customers where they have to be for their demanded services, rather there demanded services can be provided by WMCN and what information they have to provide to WMCN. However, WMCN is aware of this, and work is being done to get a better insight of what the customer demands are (for example through evaluations with customers).

However, conducting evaluations afterwards is not enough because too less attention is given on moment when the problem occurs. In such an occasion, the problem has to be investigated and actions have to be taken. The goal has to be to design the process in such a way that no problems occur and that no evaluations afterwards are needed. This saves a lot of time and resources.

Another step to satisfy the customer needs is by changing the hierarchical method of giving information to the so called "net centric approach", which is explained in paragraph 2.5.3. This will lead to the better provision of information and customers get relevant information faster.

5.2.3 STRATEGIC GOALS

The strategic goals have been clearly formulated. One of the long term goals is to create a clear vision how the customer services have to be provided, using the Lean principles. This means that decisions made by WMCN should be made in the best interest of customer and how it can benefit the customer services. Realising long term goals have priority, meaning that it overrules (conflicting) short term goals.

The strategic goals formulated by RWS have been formulated to realise the mission, which is a result of the combination of the goals and ambitions (see figure 2). The program "one Rijkswaterstaat" represents the first goal "working in one team" and which represent the building block "strong teams", the foundation of Lean Management. Currently a lot of different teams are operational at WMCN. They are all operating independently, making them weak. By improving the collaboration between the different teams, they can operate stronger and eventually improve the customer services.

The second goal ("working closely together with others") and the first and third ambition ("network manager with a focus on the community" and "decisive crisis management") represent the building block "Integrity & Collaboration". Collaboration should not only be an internal matter, but should also concern working with other parties outside the network. Without these parties it is hard to guarantee the quality and to be reliable during a crisis situation. However, to be able to act as well as possible during a crisis, the organisation has to be efficient in order to get deliver the right services to the customer. The fourth ambition ("providing information") concerns this subject. In order to provide the right information in the right way, and organisation has to be able to rely on his systems in order to communicate.

The third goal ("continued improvement of the organisation") is a typical topic from Lean Management and covers the topic "Learning & Improving".

The combination of the goals and ambition lead to the mission (dry feet; sufficient and clean water; reliable and useful information; smooth and safe flows of transport on the nation's roads and waterways), and seems to focus on customer services who are less known to the employees, namely the politic (for the accountability) and civilians (for whom you want to make a saver country).

5.2.4 PROFESSIONALISM

According the Lean principles employees tent to overload (muri) when the dispersion of the workload is irregular (mura) (Huguenin, 2011, p.22). Most organisations are used to adapt to the variable customer demand, causing the irregular workload. As a result, the pace of work changes because at some moment there is more work to be done then at other moments. Based on the interview results, employees usually work on one or two projects which lead to various tasks. The employees write a plan of approach for these projects and divide them into different sub processes.

The dichotomy of the WMCN organisational tasks is also mentioned in the interview results. As one of the interviewees mentioned, a distinction is made between the operational processes and the remaining tasks (project work): "*Well look, it's a matter of how to prioritize. Your work is also part of the operational process, which has priority at all time*". A number of employees are working on projects related to the operational process to improve the communication and collaboration with network partners. The primary goal of these projects is to become more aware of the customer demands and how WMCN can use this information to be more proactive towards to customer. These projects are quite specific and do not include any kind of standardisation.

According to Lean a professional is somebody who can indicate exactly what is necessary to get their results for their discipline and can predict what the result could be (Huguenin, Binnerts & van Gestel, 2011, p.23). Huguenin, Binnerts & van Gestel (2011, p.23) also state that a professional organisation shares these knowledge systematic and with the employees together this knowledge will be improved. This can be done by describing

standardisation. However, employees of WMCN do not think their work is suitable for standardisation: "*I don't think it is possible to implement KR8 by crisis management, because it involves a lot of improvisation and adapting to the (new) situation".* According to the Lean principles, continuous improvement is not possible without standardisation. The currently work processes are not yet described. At present, WMCN has documented the processes of what has to be done when a crisis occurs. This includes the communication lines and the different roles of the actors involved. Every year, theses documents are being reviewed and improved within the LCO. However, according an evaluation done in January 2012, these documents are not properly used.

To guarantee a better usage of these documents, WMCN is currently working on the OTO-plan (Education, Training and Practice) which focuses on specific roles rather than to be broadly orientated. For example, high tides only occur occasionally, so it is important not to lose focus in case it does occur. When using an OTO-plan, WMCN is able to see the education and training background of the employees and more importantly if there is any knowledge that is missing.

Although there is a standardisation of the daily reports, the process within WMCN still lacks a form of standardisation, even though this is a daily activity. Three things still go wrong: first, the meaning of the message is not always clear. "*Our primary customers understands our messages, however for the press/civilians/safety regions is it not always 100% clear".* Second, the information reaches customers thought different channels. Third: customers sometimes receive different messages from different people within the organisation. However, within WMCN the first steps have been taken to standardise this process and how this has to be achieved. This results in some anxiety among the employees who fear that this will result in the merger of all the coverage services (costal area, IJsselmeer and the river area), even though they all report on very different factors.

The section it is not very transparent on the process of the different projects. The head of section has a project schedule at his office, but even these schedules are not very precise.

5.2.5 QUALITY

In terms of quality the subject that matters is rather the organisation stops working on a product or project when it does not lead to the by the customer desired results. This also affects an organisation factor: the culture of an organisation. Currently, at WMCN information is delivered to customers in fragments rather than all at once. This problem is being recognised by the employees. Therefore workgroups have been set up in order to come up with a solution to this problem. WMCN distributes using a number of different methods such as e-mail, teletext, internet and Madison. However, in case of an emergency, WMCN checks to make sure the information has been received by phoning the recipient.

Although some employees are of opinion that customers can contact them in case of ambiguities, other employees are of opinion that the given information is to indistinct in the first place. The given information is often very specialist which makes it complicated to understand for customers who do not have the necessary knowledge. This is a direct result of the growing group of customers, which causes a switch from not only professionals to also, for example, civilians and the media. There is a solution for this problem, by providing a summary of the data that is understandable for everyone and an attachment with more in depth information. Nevertheless, employees experience a lack of guidance on this subject. This subject is also being addressed by the safety regions. The safety regions use the information provided by WMCN for water management purposes, but lack the specific knowledge to process the data. It is also possible for customers to specify the data they want

to receive, but most of the time, they will choose to receive al lot information and due to the large amount of data it hard to determine what it relevant and what not.

Another factor that causes uncertainty is the different organisations who deliver the data. Sometimes data is being delivered by WMCN as well as the Regional Message Service. This can lead to uncertainty because there can be a difference between the two datasets (for example because one prediction has been done several hours before the other one). The disadvantage from data providing from different organisations is also that it is unclear for customers which organisations is responsible for what. In case of questions is unclear to which organisation they have to turn to.

5.2.6   EFFICIENCY

Efficiency is being determined by 8 types of waste ('muda' and 'flow'). Waste is what does not add any value to the product or service, but does cause a longer duration of the process. Muda is the value that is being delivered to the customer. Therefore it is important to describe all the different steps within the process and to determine if value (muda) is being added in every single step. The head of section does currently not have an adequate overview of the different processes in his section. As a result he is not able to oversee the different steps within the processes.

As mentioned in paragraph 4.2.2, 8 types of waste can be identified. The employees of WMCN have been asked about their opinion whether these types of waste are present within the organisation.

1. *Doing too much:* this is particularly a problem in case of a crisis situation. In such a situation information has to be handed out as quickly as possible and doing too much only causes unwanted delay and pressure. Such a crisis situation however does not occur that often. But even in such a situation employees should be able to ask a customer for more information to able to deliver a better and more precise product. By doing so it could prevent that too much (unneeded) information is given to the customer and vice versa and that too much time is being wasted on determining what the customer wants and what WMCN needs to deliver this.

2. *Waiting:* there are no reports of time being wasted because employees have to wait for input before they can continue with their work. The communication lines are quite short which means that employees easily contact each other when they need something. However a difference is being made between a warm (crisis) situation and a cold (normal) situation. In case of a warm situation, everyone is extra alert and respond more quickly on questions and requests.

3. *Transportation and transfer:* most documents do not go through more than one section or the whole organisation, but there is no information system through which documents from different part of RWS can be consulted. Changes can be very hard to achieve within WMCN. Due to many meetings a transition process can take very long. In a difficult situation this process is sometimes also being hampered because earlier made decision are once more being reviewed.

4. *Putting too much effort in a product:* most employees agree that the final product does not necessarily have to look perfect but that it however has to be representative. Within WMCN corporal guidelines have been set up but, beside the head of section, none of the employees mention these guidelines. When it comes to the quality control there is some discrepancy. One halve of the interviewees state that they never spent time on quality control, while the other have of the interview frequently discuss their work with colleagues to remain focused and to able to improve their work during the process. There are however no specific controls on the quality of the work that is being delivered by the employees. It is difficult to determine rather too little or too much effort is spent on doing the work. To be able to do this, first the work processes have to be defined.

5. *Searching*: employees do not spent a whole lot time on searching for office materials, files, and (recent) documents. Due to the short communication lines employees easily ask each other where to look for something. To further support this, the head of section tries to keep de section as clean and organized as possible. This creates a better and more inspirational work environment in which employees hold a better overview of their work.

6. *Unnecessary motion:* currently, the setting of the office is not very practical. This is however a temporarily setting. Later this year, employees will move to a final place in a more efficient setting. In this new and old setting office supplies will be easily accessible.

7. *Correcting your own work:* occasionally it occurs that information is invalid and has to be corrected. However, this is being experienced as something normal. Making mistakes is only human and cannot be ruled out. It is seen as method to improve the quality of organisation.

8. *Untapped talent:* there is not very much loss of talent. WMCN has set a goal to involve everyone in the process as much as possible. Currently, this is not completely working out yet, but process is being made. For example, recently a meeting has been organized for all the employees to discuss how the coverage of the water levels has to be handled. There were problems related to this subject and by organising such a meeting, everyone is being involved and kept up to date.

   Manuals and forms are also set up by employees form WMCN (sometimes with the help of an external consult), using their full potential.

To optimise the workflow is hard to realise within WMCN. Although employees indicate that they are able to work well at the WMCN office and that there are options when they don't want to be disturbed (for example by closing the door or moving to another workplace), they also mention that it is hard to get into a 'flow' because they are working on to many thing at the same time. This is particularly the case in crisis situations when a lot happens in short period of time. This leads to a lot of extra work that comes on top of the current activities. This requires the ability to be flexible and switch between different subjects, but it does lead to a loss of time.

5.2.7   LEARNING AND IMPROVING

There are different opinions related to the subject on giving feedback. Positive feedback is easily given and the employees know how to find their colleagues to help them. However, in the case negative or critical feedback employees act more cautious since the feedback tents the become more personal. Feedback from the management is usually only given when one asks for it. When an employee is more often proactive in asking for feedback, the quality of the feedback improves. However, due to the recent organisation the head of section is often not present at the office or busy working on other activities.

To encourage employees and management to be more open in giving feedback, an open culture is beginning set up. However, not everyone is convinced by the advantages of such a culture. There is doubt rather it is useful, secure and how it will influence the overall working atmosphere. Due to the reorganisation employees also have the feeling that their job is on the line. The same amount of work has to be done, only now with less people.

Another method to learn and improve is 'nemawashi'. This means more time is being spent on developing and testing possible solutions and that the final decision is only made when all the professionals have been able to give their input. In terms of implementation this means that is has to be done quickly and that, if necessary, the implementation process has to be adjusted.

The PDCA model (see paragraph 4.1.4) is very useful to support this. All the interviewees have heard of this model but most of them are not working with it. They see the PDCA model a process that occurs more or less on its own, although in this case not much emphasise it being putted on the 'check' and 'act' part because it is 'less fun' to work on. The head of section does use the PDCA model to evaluate the current projects and to determine rather adjustments have to be made.

5.2.8   INTEGRALITY AND COOPERATION

At WMCN employees are encouraged to give input on how the processes at WMCN can be further optimised. The request for input comes from both employees (for example through an OTO-plan) as from higher management. The WMCN customers are also more frequently consulted and involved in the process optimization process. Without a decent form of collaboration crisis management is not possible, and employees are well aware of this fact.

To achieve this, it is essential that managers know what they are talking about and that they have a decent understanding of the Lean principles. Because of this, the head of section has recently attended to a course to get a better understanding of the Lean principles. However, this course has only been completed recently. Therefore the head of section has not yet been able to bring his knowledge into practise.

5.2.9   STRONG TEAMS

Strong teams are not really a building block of Lean management, but it does set a foundation for all the real Lean management building blocks. Within WMCN there still are a number of groups who exist independently of each other and control their own quality. WMCN is aware of this and is currently working on creating one organisation. The employees are aware of the fact that this process is going on and try to find solutions to act as one organisation. They are positive about this development which has resulted in a positive frame of mind. By making WMCN one organisation, the teams will be stronger. However, it should be kept in mind that WMCN is already a form of efficiency: "*Until 5 years ago, all the different services were spread over different organisations. Crisis control can now be tackled in a uniform way, which is already a big step if you compare it with 5 years ago*".

5.3 Conclusion

By evaluating the definition of a good quality system by Bouckaert & Thijs (2003, p144), two problems pop up with KR8 and a quality system. The first problem is that the system is not clear for the employees of WMCN. Although PIN's are introduced. The employees are only aware of the PIN's in the management contract. Second, the demand of the external society and employees are not enough ensured.

These two problems can be explained by the fact that the model is relatively new and there are various ways to embed such an approach, such as courses. Also, partners in the network are not enough approached by WMCN. Although, first steps are made in this process.

With respect to the building blocks of Lean Management for governmental organisations there are several conclusions that can be made:

- **Customer focus:** not everyone has the same focus in regard to who the customer of WMCN is. An organisation like WMCN has a lot of customers with different needs. Therefore it is important to know for which customer you are working for and to know what they want from WMCN and what WMCN wants from them. Also, not everyone knows why it is important to share an equal focus on the customer. Most employees think that doing evaluations is enough to guarantee and improve your quality.
- **Strategic goals:** the Lean principles are reflected in the strategic goals from RWS. The focus on customer service is a central issue within the organisation. Also, the building blocks "Strong teams", "Integrity & Collaboration" and "Learning & Improving" are present.
- **Professionalism:** conclusions made in regard to professionalism: first, within WMCN a distinction is made between operational processes and the remaining tasks (project work). The operational processes can be described as standardised work, and the project work demands every time another unique approach. Second, although the daily reports are standardised, the reports does not come across well by customers. Because customers get the information from different people within WMCN, it is difficult to understand. Also the meaning of the information is not always clear to all customers and sometimes information arrives more than ones at the customers.

  Third, the communication lines in case of a crisis are described very well. The responsibilities are clear as are the actions have to be taken. These documents are also regularly updated.

  Fourth, with the OTO-plan the knowledge and expertise of the employees are standardised. However, a lot has to be documented about the current activities from the employees before these can be standardised.

  Fifth, there is no central black board with the processes of different projects.
- **Quality:** information given by WMCN is scattered too widely. Some messages are given by different sections within WMCN. Though WMCN is aware about this subject. Also, the interpretation of the information lacks clarity for the customers.
- **Efficiency:** in summary the degree of how present the 8 types of waste are:
  o **Doing too much:** The customer demands should be clearer to WMCN, as should be demand from WMCN of the customer.
  o **Waiting:** within WMCN there is no problem in regard to waiting.
  o **Transportation and transfer:** documents mostly stay within the section, but there is no knowledge system and the meetings have a tendency of taking too long.

- **Putting too much effort in a product:** this is difficult to evaluate because it is something personal. Employees agree with the fact that documents should look representative for the organisation. Also, there are no strict controls on the individual employees.
- **Searching:** employees are not losing much time by looking for documents or other employees within WMCN.
- **Unnecessary motion:** at present the way the office is organised, it is not practical. However, in September 2012 there is a reallocation of workplaces what should resolve this problem.
- **Correcting your own work:** mistakes do happen within WMCN, but not too often. When a problem occurs, this problem would be resolved as soon as possible.
- **Untapped talent:** this is a process which is improving. Employees will be asked to help with improving the organisation.

Working in a 'flow' is according to the employees difficult to achieve. Although the resources are available for working without getting disturbed by fellow colleagues, employees often have to switch between lots of different activities.

- **Learning & Improvement:** the first steps to a more open culture have been taken, although employees are not always convinced that management could provide help. A second point is the use of the PDCA-model. All employees know this model, but in the daily activities it is hardly used.
- **Integrity and cooperation:** WMCN and mainly the employees are gradually beginning to recognise its importance of cooperation with colleagues and from partners in their network. To accomplish this it is important that the head of section is educated on the field of Lean. The head of section is one of the first managers within RWS who has completed the course about Lean Management.
- **Strong teams:** within WMCN there are different groups with their own way of working. Although in terms of efficiency a lot can be improved by means of internal cooperation.

6. ORGANISATIONAL FACTORS

The first paragraph discusses the different organisational factors which are found in scientific literature that could influence the implementation of a quality model within an organisation. In the second paragraph the research will go in depth by analysing the survey questions. With the literature review and survey the third sub question will be answered: *Which organisational factors are identified in literature as potentially relevant and to what extent do these - in combination with the KR8 characteristics - influence the implementation status as identified under question 2?*

6.1 Theory

Beyond the theory of quality models, the organisational factors within an organisation are crucial as well. According to Ahmed, Loh and Zairi (1999, p.426) an organisation requires an organisational culture that constantly guides organisational members to strive for continuous improvement and a climate that is conducive to learning. Without these factors an organisation cannot innovate. Moreover, creativity is important as well, because in relation to organisational management, innovation is the process of being creative and implementing new methods to organize or run a company and create improved results (Ehigie & Andrews, 2005, p.929). Ahmed, Loh and Zairi (1999, p.426) stated that in organisational levels there are three levels which could be explored to determine what could explain the implementation gap:

1. level of the individual;
2. level of the group;
3. level of the organisation.

There is an interaction between the attributes of the individual and the attributes of the environment (Ahmet, Loh, and Zairi, 1999, p.428). These characteristics are important to the success for organisations if they want to succeed in their inquiry for quality (Irani, Beskee & Love, 2004, p.648). These three levels will also be discussed in this order in this paragraph. The last paragraph will discuss barriers that are specific to Lean Management.

FIGURE 15: FRAMEWORK FOR ENHANCING THE IMPLEMENTATION OF A QUALITY MODEL

6.1.1 INDIVIDUAL LEVEL

Ahmed, Loh and Zairi (1999, p.428) stated that people learn the most when they feel motivated primarily by their interest and enjoyment, and satisfaction and challenge of the work, not by external pressure. The focus on the individual lies in values, attitudes, beliefs, aptitudes, intelligence and motivation (Rollinson, 2008, p.15). At WMCN the individual level is the level of the employee.

Scholars mention individual characteristics that encourage innovation, learning and continuous improvement:

1. Relevant skills such as expertise, technical skills and talent improve the learning and improvement abilities[1]
2. The ability to cope with interference or opposition to a project[2]
3. The ability to stay motivated the entire duration of the project[2,3]
4. Clear initial view of the results that are desired[2]
5. The ability to get support not only from management but also from their colleagues, everyone shares equally in the belief that the project is worthwhile (extrinsic interventions) [1,2]
6. Employees should be encouraged to take calculated risks (when setbacks occur) [1,2]

[1] Ahmed, Loh & Zairi (1999, p. 427)
[2] Irani, Beskee & Love (2004, p.647)
[3] Näslund (2008, p.278)

6.1.2 GROUP LEVEL

In almost every organisation people are usually located in groups. A group is concerned with social and interactive features such as group dynamics and leadership (Rollinson, 2008, p.15). Besides, groups learning is influenced by social processes (Ahmed, Loh & Zairi (1999, p. 428). This eventually influences the chance of making a success of a quality model. Schein (1990, as cited in Rollinson, 2008) stated that a group is defined in psychological terms as any number of people who: 1. Interacts with each other. 2) are psychologically aware of each other. 3) perceive themselves to be a group and 4) purposefully interact towards the achievement of particular goals or aims. This definition is also found in the building blocks of Lean: "Integrity & cooperation", "strong teams" and "strategic goals". However, you can see different types of groups within WMCN. WMCN is a group as well within RWS, but there are also smaller groups within WMCN that were before WMCN also an organisation.

1. group creativity will decrease by autocratic leadership styles [1]
2. group learning and sharing is enhanced by organic structure rather than mechanic structures [1]
3. Leaders who are good at getting people into action (e.g. participative management style) [1,2]

[1] Ahmed, Loh & Zairi (1999, p. 427)
[2] Irani, Beskee & Love (2004, p.647)

6.1.3 ORGANISATIONAL LEVEL

Level of organisation is important because it will influence the way people work and their behaviour, and it changes their actions in the perceptions of all aspects of their work, including quality (Irani, Beskee & Love, 2004, p. 645). Moreover, organisational culture is difficult to change, because people are attracted to an organisation, could be resistant to accepting new cognitive styles (Ahmed, Loh & Zairi, 1999, p.429). The organisational level here is the level of RWS.

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1. free flow of information [1]
2. close and frequent contact between work sections and emphasis lateral as well as vertical relationships[1]
3. necessary recourses and support have to be available[1]
4. Importance of shared vision and strategy[3]
5. Top management support[3]

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[1] Ahmed, Loh & Zairi (1999, p. 427)
[2] Irani, Beskee & Love (2004, p.647)
[3] Näsland (2008, p.278)

6.1.4 BARRIERS IN IMPLEMENTING LEAN

Implementing the KR8-model asks for an organisational structure and culture that allows the KR8 -model to function properly. To determine rather the KR8-model can function within the current structure of the WMCN organisation, the barriers and conditions for success have to be identified and compared with the WMCN organisation. In a series of case studies regarding the implementation of Lean in the public sector, Radnor and Walley (2008) identify a number of barriers that could determine the success of Lean:

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6. lack of clear customer focus;
7. too many procedures;
8. people working in silos;
9. too many targets;
10. lack of awareness of strategic direction.
11. general belief that staff are overworked and underpaid;
12. lack of understanding of the effect of variation, systems thinking and process flow.

Avoiding the above barriers increases in the adoption of Lean and its underlying philosophy, rather than just implementing the tools and techniques of Lean (Radnor and Walley, 2008, p.14).

6.2   Results survey WMCN

The results of the survey have been analysed per statement and will be discussed on the four levels as discussed in the previous paragraph. The criteria are divided in statements, to get a better understanding what the opinion of the employees are. The statements can be rated from 1 (lowest score) to 5 (highest score), which reflect the choices: fully disagreement (1), disagreement (2), somewhat agree (3), agree (4) and fully agree (5). A total of 10 out of the 25 people that have been approached for the survey have filled in the survey.

6.2.1   RESULTS SURVEY INDIVIDUAL LEVEL

1. Relevant skills such as expertise, technical skills & talent, improve learning & improvement abilities

The survey results indicate that WMCN is doing well on this subject. Most employees either have the right education and experience when they start working at WNCM or are already working at WMCN for a long time. Statement 1c is the only statement on this subject on which the respondents have reacted neutral.
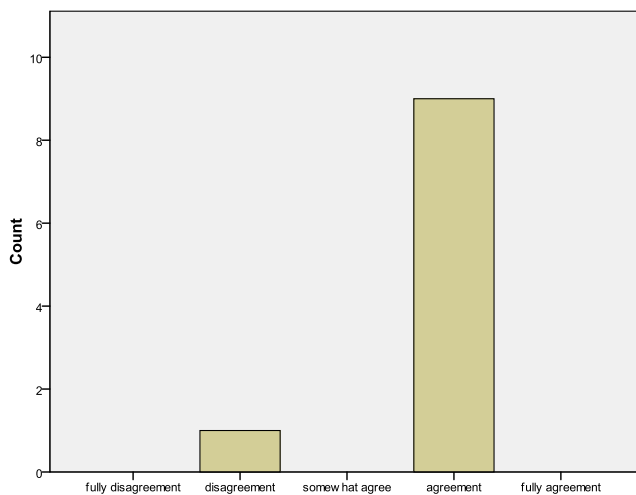
Graph 1a: My education fits my current position
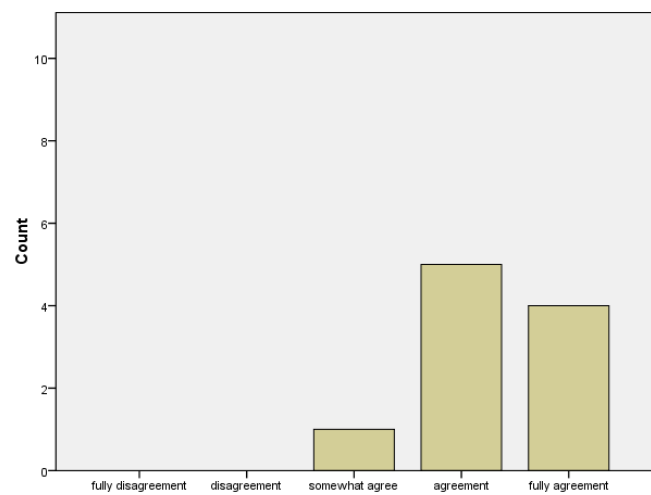
Graph 1b: My work activities are done for a long time
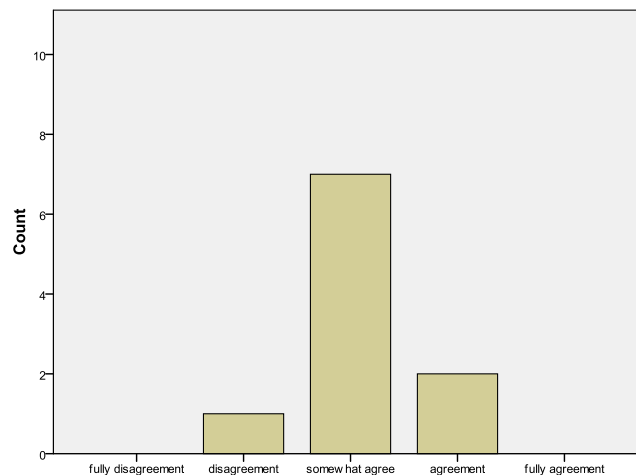
Graph 1c: The organisation does not spend enough time on educating its employees

2. The ability to cope with interference or opposition to a project

There are no barriers for the employees that prevent them to report issues to their colleagues or superior. As indicated in the interviews, the employees at WMCN are working in an open culture
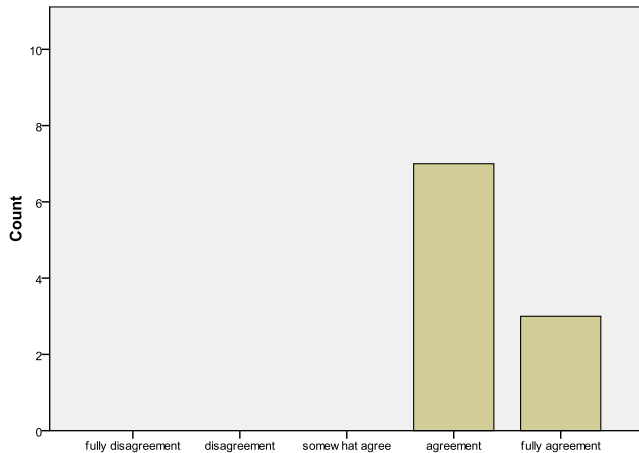
Graph 2a: If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues
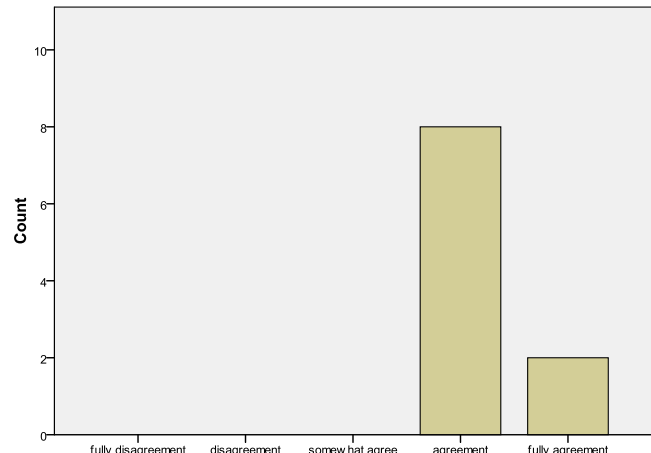
Graph 2b: If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior

3. The ability to stay motivated the entire duration of the project

This is a criteria which is also met. All employees state that they can regain motivation when they suffer a setback.
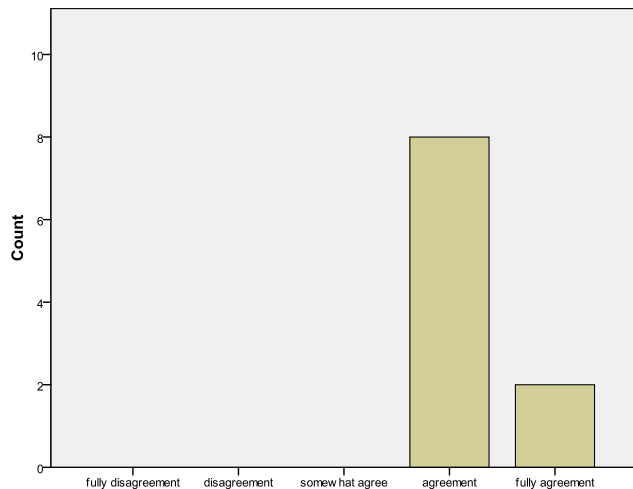
Graph 3: I can regain motivation when I suffer a setback
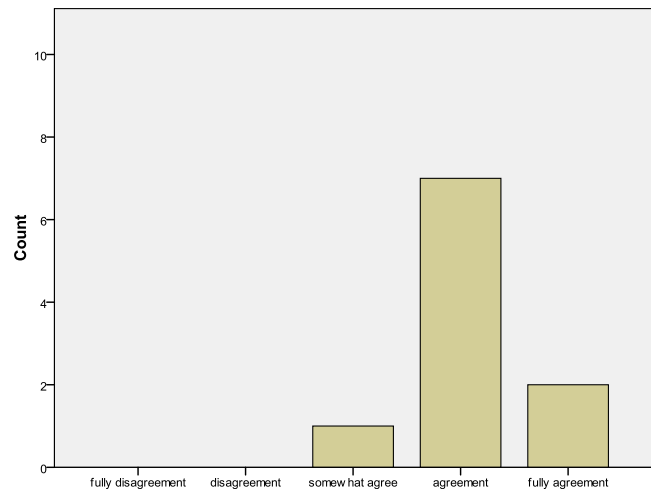
Graph 4: It is clear which targets and results my employer expects from me

4. Clear initial view of the results that are desired

Almost everyone agrees that it is clear which targets and results are expected from them (see graph 4 above).

5. The ability to get support not only from management but also from their colleagues, everyone shares equally in the belief that the project is worthwhile.

The employees find colleagues and partners in the network inspiring and supportive. This is visible in graph 5c where 8 respondents indicate that their collegues are listing to them. The employees of WMCN easily give feedback to one and another, rather they asked for it or not. However, regarding the management suport there are different opinions. 7 respondents are of opinion that the managent is not inspiiring and supportive. Two employees stated that the manegement is not interested in what is going on and that they can hardly be found on

the work floor since the reorganisation has started. The management only acts when employees are pro-active and involve the management in the process.

The employees responded postive regaring the question about the implementation and useage of crisis management. One employee stated that *"we do this for the Netherlands, to protect the civilians".*

Graph 5a: My superior is inspiring and supportive

Graph 5b: My colleagues are inspiring and supportive

Graph 5c: I think my colleagues do not listen enough to me

Graph 5d: Partners in the network are inspriring and supportive
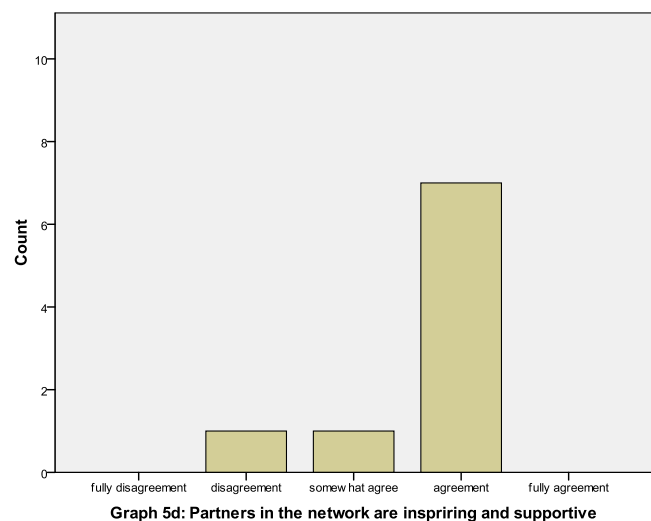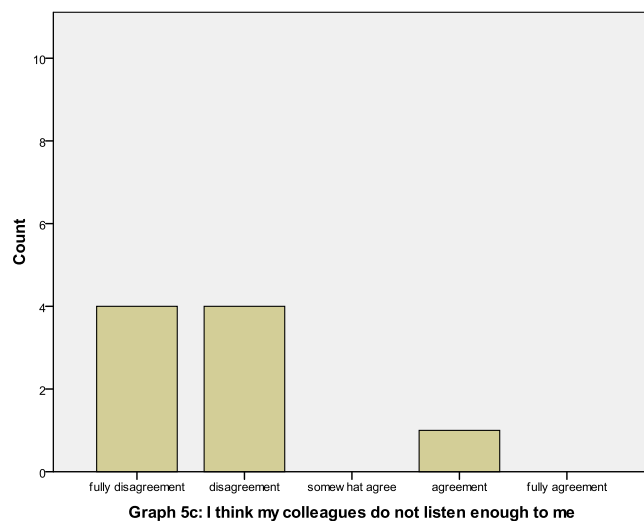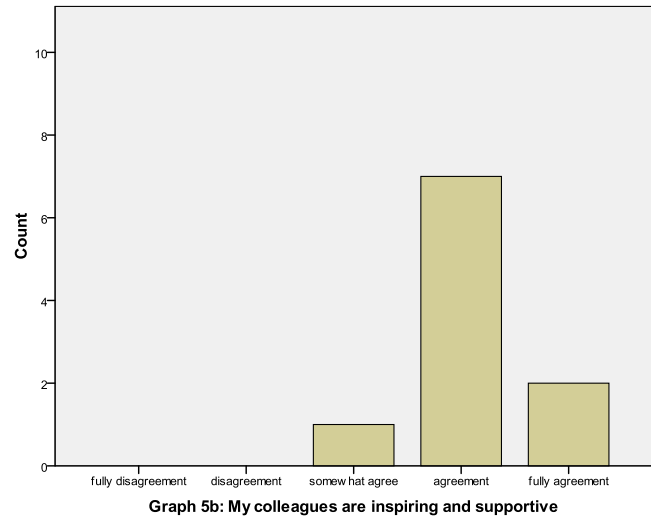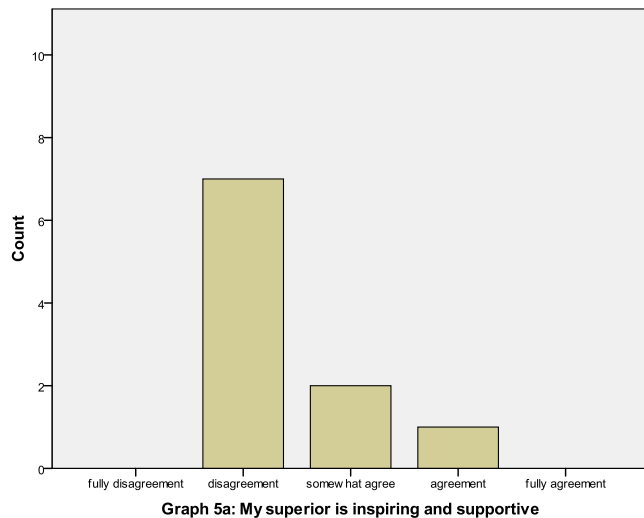
6. Employees should be encouraged to take calculated risks (when setbacks occur)

The employees of WMCN agree (7 out of 10 agrees and 3 employees fully agrees) that they have the freedom to improvise in case of a setback. This due to usage of the OTO-plan. Using the OTO-plan, there is guaranteed that all the employees have the right knowledge and also know how to use it in case of a crisis situation. Because all interviewees stated that they agree with this statement, no graph is added by this criteria.

7. Group creativity will decrease by autocratic leadership styles

There are different opinions regarding this statement. Although the same opinion as seen in graph 5c is visible regarding this statement, over 6 respondents indicate that the management clearly shows that they are in charge (graph 7b). One employee stated that sometimes is feels that only negative feedback is being given, even though everyone is working hard. This is also visible graph 7c, where 5 employees indicate that they have the feeling that it is not accepted to have a different opinion. The difference in graph 7d can be caused through the distinction between operational tasks and crisis management. The operational tasks are well defined, so the chances of making errors is minimised. However, if they do occur, actions are taking by referring to the PIN's.
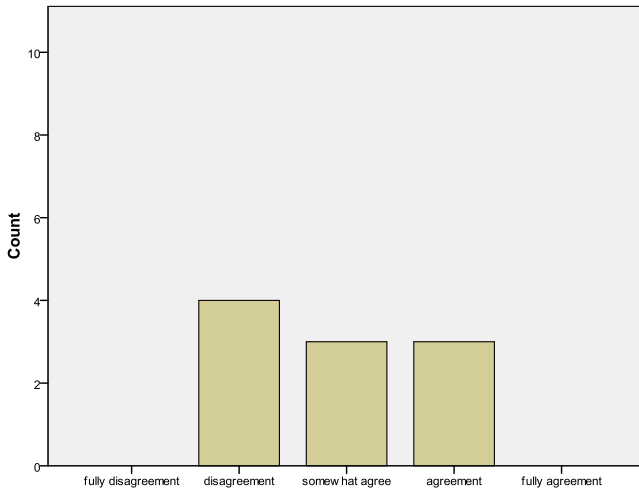
Graph 7a: My superior only intervenes when it is really necessary
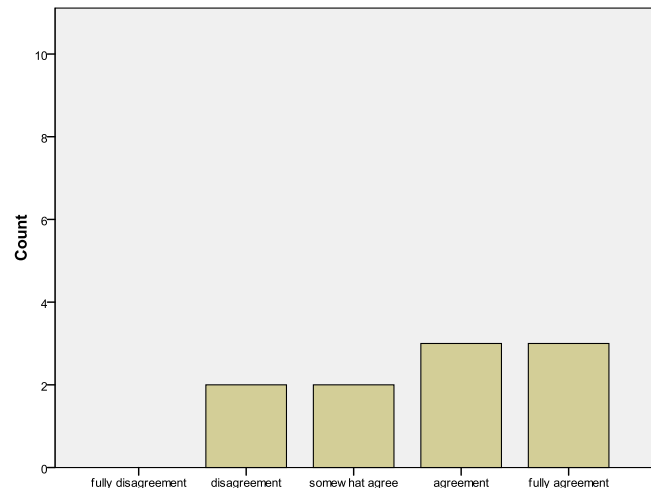
Graph 7b: My superior clearly shows who is the boss
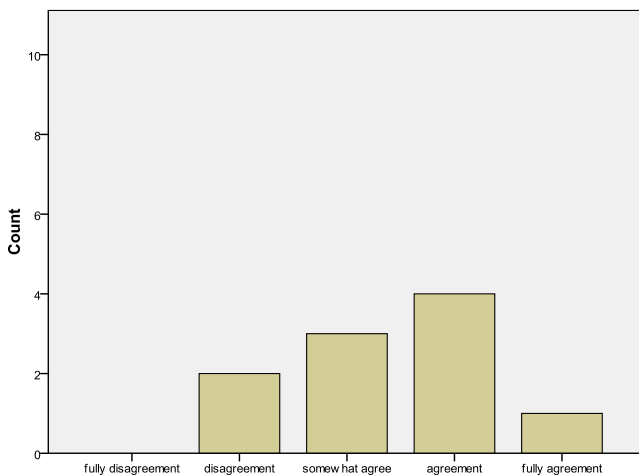
Graph 7c: My superior does not tolerate diverging opinions whenever a decision has been taken
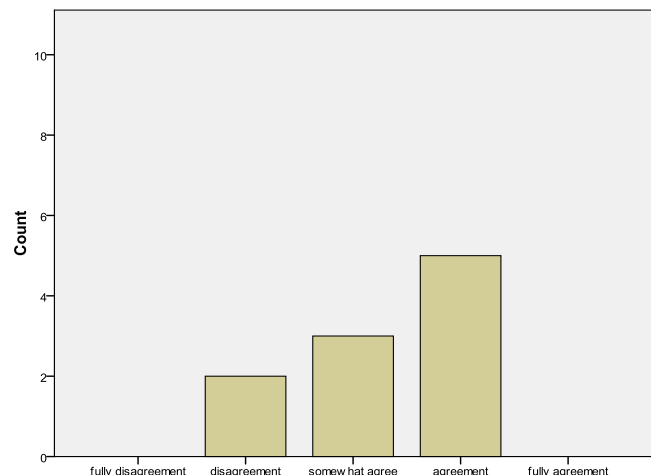
Graph 7d: I am allowed to make mistakes

8. Group learning and sharing is enhanced by organic structure rather than mechanic structures

The structure of WMCN is hierarchical, which is not uncommon for government organisations. However, the top down communication is not functioning very well. 7 Out of 10 respondents agree that is this an issue at WMCN and this is also addressed in earlier management evaluations. The communication between the employees themselves is working well, as indicated in the earlier discussed statements.
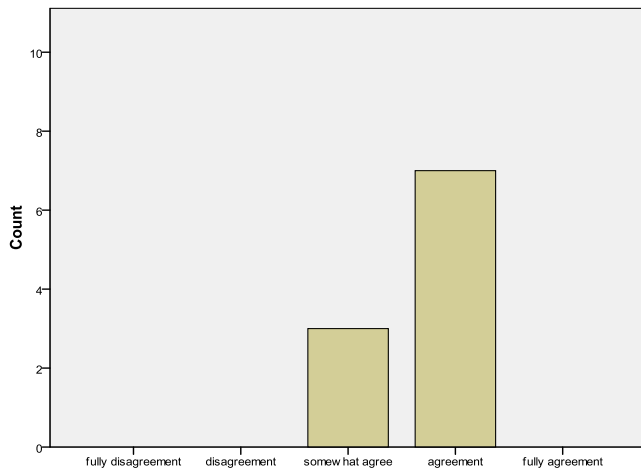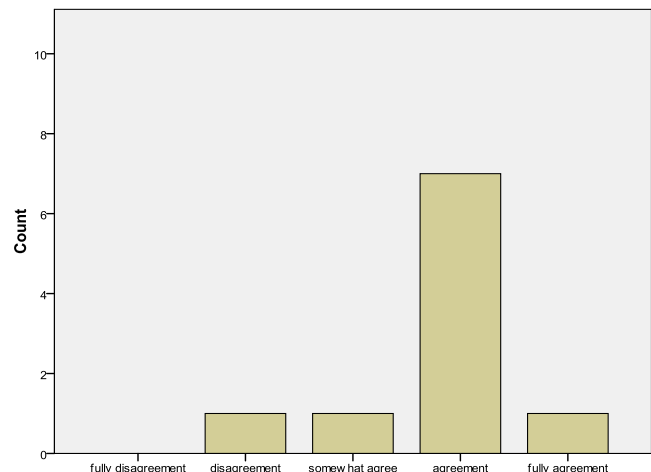
Graph 8a: I believe that the organisation has a hierarchical structure
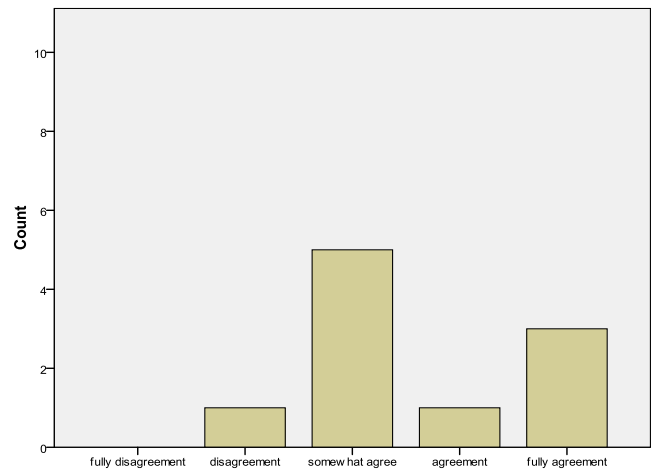
**Graph 8b: There are too many managers within the organisation**
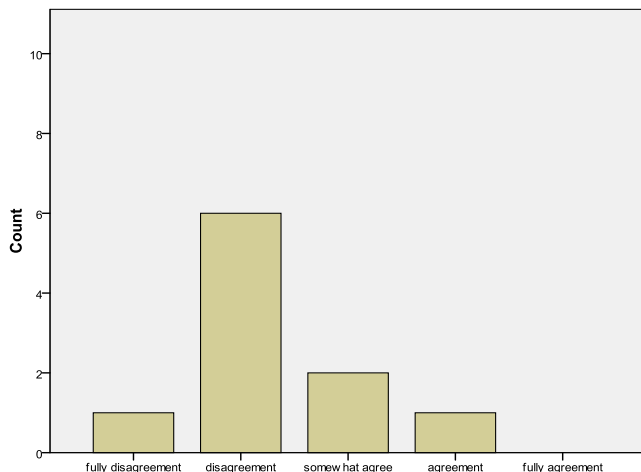
**Graph 8c: The top-down communication is going well**

Graph 8d: The communication with my colleagues is going well

## 9. Leaders who are good at getting people into action (e.g. participative management style)

All the participants agree that WMCN offers the opportunity to participate in the decision making process. However, this is being contradicted in the following statements. In graph 9c, 2 participants do not agree with the statement and feel left out in the process. This is also visible in graph 9d in which was asked if WMCN strives for a correct way to co-decide in the decision making process. 4 Participants do not agree on this. This might have to do with the fact that employees can join the decision making process on their own and this decision is often supported by the management. However, the other way around where the management encourages employees to participate does not occur. The employees have the feeling that WMCN is a *"self steering"* organisation.
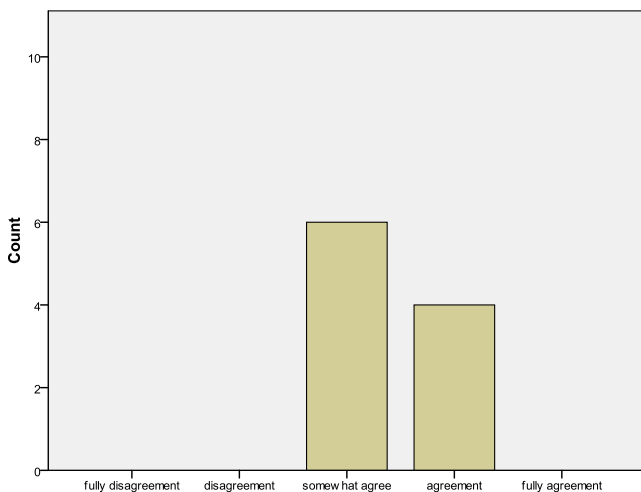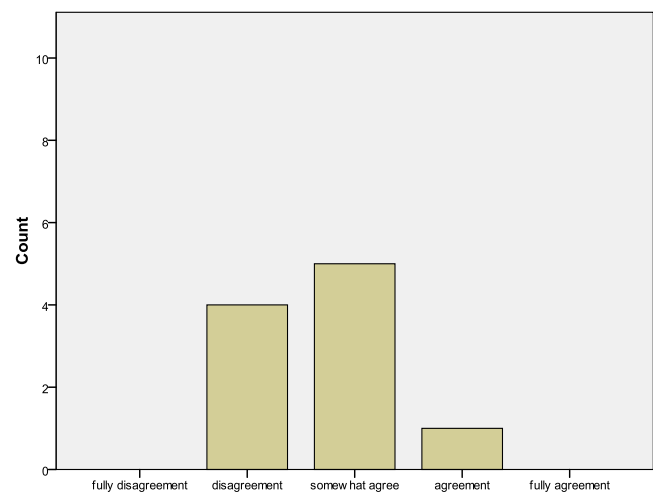

Graph 9a: I have the possibility to participate in the decision making process
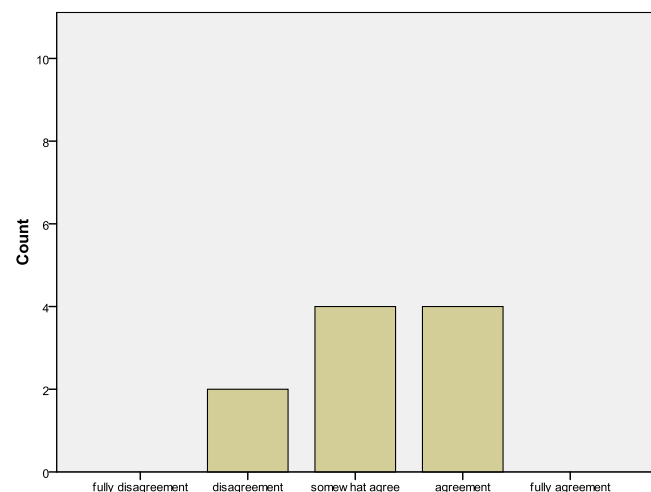
Graph 9b: My superior delegates tasks and responsibilites
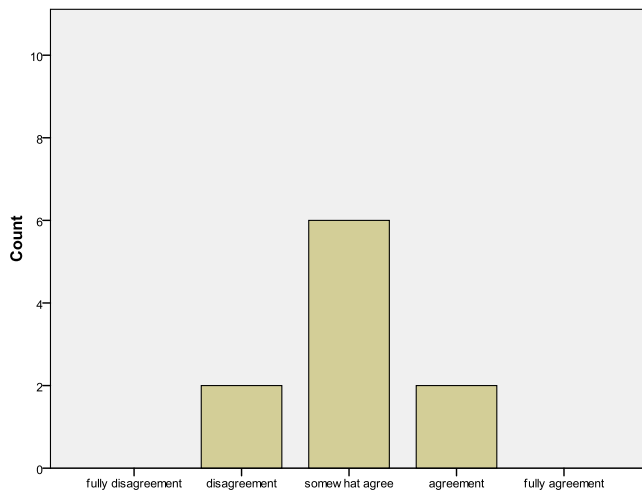
**Graph 9c: I feel involved in the decision making process**

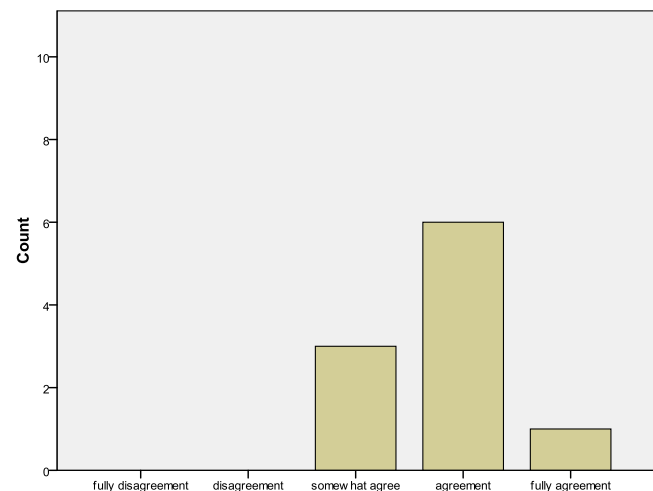**Graph 9d: My organisation strives for a correct method of letting employees codecide**

10. Free flow of information

There are different opinions regarding the availability of information. 3 out of 10 respondents find it hard to get information, 3 employees has some problems with it, and 4 of them do not experience any problems. A possible explanation for this is that WMCN does have an internal information system. Also are the different services, from whom WMCN is a part of since January 2012, located at different locations. As result, information is also spread over different locations. The statement regarding the availability of information about work activities (graph 10b), 3 respondents somewhat agree with the statement, while the rest agrees or fully agrees. This can be explained due to the fact that the (individual) work processes have not yet been fully processed and personalized. 4 respondents are of opinion that they do not receive enough information about changes that are being made or are in process. They indicate for example that they do not fully know the meaning of KR8 and what possible consequences it brings along. The only thing they hear is that *"more will be done with less".* However, other respondents indicate that it is very clear due to the usage of PIN's and state that because of the PINs you know how to meet the criteria that WMCN has formulated.
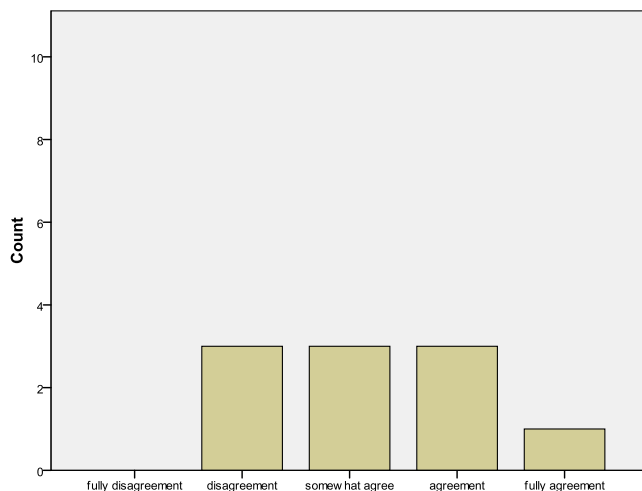
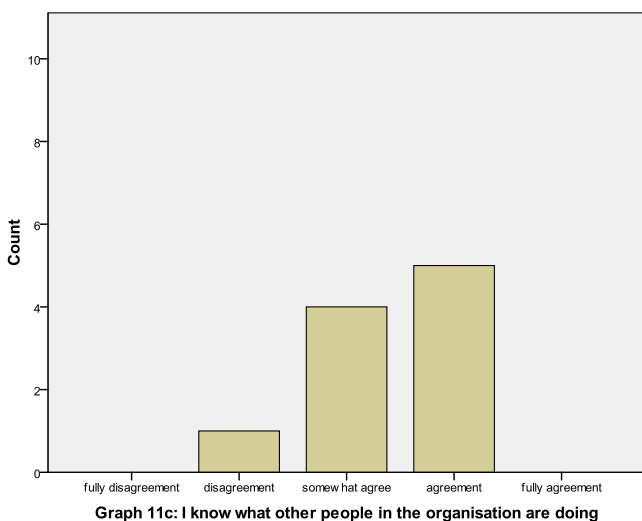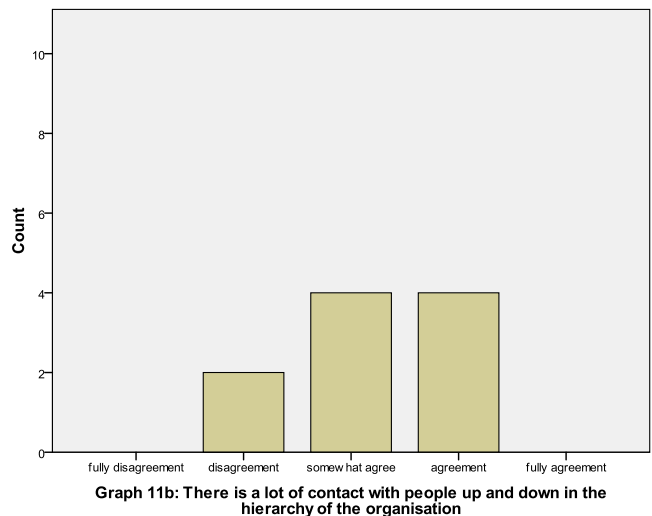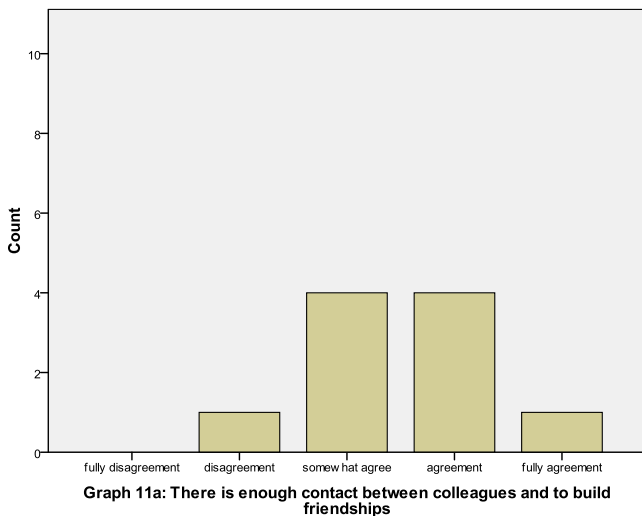**Graph 10a: It is easy to get information within the organisation**

Graph 10b: It is easy to obtain information about my work activities

Graph 10c: It is easy to obtain information about my organisation as a whole

Graph 10d: I receive insufficient information about changes within the organisation
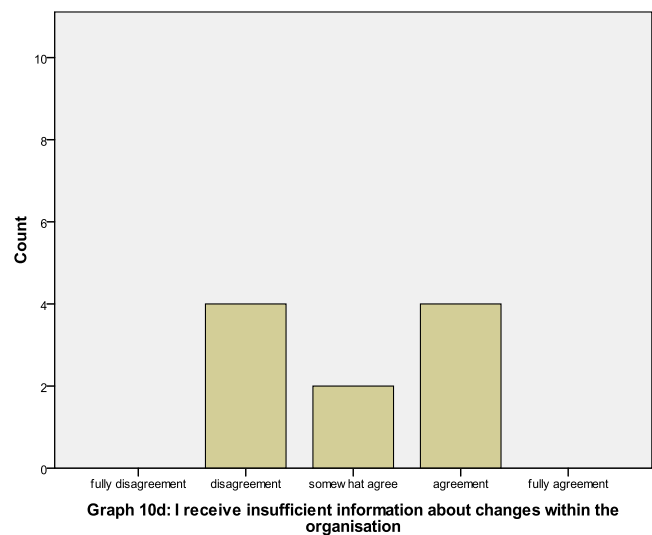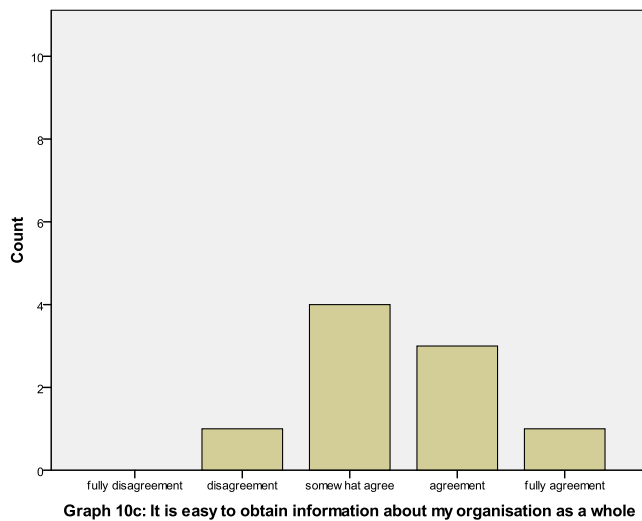
11. Close & frequent contact between work sections & emphasis lateral as well as vertical relationships

Most of the respondents agree that there is a lot of contact with colleagues, both formal and informal (graph 11a). This is emphasized by an employee who stated that "there are a lot of personal conversations and meetings". There is also a lot of contact with colleagues who work at lower or higher positions (graph 11b), and most of the employees are aware of what their colleagues do at WMCN (graph 11c). As a result of the informal and frequent contact, employees experience no problems in contacting each other for questions or requests for information.

Graph 11a: There is enough contact between colleagues and to build friendships

Graph 11b: There is a lot of contact with people up and down in the hierarchy of the organisation

Graph 11c: I know what other people in the organisation are doing

12. Necessary recourses and support have to be available

Most of the respondents agree that all the necessary recourses have been made available by the management to do their job. However, as can been seen in graph 5a, employees do not find the management supportive and inspiring. This criteria is therefore only met regarding the necessary recourses.
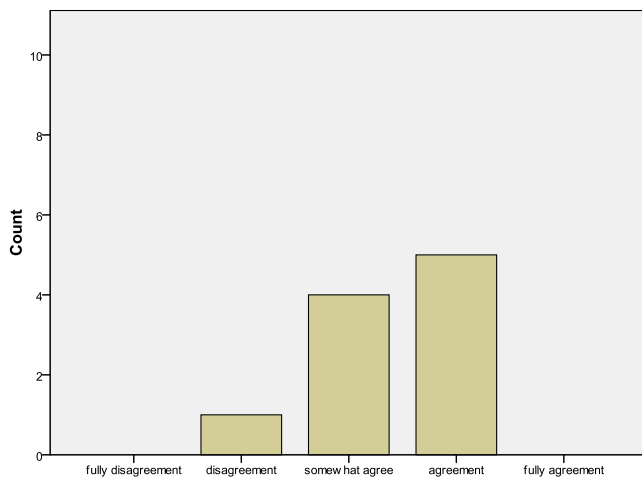
Graph 12: Management provides all recourses available that I need to be able to do my work
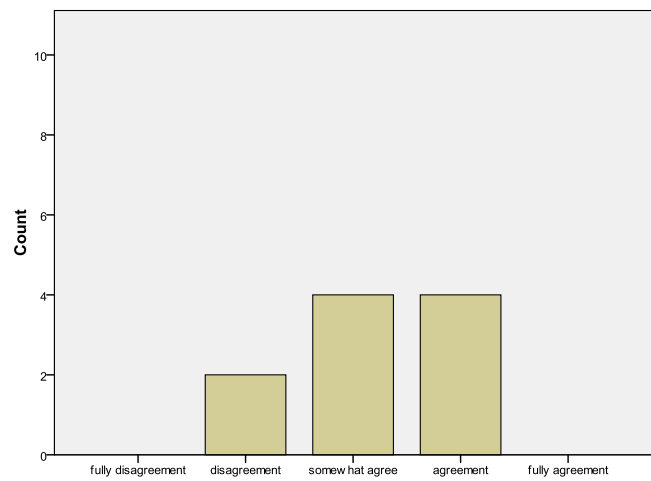

Graph 13: There is consensus within the organisation about its goal and mission

13. Importance of shared vision and strategy

Most of the respondents indicate that they have the feeling that there is a shared consensus (graph 13, above). This is peculiar because the results of the interviews indicated that employees have the feeling there are still a lot of groups who have their own perception on how things have to be done. Although all the respondents indicate that improvements have been made, it is still a problem that WMCN is not acting from a single shared vision and as one organisation.

14. Top management support

Most of the respondents indicate that the management shows their respect for the work that is being done, even though most respondents also indicated that they find the management not very inspiring and supportive (graph 5a). Based on the interview results, there also was a mixed feeling regarding the appreciation of the management. Some indicated the management is not interested in the content of the work that is being done, while others indicated that the management gives support and is transparent.
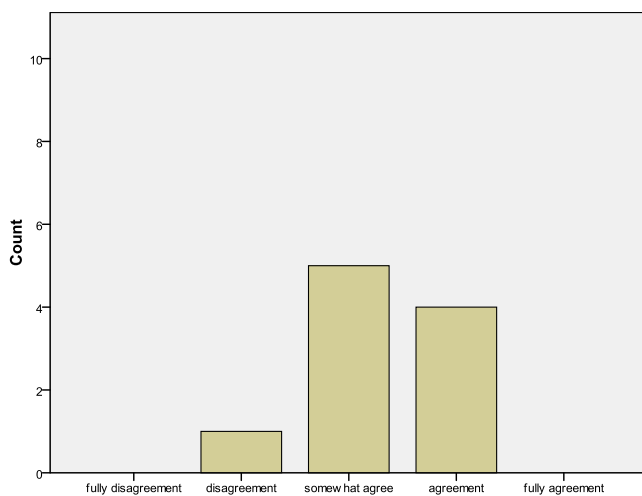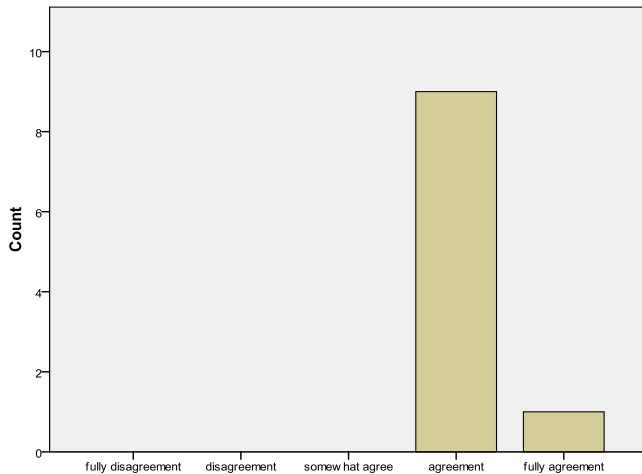

Graph 14: My employer shows his appreciation of my work
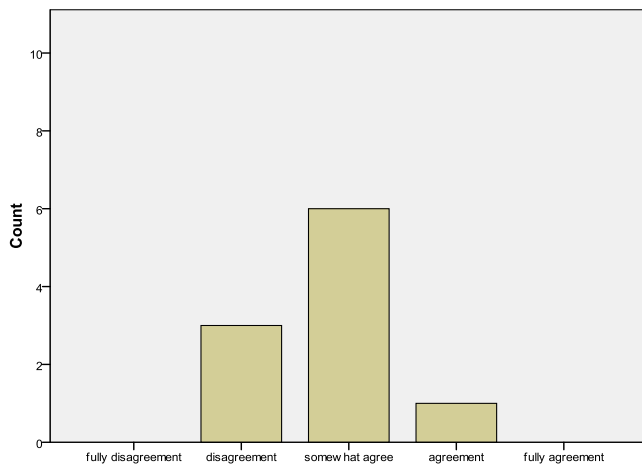
15. Lack of clear customer focus

All the respondents are aware of who the customers of WMCN are. These results correspond with the results of the interviews held at WMCN.
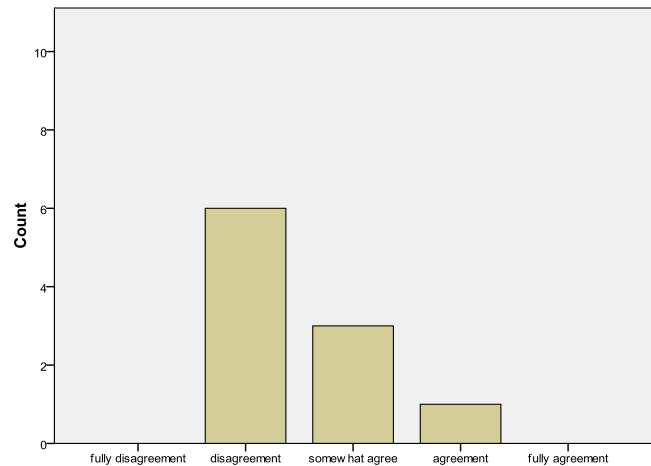
Graph 15: It is clear to me who is the customer

16. Too many procedures

Almost all the respondents agree that they do not have to work with many procedures and that not much has to be documented.

Graph 16a: I think that there are too many procedures that I have to take into account during crisis

Graph 16b: I think that I have to document too much concerning about my activities

17. People working in silos

8 out of 10 employees indicate that most of the time they work alone (graph 17a). This is due to the fact that most of the tasks are done individually. However, the biggest problem is not that the employees are working silos, but the work that is done in teams. As indicated earlier, *"the collaboration should be optimised because we want to become better in working together. This increases the understanding for each other's situation and improves the quality of the work that is being delivered. It helps the build of a better product".* However, in case of a crisis situation the collaboration has to go well. Over 7 respondents indicate that in such a situation there are no significant problems regarding the collaboration (graph 17b).
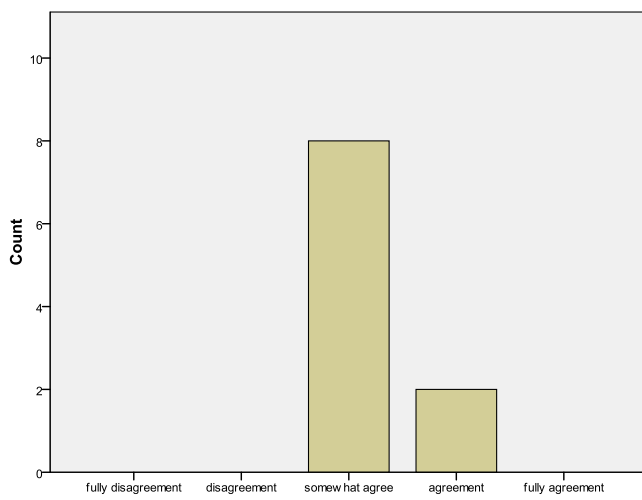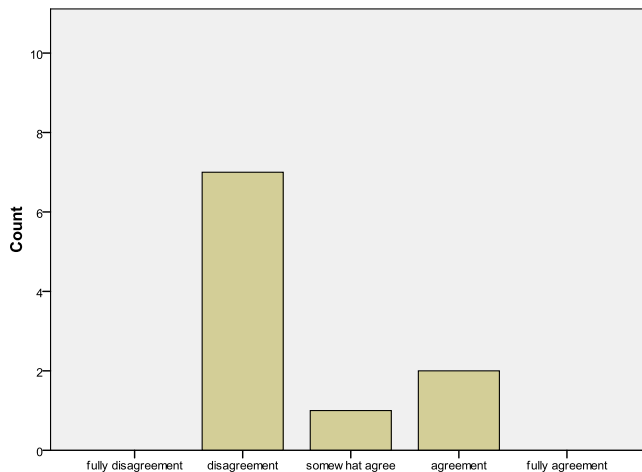
Graph 17a: People most of the time work alone
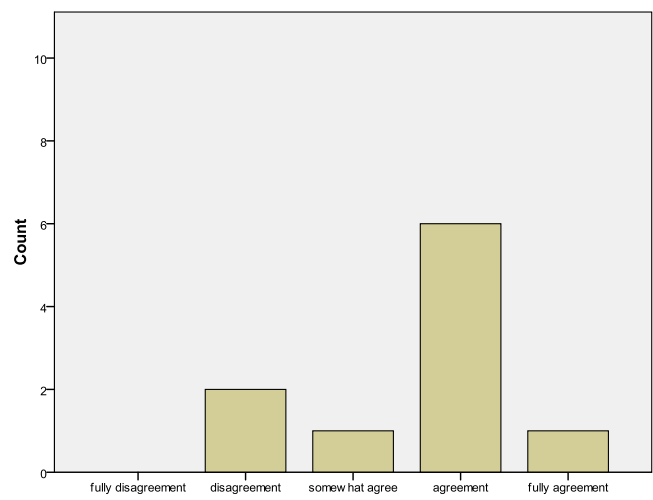
Graph 17b: People are cooperation well in times of crisis

18. Too many targets

Most of the respondents do not agree with this statement that there are too many goals, which means that this barrier is not presented within WMCN.

Graph 18: The organisation has too many goals that I have to take into account
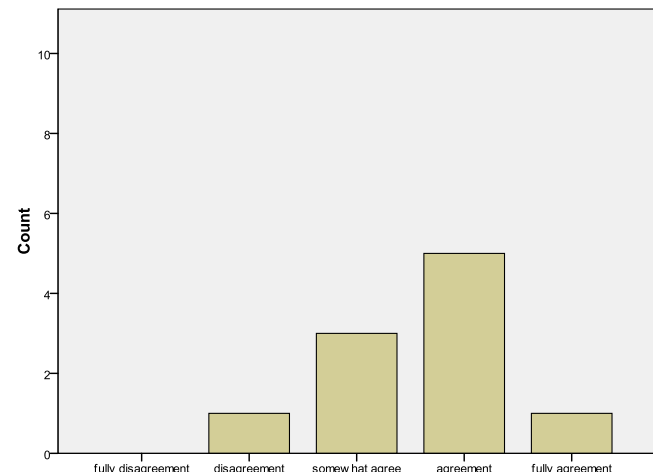
Graph 19a: I receive sufficient information about the goals of the organisation

19. Lack of awareness of strategic direction.

Almost all the respondents indicate that they receive enough information regarding the goals of the organisation (graph 19a, see above). Similar results are visible in graph 19b, regarding the awareness of the strategic goals of the organisation. However, 2 employees stated that they do not exactly know what the goal and mission of the organisation is (graph 19c). This indicates that a relative large group lacks awareness.
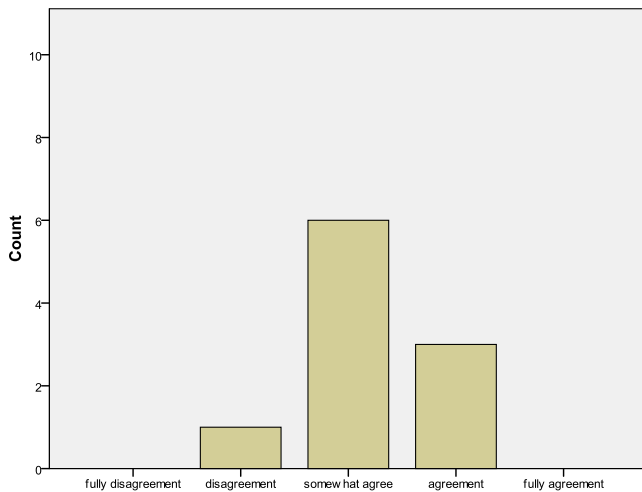
Graph 19b: I receive sufficient information the strategy of the organisation
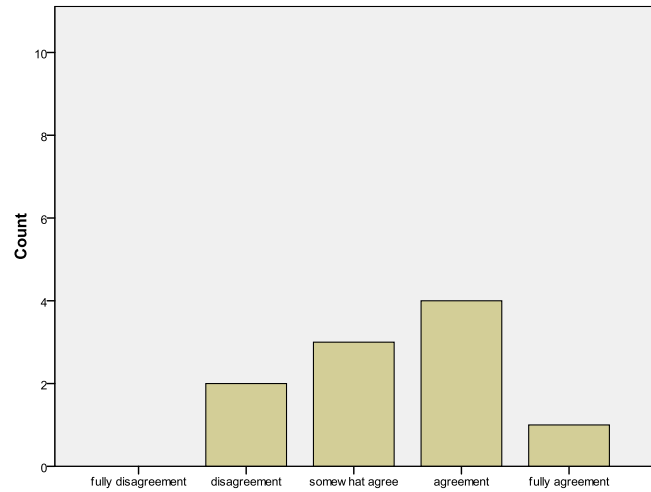
Graph 19c: I know exactly what the goal and mission of the organisation is

20. General belief that staff are overworked and underpaid

There are no significant results regarding this statement.
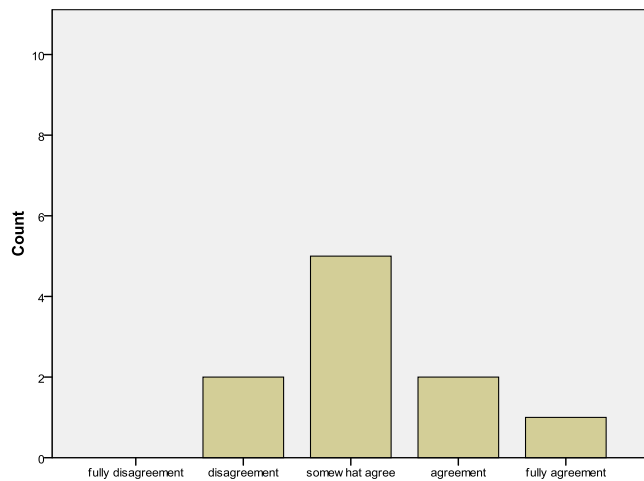
Graph 20a: do too much work
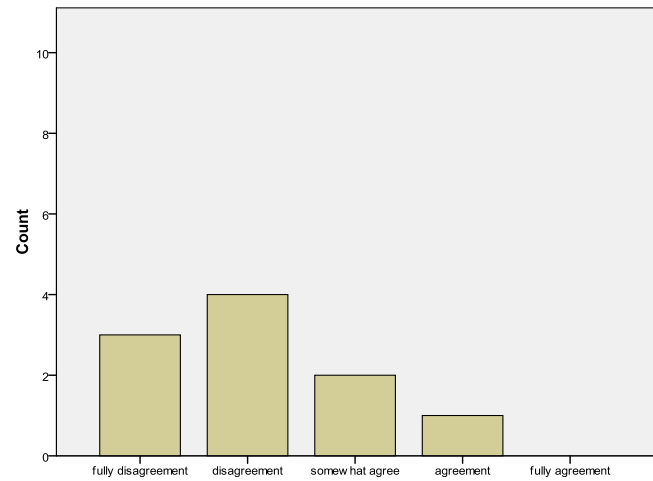
Graph 20b: I think that I am underpaid

21. Lack of understanding of the effect of variation, systems thinking and process flow.

The survey results indicate that almost all the respondents do not know the meaning of these concepts (graph 21). Most likely this is due to the fact that KR8/Lean only just has been implemented in the organisation. A common reaction given an employee of WMCN: *"I have not yet been working with KR8 and its related concepts. For that matter I am still open minded and curious what it is going to bring"*.
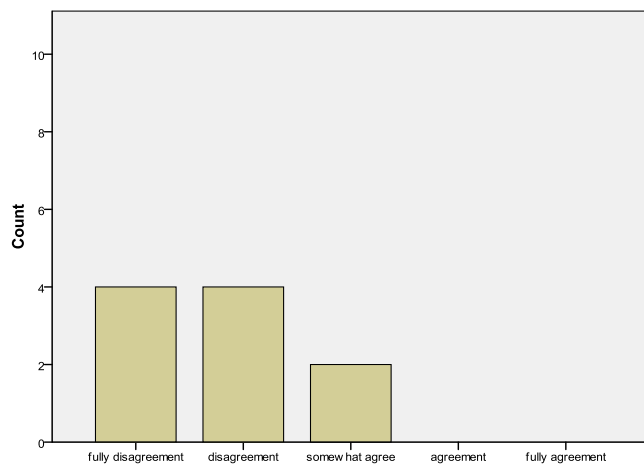
Graph 21: I know exactly what the concepts system thinking, process flow and 8 type of waste mean

6.3   Conclusions organisation factors

The emphasis of this paragraph is on personal, group and organisational factors, as well as factors that influence mainly the implementation of Lean. From the results of the survey can be concluded that not yet enough is done with Lean. Although the most factors are in a positive way present within WMCN, some statements stand out. These statements are marked in purple with an arrow in the front of the statement, which can be found in appendix V.

With respect to the personal level, almost all statements turn out to be positive with a mean score of 4 (see appendix V). One criteria which attracts attention in this section is "The ability to get support not only from management but also from their colleagues, everyone shares equally in the belief that the project is worthwhile." The employee disagrees with the statement "My superior is inspiring and supportive". However, the employees state that they get enough inspiration and support from their fellow colleagues and have a shared believe.

Further to the group level the scores are in average medium. From which can be concluded a lot could be gained to this level. A statement which strikes the most are "The top-down communication is going well" which has an average score of 2.3 and "My organisation strives for a correct method of letting employees co-decide" (2.5).

Next in the organisational level, the scores are average as well. The lowest score is for the statement "I receive insufficient information about changes within the organisation" with an average score of 3.0. The rest of the statements scores average between 3.2 and 3.8 which indicates that some aspects could be improved, but are not negatively evaluated by the employees.

In the barriers which could explain why the implementation does not work. The first thing which pops up is the statement of "It is clear to me who is the customer", which has an average of 4.1, which means that the employees of WMCN have the opinion that they know which customer they serve. There are a couple of statements that are evaluated positively: the statement "I think that I have to document too much concerning about my activities" scores low with a 2.5. At last, the statement "I think that I am underpaid" scores a 2.1, which means that almost everyone did not agreed with this statement. The only aspect which scores very low in the thesis is the statement "I know exactly what the concepts system thinking, process flow and 8 type of waste mean". This statement scored a 1.8, which means that almost everyone does not what these concepts means. Furthermore, the statement "I know exactly what the goal and mission of the organisation is" has a mean of 3.4. Although this is around the mean, 2 employees stated that they disagreed with the statement, which is remarkable, because this is the foundation of a quality system.

In the next chapter two other organisations (KMNI and Water Board Rivierenland) will be discussed.

7. RESULTS WMCN COMPARED WITH OTHER ORGANISATIONS

In this chapter two partners within the network of WMCN are briefly analyzed (see appendix III for the cooperation partners). The fourth sub question applies to this chapter: "*How are these results comparable with the implementation of quality management systems in two other organisations within the network of WMCN*? "

First of all the KNMI will be discussed, analysing the differences in the quality management system. This is done by analysing the quality system using an interview and surveys to get a better picture of the organisational setting. The second organisation that will be discussed is the Water board Rivierenland. In this discussion the focus will be on the organisational factor that influences the implementation of Lean. Because the Water board Rivierenland is using the same quality system as WMCN, only surveys are used for this discussion.

7.1. KNMI

7.1.1. CASE DESCRIPTION

KNMI is the national institute for weather, climate research and seismology. It disseminates weather information to the public at large, the government, aviation and the shipping industry in the interest of safety, the economy and a sustainable environment (KNMI, n.d.). In case of flooding, the KNMI conducts information about the weather in all the phases.
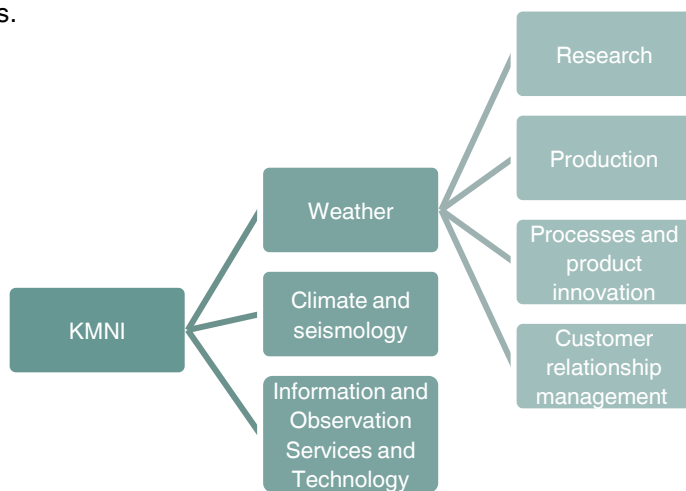
FIGURE 16: ORGANOGRAM KNMI

The sections 'weather and information' and 'services and technologies' are working with the ISO 9001:2000 and are certified since January 2005. This has been done because the organisation has to guarantee a certain level of quality and must be able to deliver their products in time. By doing so the KNMI guarantees to be a reliable, professional and independent partner in delivering meteorological services. That does not directly guarantee that the products that KNMI deliver are of good quality, but it does guarantee that in case of a mistake or invalid information the process has been organized in such a way that improvements can be made and processed. There are two sides to this system. On the one hand it is the quality system that ensures the quality of the process and on the other hand it ensures a high quality of content.

Different methods are used to maintain this system. First of all, courses and trainings are being given. Secondly, there is attention for customer relation to discusses the content and processes with customers. Finally, a verification system is used to determine if the predications, given in the delivered products, have been adequate.

The research section is not using the ISO 9001:2000 certification, but is being reviewed trough scientific reviews using a peer to peer system.

The KNMI and WMCN are mutually dependent upon one other. First of all, WMCN assessed the weather forecasts received from KNMI (in the normal phase and in times of crisis). Second, in times of crisis, the LCO monitors the information from the KNMI in terms of reliability and completeness. Also, one meteorologist of the KNMI holds an important position in the LCO and one meteorologist in the Water Chamber (KNMI, 2011). Furthermore, the RWS Message Service makes reports regarding the expected water levels in cooperation with the KNMI.

7.1.2. RESULT ANALYSIS QUALITY SYSTEM

To return to the definition of quality system stated by Bouckaert & Thijs (2003, p.144), the four criteria of Bouckaert & Thijs found in KMNI are:

1. The system is understood by the employees

   The KNMI uses a quality system for quite some time now. Employees know what they have to do and what they can expect from their management. At first when the quality system was just implemented, it seemed that it only resulted in extra bureaucracy. However, when all the process where documented most of the work was done and they only needed to be reviewed on a regular basis. As a result, there is less miscommunication and it is clear who is responsible for specific tasks.

2. The system is effective

   The quality system has become more effective over the years because processes have been better documented. These processes already run more efficient, but there is still room for improvement. The higher efficiency has resulted in less work, meaning that more manpower is available for other processes.

3. The system ensures that the demand of the society (intern and extern) is satisfied

   One of the reasons that ISO has been implemented is because of external pressure. The KNMI is a service provider and therefore must ensure that their customers are satisfied. That's why every is done to maintain good contact with the customers in order to improve their services. The section customer relationship management is continuously working on this process. This discussion on what is relevant for the customer is the most important for this section. In addition it is also important that the customer is aware of the uncertainty of their services. The KNMI has a warning function that includes the uncertainty that a prediction might not be come out. The communication section pays also special attention to the interpretation of information so there is less chance that it will be misunderstood by the customer.

4. The system is focused on preventing problems to occur

   This is one of the key elements of the quality system. One of the most important issues within the KNMI is the verification of important information (for example, when an alarm is given out in case of extreme weather). This means making the comparison between the expected and the actual situation. When a difference occurs, an investigation starts on what caused the difference. When the problem turns out to be within the system, it is a signal that it should be improved. In some instances, the verification of the information is more

in depth, for example when an alarm is given out for extreme weather. In such a case, the procedures, communication and technical elements are being evaluated. The improvements are not processed before discussing them with the customer. This is to prevent that improvements are made that go too much into detail even though they are not desired by the customer. Altogether its demands a good alignment of the customers, researchers and the meteorologists.

7.1.3. RESULT ANALYSIS QUALITY SYSTEM WITH LEAN MANAGEMENT

Although the KNMI uses ISO 9000 as quality system, this paragraph will go into the effects of Lean on the KNMI. First, a short chapter is about measuring ISO. After that the Lean Management model for governmental organisations with the building blocks are discussed.

7.1.3.1. Measuring ISO

KNMI as well has achievement indicators to measure the quality of their weather reports. These indicators are for example about the timeliness and reliability of their reports. Whenever an indicator is not met, the situation and later processes are checked, to prevent this in the future. These indicators will help KNMI to maintain their quality.

7.1.3.2. Focus on customer service

The KNMI focuses mainly on the external customer. The KNMI has a separate section that focuses on the customer relationship management. As a result, the employees do not make any decisions and agreements with the customers. However, for these sections the customers they serve have been well defined. The diversity of the customer group of the KNMI is very broad although they are mainly organisations that are somehow active in infrastructure related projects. However, their biggest customers are the airline industry. The demands of the customers are getting more specific over time. The information delivered by the KNMI is as much as possible, as long as possible in advance and as reliable as possible.

7.1.3.3. Strategic goals

The goals and mission of the KNMI is currently under political review. Because of this, the goals and mission are not clear to the employees and they lack internal consensus.

7.1.3.4. Professionalism

In order to become more professional, the KNMI still has a lot of work that has to be done. In the meanwhile, they also have to deal with severe budget cuts. Therefore it is important to know how employees should work to deliver the most optimal result. The products that the KNMI deliver to their customers is quite standard. This means that the KNMI uses a standard format and the quality is determined by its content. The Weather Chamber also uses standardised work flows, that have been designed in collaboration with both employees and customers.

7.1.3.5. Quality

The KNMI attempts to send as much information as possible all at once. They do this by collecting the different bits of information at one central point, and sending it from there. This is also being encouraged through so called "providers meetings" where customers can indicate when need different information. The information is also always available through the KNMI website. There is also a push and pull system. Using the pull system, customers can get information on their own using an FTP client. The push system offers the information to the customer on a timely base. In case of an emergency, the push system is always used.

7.1.3.6. Efficiency

This paragraph discusses the eight types of waste and whether they occur at the KNMI.

1. *Doing too much:* the KNMI is working with the pull principle which is a premise of Lean. There is also a lot of discussion with the customer to determine if the right amount of time is invested in the customer.
2. *Waiting*: employees mainly have to wait for non operational data such as research documents. This is due to the fact that there is not al lot of pressure on when these reports have to be finished. However for operational data strict deadlines have been set.
3. *Transportation and transfer*: the employees of KNMI do not move much through the office, and documents usually stay at one place. Also, Service Level Agreements (SLA) has been set up with different sections. The sections use these agreements, but there is room for improvement.
4. *Putting too much effort in a product:* this differs per person, but the tasks and responsibilities are well defined. This prevents employees from doing too much.
5. *Searching:* the employees of the KNMI experience no significant problems when they have to search for documents of office supplies.
6. *Unnecessary motion:* there is not much unnecessary motion. All the employees have a phone and they can see if their colleagues are present using a board. On this board a colour system is used that allows employees to see if their colleagues is on vacation (green), working at home (yellow), working at the office (green) or on a business trip (blue). All the employees are also easy to contact through email.
7. *Correcting your own work:* this does not occur very often. There are many moments when customer can indicate that they want something different from the KNM, meaning that there I a smaller chance that mistakes are made in the first place. However the real control mechanisms are within the verification of the weather expectations with the actual weather.
8. *Untapped talent:* employees are involved in the improvement of the processes. Also the descriptions of standard activities are carried out in consultation with the employees.

7.1.3.7. Learning and improving

Especially the team leadership and the meteorologists have team meeting where also feedback is given. However, it is still difficult to be critical when giving feedback. The PDCA is mainly used in projects to prevent them from taking longer than necessary. There are attempts to increase the usage of the PDCA model.

7.1.3.8. Integrity and cooperation

For a while there has been communication path between the managers and the meteorologists. This does ask for a special approach because the meteorologists are present 24 hours a day, while the management is only present 8 hours a day. Therefore another strategy is needed to get a better understanding how the employees are working and to avert that groups start to work separate of each other. This is important because it allows managers to stay aware of what is happening on the work floor and to determine if earlier made decisions are being respected.

7.1.3.9. Strong teams

At the KNMI there are groups with clearly divined responsibilities. Everyone is aware of their responsibilities and is therefore better able to act. However, there is room for improvement. For example by improving the communication between the sections 'processes & product innovation' and 'production', the connection between the models, predictions and tools that have been designed can be improved.

7.1.4. RESULT SURVEY KNMI

The survey has been held at the production section and has been filled in by five respondents. First the statements that have the strongest relation to WMCN are compared with the KNMI survey results. In addition the statements that have a strong relation with KNMI will be discussed. The scale that has been used in the survey went from 1 = disagree to 5 = agree.

7.1.4.1. Results compared KNMI with WMCN

In this paragraph the survey results of KNMI and WMCN are being compared. What once more stands out is that the scores are very close to each other with more or less the same standard deviation. When we take a closer look at the statements that have larger difference then 0.5 points between the KNMI and the WMCN scores, the following statements are notable which are marked in purple and with an arrow:

		Statements	Mean (sd) WMCN	Mean (sd) KNMI
Personal	➤	My work activities are done for a long time	4.3 (0.675)	3.60 (1.140)
	o	If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues.	4.3 (0.483)	4.2 (0.447)
	o	If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior	4.2 (0.422)	4.2 (0.447)
	o	I can regain motivation when I suffer a setback.	4.2 (0.422)	4.0 (0.000)
	o	It is clear which targets and results my employer expects from me	4.1 (0.568)	4.0 (0.000)
	➤	My superior is inspiring and supportive	2.4 (0.699)	4.0 (0.707)
	o	My colleagues are inspiring and supportive	4.1 (0.568}	4.0 (0.000)
	o	I think my colleagues do not listen enough to me	1.78 (0.972)	1.75 (0.500)
	➤	Whenever there are setbacks I have the possibility to improvise	4.3 (0.483)	3.8 (1.095)
Group	➤	The top-down communication is going well	2.3 (0.823)	2.8 (0.837)
	➤	My organisation strives for a correct method of letting employees co-decide	2.5 (0.675)	3.4 (0.894)
Organisation		-	-	-
Barriers	o	It is clear to me who is the customer	4.1 (0.316)	4.4 (0.548)
	o	I think that I have to document too much concerning about my activities	2.5 (0.707)	2.4 (0.548)
	o	The organisation has too many goals that I have to take into account	2.5 (0.850)	2.4 (0.548)
	o	I think that I am underpaid	2.1 (0.994)	2.0 (0.000)
	o	I know exactly what the concepts system thinking, process flow and 8 type of waste mean	1.8 (0.789)	1.8 (0.837)

TABLE 9: STATEMENTS THAT PEOPLE OF WMCN HAVE THE STRONGEST FEELINGS ABOUT (AVERAGE MEAN SCORE < 2.5 OR > 4) COMPARED WITH KNMI.

The first thing that is noticeable is that the activities at KNMI are done for quite a long time, but not as long as the activities at WMCN. However this does not influence the related criteria ("Relevant skills such as expertise, technical skills and talent improve the learning and improvement abilities"), because also the other statements related to this criteria show a positive result.

The second statement (related to the criteria "The ability to get support not only from management but also from their colleagues", "Everyone shares equally in the belief that the project is worthwhile") that score very high in the KNMI survey is "my superior is inspiring and supportive". As indicated in paragraph 8.1.3.7, a lot of effort is put in to the relationship between the management and the employees. "Both parties are positive regarding the communication paths. Everyone is aware of what they are doing and how they have to communicate with each other. To recall how to interact with each other every now and then, it becomes clear to everyone."

The third statement (related to the criteria "Employees should be encouraged to take calculated risks (when setbacks occur)") that stands out because of its lower score then WMCN is "Whenever there are setbacks I have the possibility to improvise". This can be explained due to the usage of ISO certificates at KNMI. Because of this, processes have been document and run through a fixed path, leaving less room for improvisation. All the employees know their tasks and responsibilities. They indicate that "it should not be the case that employees take over the tasks of their colleagues". Although it hampers the improvisation within the organisation, is does result in clear and well described processes.

The fourth statement (related to the criteria "Group learning and sharing is enhanced by organic structure rather than mechanic structures") is "The top-down communication is going well" and also has to do with the better connection between the management and the employees at KNMI. Because there is better understanding of each other, employees know what they can expect from each other and from the management. As indicated "it prevents that different groups arise and increases the mutual understanding."

The last statement (related to the criteria "Leaders who are good at getting people into action (e.g. participative management style") is "My organisation strives for a correct method of letting employees co-decide" and shows a large difference in favour of the KNMI. As indicated by an employee, "from time to time the management asks my opinion in the final decision making process." There are also a lot of meeting between the management and employees. Because of such examples, employees feel well involved in the processes.

A last remark that has to be made is that most people at WMCN are of the impression that ISO9000 causes a lot of extra bureaucracy, while the corresponding statement ("I think that I have to document too much concerning about my activities") are at the same order at WMCN and KNMI. As indicated in paragraph 7.1.2. How the quality system has been implemented and accepted at the KNMI, it looked at first that it did caused a lot of extra bureaucracy. However, at a later stadium, the documented processes only occasionally had to be adjusted and resulted in extra efficiency. Therefore there can be concluded that the implementation of a quality system asks for an investment, which pays off after a while.

In this paragraph the extremer statements are highlighted where the employees of KNMI had stronger feelings about and which scored moderate at WMCN.

	Statements	Mean (sd) KNMI
Personal	-	-
Group	o My superior only intervenes when it is really necessary	4.4 (0.548)
	o My superior does not tolerate diverging opinions whenever a decision has been taken	2.2 (0.837)
	o My superior delegates tasks and responsibilities	4.2 (0.894)
Organisation	o I receive insufficient information about changes within the organisation	2.2 (0.707)
	o There is a lot of contact with people up and down in the hierarchy of the organisation	2.0 (0.000)
	o There is consensus within the organisation about its goal and mission	2.0 (0.000)
	o My employer shows h**is** appreciation of my work	4.2 (0.447)
Barriers	o I think that there are too many procedures that I have to take into account during crisis	2.4 (0.548)
	o People are cooperation well in times of crisis	4.2 (0.447)

TABLE 10: STATEMENTS THAT PEOPLE OF KNMI HAVE THE STRONGEST FEELINGS ABOUT

Statements related to leadership score relatively high at the KNMI, especially compared to the results of WMCN. People feel involved in the decision making process, there is mutual understanding and the management seldom has to intervene. The latter is possible because all the tasks and responsibility have been carefully documented so all the employees know what is expected from them. Although table 10 indicates that employees are not completely satisfied with the information flow from higher management and that there is not very much contact with people with a lower or higher function, they do find that there is enough information available about changes made at the KNMI and that there is enough appreciation regarding the work they do. The statement "There is consensus within the organisation about its goal and mission" has a low score. This can be explained with an earlier made statement that "the goals and mission of the entire organisation is currently reviewed by the politic and is therefore not clear to everyone. As a result, not everyone within the organisation is in agreement regarding the goals and the mission.

7.2.   Water Board Rivierenland (WBRL)

7.2.1. CASE DESCRIPTION

Water Board Rivierenland is responsible for water control in the River Area in the middle of the Netherlands (marked with the colour orange in figure 16). The main task of this water board in regard to water is:

- water management (maintenance, water levels, water quality);
- looking after the dikes and 'boezem' (drainage) quays;
- the treatment of waste water;
- managing the waterways of, among others, the Linge Smoutjesvliet, Alblas, Giessen and Graafstroom.

(Water board Rivierenland, 2005)

FIGURE 17: THE NETHERLANDS

The interdependency between Water boards and Centre for Water Management are established in the legalisation of the Netherlands through WMCN (PWC, 2011, p.25). Their legal task is to give early warnings and advise about high water and low water. However, in case of flooding or the threat of flooding the LCO is formed to give advice. Also, the RWS Message Service translates the weather forecasts in flood levels and the prediction of high waves (PWC, 2011, p. 31). The water boards are responsible for the flood defences. There are a couple of communication resources available between the water boards and WMCN, e.g. telephone, mail and computerised systems (PWC, 2011, p. 29). Until 2012, there was not a quality system within WBRL. However, since 2012 they started with implementing Lean in the organisation.

7.2.2. RESULT SURVEY WBRL

WBRL has not been analyzed using the Lean principles because there is little difference between WBRL and WMCN and Lean only just has been implemented. Therefore only a survey has been carried out at WBRL.

The survey has been held at the crisis section of WBRL and has been filled in by four employees. First the statements that have the strongest relation to WMCN are compared with the WBRL survey results. In addition the statements that have a strong relation with WBRL will be discussed. The scale that has been used in the survey went from 1 = disagree to 5 = agree.

Now, the survey results of WBRL and WMCN are being compared. The mean scores are very close as well at WBRL, with more or less the same standard deviation. When we take a closer look at the statements that have larger difference then 0.5 points between WBRL and the WMCN scores, the following statements are notable which are marked in purple and with an arrow:

	Statements		Mean (sd) WMCN	Mean (sd) WBRL
Personal	o	My work activities are done for a long time	4.3 (0.675)	3.0 (0.707)
	o	If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues.	4.3 (0.483)	4.4 (0.548)
	➤	If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior	4.2 (0.422)	4.8 (0.447)
	o	I can regain motivation when I suffer a setback.	4.2 (0.422)	4.0 (0.000)
	o	It is clear which targets and results my employer expects from me	4.1 (0.568)	4.2 (0.447)
	➤	My superior is inspiring and supportive	2.4 (0.699)	3.4 (0.894)
	o	My colleagues are inspiring and supportive	4.1 (0.568}	3.8 (0.447)
	o	I think my colleagues do not listen enough to me	1.78 (0.972)	1.6 (0.894)
	o	Whenever there are setbacks I have the possibility to improvise	4.3 (0.483)	4.0 (0.000)
Group	➤	The top-down communication is going well	2.3 (0.823)	3.2 (0.837)
	o	My organisation strives for a correct method of letting employees co-decide	2.5 (0.675)	2.8 (1.095)
Organisation		-	-	-
Barriers	o	It is clear to me who is the customer	4.1 (0.316)	4.2 (0.447)
	o	I think that I have to document too much concerning about my activities	2.5 (0.707)	2.0 (0.000)
	o	The organisation has too many goals that I have to take into account	2.5 (0.850)	2.2 (0.447)
	o	I think that I am underpaid	2.1 (0.994)	2.5 (0.894)
	➤	I know exactly what the concepts system thinking, process flow and 8 type of waste mean	1.8 (0.789)	1.2 (0.447)

TABLE 11: STATEMENT THAT HAVE PEOPLE OF WMCN COMPARED WITH WBRL FEEL THE STRONGEST ABOUT (AVERAGE SCORE < 2.5 OR > 4)

It stands out that where WMCN scores either very high or very low, the WBRL scores are almost the same with about the same standard deviation. When we take a closer look at the statements that have larger difference then 0.5 points between the WMCN and the WBRL scores, the following statements are notable:

The first statement (related to the criteria "The ability to get support not only from management but also from their colleagues, everyone shares equally in the belief that the project is worthwhile") that has a noticeable difference is "my superior is inspiring and supportive". As indicated, there are many meetings, both bilateral as with the crisis management team at WBRL. The management is also open for ideas from the employees. For example, at first employees did not show up at exercises because it was not mandatory. When there where complains that this approach did not work, the management took action and made the exercises obligatory. Most employees at WBRL have the feeling that it rewards to report problems, rather than to try to work around them.

The second statement (related to the criteria "the ability to cope with interference or opposition to a project".) that has a large difference is "If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior". The results are consistent with the previous statements where the management got a high rating and employees indicated that they find it easy to report any problems.

The third statement (related to the criteria "Group learning and sharing is enhanced by organic structure rather than mechanic structures") to be mentioned is "the top-down communication is going well". First of all, there is a lot of interaction among the employees of WBRL. Another advantage of WBRL is that they use a system where employees can present propositions. When a proposition has been presented, you are able to follow the process and see when it is being discusses and what decisions have been made. Because the process has been documented and is reviewable, it makes the process more transparent.

The last statement (related to the criteria "Lack of understanding of the effect of variation, systems thinking and process flow") that shows a large difference is "I know exactly what the concepts system thinking, process flow and 8 type of waste mean". Most likely, the difference is because WBRL has only just started using the KR8 concepts. However, based on the interview results, Lean has been implemented in some sections, and soon all the processes at WBRL will be evaluated using the Lean principles.

7.2.2.2.   Statements which scored extremer at WBRL than WMCN

The extremer statements are highlighted where the employees of WBRL had stronger feelings about and which scored moderate at WMCN.

	Statements	Mean (sd) WBRL
Personal	My superior delegates tasks and responsibilities	4.25 (0.500)
Group	It is easy to obtain information about my work activities	4.00 (0.000)
	I receive insufficient information about changes within the organisation	2.40 (1.517)
Organisation	My employer shows his appreciation of my work	4.20 (0.837)
Barriers	I know exactly what the goal and mission of the organisation is	4.00 (0.000)

TABLE 12: STATEMENTS THAT PEOPLE OF WBRL HAVE THE STRONGEST FEELINGS ABOUT

Although the delegation of tasks and authorities score high in the survey (see table 12) it does not necessarily say anything about the participation of employees because the other statements only show an average score. However, based on other criteria where the management does get high scores, there can be indicated that employees do not see this as a problem and that they do appreciate the management. A possible reason why the management scores high on this point is that one of the quality parameters is the usage of critical success factors which have to be improved at the end of every year. Every employee is made responsible for a particular task which they carry out on top of their normal everyday activities. Every month the process has to be reported in order to determine if everything is on schedule. Remarkable is the statement about the information about the changes in the organisation. Apparently, according to the employees of WBRL they get more sufficient information than at WMCN. Also, the surveys indicated that the managements appreciate the work of the employees. Finally, one important aspect for implementing a quality system is that employees know what the goal and mission of their organisation is. This statement scored high with a 4.0 average.

7.3.   Conclusions about the comparison with other organisations

In regard to **KNMI** a couple of conclusions can be made. Although ISO-9000 is a different quality system than Lean Management, both models have a similar goal: a better quality for customers. Therefore, an efficient organisation can also use Lean Management, even though the interviews have been based on these principles. In regard to the KNMI there are a couple of differences:

- The ISO-9000 meets the criteria of a good quality system. ISO-9000 has been used for a longer period, and all the processes have been documented. All the employees know what is expected from them and what their responsibilities are. By working more efficient, more time is available to work on other tasks.
- There is a stronger focus on customer service. To properly serve the customer, the customer relationship management section determines who is responsible and what happens to customers. For many employees at WMCN this is a task they have to do on top of their normal everyday activities.
- The KNMI intends to be as clear as possible to the customers. Information only flows to the customer from one point in the organisation. This process has also been carefully documented. The responsibilities of the employees have also been well documented. Everyone knows what they can expect from their colleagues, and if anyone fails to meet this expectation they can be corrected for it. Because everything has been well documented, there is not much redundant work being done.
- The KNMI mainly use a pull system, which saves time and energy.
- The KNMI also tends to work more efficient then WMCN. By discussing many topics with its customers, it become clear to customers what they can expect from the KNMI and what the KNMI can expect from its customers. As a result, not much work has to be corrected afterwards. Regarding to the time one has to wait for information, the employees of the KNMI have to wait sometimes for the research section. This is due to the more flexible work hours of the research section. Also, documents are easy to find and employees are easy to reach.
- The KNMI uses a communication path to maintain the connection between the management and the meteorologists. This way, both groups keep a mutual understanding what they can expect from each other.

Concerning the survey one big difference can be noticed:

- Leadership is being better evaluated at the KNMI. Employees feel more respected and more involved in the decision making process.

In relation to **WBRL**, the biggest difference is similar to the one with the KNMI: WBRL and KNMI have a better leadership style. Employees at WBRL feel more understood, get sufficient information about the changes within their organisation and know the goal and missions. This results in the fact that they are less likely to resist to upcoming changes.

At WMCN not many employees know the meaning of the Lean concepts. However, at WBRL this has been rated even lower. This is most likely due to the fact that Lean has only just been implemented and that it takes a while before everyone is familiar with it. The other statements score more or less the same as WMCN.

The following chapter will go more deeply into general conclusions and recommendations.

8. CONCLUSIONS & RECOMMENDATIONS

This final chapter provides conclusions and recommendations based on data gathering, analysis, interviews, and research conducted as part of the final master thesis. The first paragraph deals with the conclusions from the main research question and a small summary of the answers of the four sub questions. The second paragraph provides recommendations for WMCN. Finally, a discussion of this master thesis is provided.

8.1. Conclusions

This thesis has a couple of major conclusions, which will be discussed per sub question.

8.1.1. ANSWER SUB QUESTION 1

"What are the characteristics of the KR8–model (including pros and cons)
and how do these compare to other quality models"

The main characteristics of KR8 are the focus on customer orientation, respect (which is not clearly defined) and the 8 types of waste. In comparison to the four models which are discussed (Lean, KO-model, Six Sigma and ISO9000) all models are quite similar, with concepts which mean more or less the same. Although the KO-model is more a self assessment-model, the rest of the models are about standardisation and continuous improvement, which could be achieved by using the PDCA-model (or DMAIC, which basically means the same).

As we saw in chapter 5, KR8 is based on Lean Management. The key characteristics of KR8 are the focus on customer service and the 8 types of waste. Two additional types of criteria were identified in the comparative analysis with a selection of other quality models: suitability and user friendliness.
Some differences between KR8/Lean and other quality models are:

- The Lean house for governmental organisations (Huguenin, Binnerts & van Gestel, 2011, p.17) is specially adapted to governmental organisation. Although the KO-model is also adapted to governmental organisations, other quality models are set up in such a way that it is particularly practical for profit organisations with standard production;
- Lean has a bottom up approach, instead of a top down approach;
- Lean is more flexible.

With Lean you map the processes and orientate at the activities that add value to a product. However, there is one big advantage towards ISO 9000 and Six Sigma, because as an organisation you are not tied down to the obligations which are involved with the bureaucracy.

> The overall conclusion of this first research questions is that the characteristics of KR8 are focused on customer orientation and the 8 types of waste. However, it is notable that the four models (Lean, KO-model, Sig Sigma and ISO-9000) are not that different from each other.

"What is the degree of implementation i.e. the current status of WMCN
regarding quality management and the KR8-model?"

KR8 was implemented as a pilot in 2008 and is now properly being implemented in the whole organisation since 2012. Which is fairly early in the process, and can also be seen in the fact that the employees do not really know what a quality system is and what KR8 means. However, the PIN's are already used to measure Lean. Another problem is that there is too little interaction between the employees of WMCN concerning their views what could be changed within WMCN and to partners within the network.

Conclusions based on the building blocks of Lean Management for governmental organisations:

- **Customer focus:** it is important that every employee has the same focus in regard to who the customer is, because it is not up to the employee to decide who they think is the most important customer, but to the management. Also, it is not clear where a customer should obtain their information from the WMCN. Furthermore, doing evaluations is not enough to improve the quality of WMCN, because this would hinder the employee with his normal daily activities. And finally, it is a positive development that WMCN is starting with the Netcentric approach, which could benefit the customer.

- **Strategic goals:** most Lean principles, such as "integrity & collaboration", "learning and improving", "focus on customer service" and the foundation of the model "strong teams" are reflected in the strategic goals of RWS.

- **Professionalism:** here there are a couple conclusions that can be made:
  o Communication lines in case of crisis are described well
  o A good way of standardisation what knowledge and expertises employees have, is the OTO-plan.
  o Although the daily reports are standardised, a couple of things still go wrong: first, the information is not clear to customers. Second, information reaches customers through different channels. And third, customers sometimes get different messages from different people within WMCN.
  o There is no central blackboard with the processes of different projects.

- **Quality:** information given by WMCN is scattered too widely and the interpretation of the information lacks clarity for the customers;

- **Efficiency:** the biggest type of waste for WMCN are:
  o **Doing too much:** it is not yet clear what the customer exactly wants.
  o **Untapped talent:** although this is a process what is improving, it is important to let the employees to participate with the procedure of improving within WMCN.

In regard the concept "flow", there are enough possibilities within WMCN to find the flow. The only problem is that due to different projects it is more difficult to work in a flow.

- **Learning & Improvement:** there is a strong focus within RWS to operate as one organisation. This is as well visible by the employees, because they are also convinced that this is one way to help customers to find their way in using the information WMCN gives them. The head of section has also followed some courses about Lean, which helps implement Lean better within WMCN. The OTO-plan is implemented to keep up the level of Education, Training & Practice from the employees. This is done in a systematic way.

- **Strong teams:** historically, WMCN has a lot of different groups which act strongly on their own. This is a good foundation for WMCN, but to improve quality it is important that these groups cooperate more with each other.

> To conclude research question 2, although the process of implementing Lean is in a fairly early stage, steps have already been taken. First of all, PIN's are made to measure Lean, the OTO-plan is created to evaluate the process of education, training and practice.

8.1.3. ANSWER SUB QUESTION 3

"Which organisational factors are identified in literature as (potentially) relevant and
to what extent do these - in combination with the KR8 characteristics –
(potentially) influence the implementation status as identified under question 2."

In the scientific literature there are four levels identified which can influence the implementation status. It is important for an organisation to encourages innovation, learning and continuous improvement. The four most important levels which influence the implementation at WMCN are:

1. **Individual level:** according to employees, WMCN invests too little in them. Although the employees get enough support and inspiration from their fellow colleagues, this is not the case for the management.
2. **Group level:** two concepts stand out: communication and participation. The employees state that there could be better communication from the management to the work floor. In regard to participation the employees state that the leaders do not get the people into action and the way the employees participate with decisions is not set in the right way.
3. **Organisation level:** the lowest score here has also to do with communication. Employees declare that they do not get enough information about changes within the organisation.
4. **Barriers for implementing lean management:** the only statement that strikes the most is the knowledge people have. The statement "I know exactly what the concepts system thinking, process flow and 8 types of waste means" scored very low.

In these four levels, employees have strong feelings about some statements in the survey. These key statements which could influence the implementation are:

- **Support from the (top) management:** employees stated that the management to some degree appreciate their work. Also, a majority stated that they do not find their superior inspiring and supportive.
- **The way of communication is not set out right:** a majority finds the top-down communication not good and that there is insufficient information about the changes within WMCN.
- **Lack of understanding of the concepts from Lean:** a majority of the employees lacks a clear understanding what the most important concepts of Lean means.

> To sum up, criteria which could influence the implementation of a quality system are present at group and organisational level and is the criteria "there is too little support of the management". On group level, the way of communication is not set right. Another barrier is that the employees do not have a good of understanding of the concepts of Lean.

8.1.4. ANSWER SUB QUESTION 4

How are these results comparable with the implementation of
quality management systems in two other organisations within the network of WMCN?

Besides the different quality systems, the biggest difference is that the quality system at KNMI is been used for a long time. Therefore efficiency steps are already in an advanced stage.

- By using a system for a longer period, employees know what the system does and what benefits it brings along rather than only seeing the few negative points. This is because the implementation of a quality management system takes time and effort to implement, and the employees will learn to appreciate this system over time.
- At the KNMI there is a section that is responsible for the contact with customers. The employees themselves do not contact the customers to make any agreements.
- Information is being sent to the customer from one point in the organisation, making it clear for the customer. This can been done because the processes and the responsibilities of the employees have been well documented. If an employee does make a mistake, he can be corrected for it.
- Because the KNMI knows what they can expect of a customer, there is less chance that mistakes will be made and work has to be corrected afterwards.
- The communication path between the management and the meteorologists have resulted in better understanding.

Only the statements that are related to the management and leadership styles score much higher at the KNMI and WBRL. The statements regarding the group and organisational factors also show a similar trend. Also, as expected, the maintenance of the quality system at WMCN does not take a lot of effort when the implementation is complete.

In comparison to the KNMI the biggest differences are that ISO9000 is implemented for a long time, there is a department responsible for only the communication with customers and that the management intensively works on the contact with the work floor.
Regarding to the survey the statements about management and leadership styles at WMCN are less positive evaluated than at KNMI and WBRL.

"What are the (potential) implementation gap issues gap issues of KR8 and how are they explainable by the characteristics of the KR8-model and the organisational factors?"

The first thing that strikes in this research is the great deal of overlap between the criteria set by other scholars and myself. First the criteria of a good quality system were discussed in chapter 4 and then there were criteria set to evaluate if the type of quality system is suitable for an organisation. In chapter 5 the building blocks of Lean were reviewed and at last in chapter 6 the organisational factors. In appendix X the relations between these criteria are exposed by linking the criteria. A lot of progress has already been made regarding the implementation of KR8 at WMCN. It should be kept in mind that not only the implementation of KR8 only just has been introduced, but also that the organisation of WMCN is relative new. The whole idea of WMCN is also an efficiency step, because in the past the same service was fragmented over a number of different organisations. The idea is that crisis control can now be tackled in a uniform manner, but the merger of the different organisations cost time in regard to culture change. During the interviews it was clear that everyone wants to improve WMCN so the service for customers can be improved. It should be kept in mind, that changing an organisation cost a lot of time and commitment and speeding up the procedures in regard to quality, will have the opposite effect of employees who will oppose to the new measures.

As mentioned earlier in this thesis, it is too early to draw conclusions. However, it is possible to state potential bottlenecks in the process of implementing Lean/KR8 within WMCN.
Potential bottlenecks observed during the research:

- **Too little effort is put in customer-orientation**. Although one employee is busy with entering into dialogue with partners on this matter and evaluations are made, this is not enough.
- **WMCN needs much greater cooperation and should become more one organisation**. Although there is an understanding at WMCN that this is necessary, more effort should be put in this subject, so that there is more uniformity and efficiency how to act within the network and how to maintain the quality within WMCN. For example evaluations are done by each group, and not for the organisation as a whole. Also, for partners in the network it will be more clear who WMCN is and what their tasks are.
- **Communication between the employees at the work floor and management is not good enough.** The employees believe that they get not enough information from the top and managers do not always understand what is happening on the work floor.
- **Employees do not understand what Lean/KR8 is.**

However, what WMCN is already doing in respect to quality is:

- **Evaluations** are taking place
- **Written manuals** have been formulated to systemise the communication lines in times of crisis.
- **OTO-plan** is in development, which standardise the knowledge of the employees.
- **PIN'**s are formulated to measure quality.
- There is a "**netcentric approach**" which is set up to enhance the mutual cooperation between WMCN and other partners within the network.
- The employees within WMCN are **motivated** and have a high sense of **responsibility** in the way to fulfil their tasks. They are receptive for new ideas about to make WMCN a more effective and efficient body.

8.2. Recommendations

Besides the conclusions on what the implementation gap issues are, some recommendations can be made. It is still too early to say something about KR8, because KR8 is implemented since January 2012. However, I wish to comment on several items:

Organisation

- Stick to a single quality management system and do not switch to soon. A quality management model needs time to be implemented in the organisation and to become effective.

- Instead of using the core of traditional Lean principles which are focused on the business sector, it is better to use an adapted version of Lean which has specifically been designed for governmental settings.

- The organisation of RWS is mainly focused on a top down management style, while the focus on Lean is bottom up. This needs a cultural change.
  Area of action: management: point out to the employees that their contributions can make a difference within WMCN.

- Information should be distributed by one section and the information should be adapted to the right target group. When this is not done, customers could become confused and WMCN might not be seen as one organisation. It is important to communicate within WMCN what everyone's task is and to make the employees aware of these responsibilities.
  Area of action: management en operational section. Obtain more insight in the work processes and make people responsible for their task.

- Positive feedback is easily given by the employees, but it is harder to give critical comments. Although employees in the survey state that negatively feedback is easily given, in the interviews a different answer is given. Critical feedback is important for continue learning and improving of an organisation.
  Area of action: management give employees the necessary space to do this, and when meetings do not work, maybe a course can be given how to give critical comments without making these comments personal.

Communication

- Management should be much more involved, because employees state they feel the need to be included by the management. Management should be more interested what is happening on the work floor, but also, with explaining what KR8 is.
Area of action: management: more commitment

- Improve the communications between the operational section and the management. This will increase the mutual understanding between these two groups.
Area of action: management: invest time and resources (e.g. workshops) to achieve this.

- It is important that everyone has *the same focus* in regard to who the customer is. An organisation like WMCN has a lot of customers with different needs. Therefore it is important to know for which customer you working for and to know what they want from WMCN and what WMCN wants from them. Also, it is important that everyone knows why it is so important to have the same focus on customer service. In the survey, employees declare that they know their customers. However, this does not mean that there is consensus.
Area of action: management: it is in everyone's interests that it is clear who the customer is, and that this is not defined by the employees themselves.

- There should be *a better focus on customer service*. People are already busy with talking to customers, but this is done on a small scale. It is not only important to know what the customer wants from WMCN, but also what information WMCN would like to have from them. Crisis management is no standardised process, however communication, which is the product of the process, should be clear. It is important to appoint other people than the people who are already working with the customers, because in this manner the employees do not choose what they personally think it is important. The content is not important, but the framework of activities and especially, expectations are important.
Area of action: management: appoint a group of people who are particularly concerned of this issue.

- Go more often into dialog with the customer and make employees responsible for this task. Also make sure that they have time for this and that it does not come on top of their everyday activities. For the customer it becomes clearer who they have to approach and the employee do not determine what is important because there is more input from the customer himself.
Area of action: management: to make possible that a couple of people is responsible for this task.

- WMCN is for customers not a transparent organisation. Customers point out that they do not know where in the organisation they should be for certain information and therefore it could be difficult for customers to know which value WMCN has as an organisation. This could be tackled by inviting customers on a regularly basis (for example: one a year) to WMCN for a course. In this course WMCN could explain who they are, what they could deliver and where customers could ask for specific information within WMCN.
Area of action: management: appoint a group of people who are particularly concerned of this issue.

- Customers have difficulties with the interpretation of the information given by WMCN. This is not only pointed out by the employees of WMCN, but also by the customers within the network.
Because employees within WMCN could stagnate in their own jargon, it is important to let communication experts revise these information to the right target group.
Area of action: operational section/management: bring in communication experts.

- Employees are critical about Lean Management and KR8 and the information they heard about is that this method is used by standardised processes in business environment such as McDonalds and Toyota. Employees only have a sketchy idea and precious little knowledge about this quality system.
Area of action: management: explain what a quality system exactly is and what the added value of KR8 is. Also, explain that this model is certainly feasible within an organisation such as WMCN.

- Point out that standardisation is no limitation for the employees own interpretation and creativity. Standardisation makes the work process on the whole more transparent and better and employees can use their own creativity to enhance the overall quality. If procedures will not work, it is easier to improvise or the to intervene in the system.
Area of action: management: point this out to employees.

Tools & processes

- Standardise processes as much as possible and make all the processes clear. Although crisis is mostly acting on improvisation, basic processes can be standardised. This is more useful and clear for WMCN and partners within the network. For example, the data transfer in regard to water levels which are passed by the Water boards.
Area of action: management: get insight in the work processes

- Make more use of the PDCA-circle. Almost every employee only uses the "Plan" and "Do, but not the "Check" and "Act". They state that these last two steps in the PDCA-circle are more dry matter than the first two steps. However, without these two steps, it is difficult to guarantee continue quality (improvement).
Area of action: management: if they have more insight in the processes, they could better point out how the PCDA-circle could be used and make employees conscious of these two steps.

- Hang a black board in the centre of the department. This is a transparent method to focus on improvement on a daily basis. By using such a board, the activities related to a project can be made visible, including who is responsible and when the latest update has been made. By doing this, it becomes easily visible if the project is still on track.
Area of action: management: place a black board and keep it up to date.

8.3.   Discussion

This paragraph will discuss the shortcomings of this study and will present directions to further research.

8.3.1. SHORTCOMINGS

This research was about the implementation of Lean and the possible organisational factors that hinder the process. However due to various reasons, there are a number of shortcomings of this thesis that have to be identified.

- Although I selected two other cases to look deeper into and to find information which could be helpful for WMCN, the research was not deep enough to gather all the information, mainly due a lack of time. Also, because these two organisations were not my main cases, it was more difficult to get all the information and to get responses from the employees. Therefore the survey response at KNMI and WBRL is low, which makes it difficult to generalise for the whole section which deals with crisis management.
- It would have been better to verify the input of the employees of WMCN what they said about their partner in their network and other sections in RWS. Because of time limits, I did not interview other partners and colleagues and to find out what was exactly going on.
- Because of the length of the interviews, only six employees are interviewed at WMCN. It would be advisable to make a shorter interview and to interview more people. In this way you could categorise the different opinions of the employees better and sort them by profession categories.

8.3.2. FURTHER RESEARCH

Most of my recommendations to WMCN are clear. However, before they implement these recommendations it is advisable to invest in the following:

- Lean is about eliminating all the unnecessary activities which does not add value to their product. So before Lean is implemented, it is advisable to start with mapping the processes and get a clear image of this. Without this, it is almost impossible to implement Lean. It is advisable to do this in a participative way with the employees and not only by the management themselves. In this way the employees feel more involved in the process.
- Before Lean could be evaluate properly, it is necessary to give Lean time to implement and employees time to adjust to the situation. This research is probably set out to early and it is advisable to repeat this research in a couple of years.
- A study should be made about the partners in the network/ customers with their wishes and demands. It should become clearer in order to cooperate better with each other.

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APPENDIX I: LIST OF TABLES

APPENDIX II: LIST OF FIGURES

(Rijkswaterstaat, 2010d)

APPENDIX IV: ELABORATION OF THE LEAN HOUSE OF GOVERNMENTAL ORGANISATIONS

Huguenin, Binnerts & van Gestel (2011, p.17) argued that the model of Lean house for governmental organisations consists of building blocks which represent the different aspects of Lean management for governmental organisations.

1. Focus on customer

First of all, it is important for an organisation to focus on what a customer wants and to formulate long term strategic goals. It is important to take up extra work, only if it add value to the customer satisfaction. Because of this it is important to know who 'the customer' is. This can be civilians, companies, boards or pressure groups. Governmental organisation are more busy concerning internal process, than what a customer wants. Also, there is a risk that a employee alone decides what the best is for a customer.

2. Strategic goals

It is important that an organisation focus on long term strategic goals, because this injects stability within an organisation.

3. Professionalism

Here it is vital to spread work evenly, which is the so called 'heijunka'. If the production process is more 'relaxed' by eliminating peaks and troughs, people can handle their work better and do not get overloaded "muri". Furthermore, if employees work in projects it is important not to work in too many projects, because it seems like that a lot of work is done, but in reality the effectively of the employees declines.

Also, it is important to create standards and to make the work visible. In an organisation knowledge should be shared and should be continuous improved in cooperation with colleagues together. Standard forms should be made by the employees themselves, because the employees themselves knows what is important for their activities and otherwise there is a risk that employees would not use the forms because it can increase bureaucratic activities. If work is made visible within an organisation, it is clear to everyone how far everyone is in a process. There are no ambiguities about the work process.

4. Quality

If quality is embedded in the work process or the way the employees are working, the work can be done in one time. If a employee believes that something is wrong in the process, it is important to stop the process and to analyse en prevent the problem. In the long term this will save time and money.

5. *Efficiency*

Here it is important to eliminate the eight types of waste "muda", which prolong activities in the process and which do not add value to what a customer wants. In addition, if the process is better coordinated "flow", it would shorten handling times. Lot of employees will add a buffer in their work by reserving more time than necessary, in case they need this time. This an example of ignoring problems instead of tackling them, which eventually hinder the flow.

6. *Learning and improving*

One of the central concepts of Lean management is the focus on continue learning and improving. It is important that employees within the organisation, not only are used to give each other feedback, but also give feedback towards management. One of the tools to do this is using the PDCA cycle (see 4.1.4), which encourage correction in a systemic way if necessary.

7. *Integrity and collaboration*

If an organisation wants to focus on learning and improving it is important to include professionals actively in this process. This is required for more involvement in the organisation, promptly act on decisions and questions from colleagues, clarity and simultaneousness within the organisation. In order to work more efficiently and effectively with partners in the network, it is important to involve these partners. If these partners are on the same line regarding the problem and solutions, the flow of the implementation of the solutions will be much better.
To do so, it is important as well that the managers have a clear idea what lean management implies, because they need to steer the professionals to a direction in which there is a process of continue learning and improving.

Overall block: strong teams

Strong teams is the foundation of the Lean House. Without trust en commitment in the team, it is impossible to implement Lean Management.

APPENDIX V: MEAN AND STANDARD DEVIATION SURVEY – RESULTS WMCN

Extreme statements which scored < 2.5 or > 4.0 are marked in purple with an arrow in the front of the statement.

Statements individual level	N	Mean	SD
1a. My education fits my current position	10	3.8	0.632
➤ 1b. My work activities are done for a long time	10	4.3	0.675
1c. The organisation does not spend enough time on educating its employees	10	3.1	0.568
➤ 2a. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues.	10	4.3	0.483
➤ 2b. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior	10	4.2	0.422
➤ 3a. I can regain motivation when I suffer a setback.	10	4.2	0.422
3b When work only exist of project work, go to A, otherwise go to B.			
➤ A: I can stay motivated for an entire project.	4	4.25	0.500
➤ B: I find it hard to be motivated during my work	6	1.67	0.516
➤ 4. It is clear which targets and results my employer expects from me	10	4.1	0.568
➤ 5a. My superior is inspiring and supportive	10	2.4	0.699
5b. I am allowed to make mistakes	10	3.3	0.823
➤ 5c. My colleagues are inspiring and supportive	10	4.1	0.568
➤ 5d. I think my colleagues do not listen enough to me	9	1.78	0.972
5e. Partners in the network are inspiring and supportive	9	3.67	0.707
➤ 6. Whenever there are setbacks I have the possibility to improvise	10	4.3	0.483

Statements group level	N	Mean	SD
7a. My superior only intervenes when it is really necessary	10	2.90	0.876
7b. My superior clearly shows who is the boss	10	3.70	1.160
7c. My superior does not tolerate diverging opinions whenever a decision has been taken	10	3.40	0.966
7d. My superior controls whether I achieve my targets and perform my tasks correctly	10	3.20	0.632
8a. I believe that the organisation has a hierarchical structure	10	3.70	0.483
8b. There are too many managers within the organisation	10	3.60	1.075
➢ 8c. The top-down communication is going well	10	2.30	0.823
8d. The communication with my colleagues is going well	10	3.80	0.789
9a. I have the possibility to participate in the decision making process	10	3.40	0.516
9b: My superior delegates tasks and responsibilities	10	3.20	0.789
9c: I feel involved in the decision making process	10	3.00	0.667
➢ 9d: My organisation strives for a correct method of letting employees co-decide	10	2.50	0.675

Statements organisation level	N	Mean	SD
10a: It is easy to get information within the organisation	10	3.20	1.033
10b: It is easy to obtain information about my work activities	10	3.80	0.632
10c: It is easy to obtain information about my organisation as a whole	9	3.44	0.882
10d: I receive insufficient information about changes within the organisation	10	3.00	0.943
11a: There is enough contact between colleagues and to build friendships	10	3.50	0.850
11b: There is a lot of contact with people up and down in the hierarchy of the organisation	10	3.20	0.789
11c: I know what other people in the organisation are doing	10	3.40	0.699
12: Management provides all recourses available that I need to be able to do my work	10	3.40	0.699
13: There is consensus within the organisation about its goal and mission	10	3.20	0.789
14: My employer shows his appreciation of my work	10	3.30	0.675

Statements barriers	N	Mean	SD
➢ 15: It is clear to me who is the customer	10	4.10	0.316
16a: I think that there are too many procedures that I have to take into account during crisis	10	2.80	0.632
➢ 16b: I think that I have to document too much concerning about my activities	10	2.50	0.707
17a: People most of the time work alone	10	3.20	0.422
17b: People are cooperation well in times of crisis	10	3.60	0.966
➢ 18: The organisation has too many goals that I have to take into account	10	2.50	0.850
19a: I receive sufficient information about the goals of the organisation	10	3.60	0.843
19b: I receive sufficient information the strategy of the organisation	10	3.20	0.632
19c: I know exactly what the goal and mission of the organisation is	10	3.40	0.966
20a: I do too much work	10	3.20	0.919
➢ 20b: I think that I am underpaid	10	2.10	0.994
➢ 21: I know exactly what the concepts system thinking, process flow and 8 type of waste mean	10	1.80	0.789

Extreme statements which scored < 2.5 or > 4.0 are marked in purple with an arrow in the front of the statement.

Statements individual level	N	Mean	SD
1a. My education fits my current position	5	3.80	1.095
1b. My work activities are done for a long time	5	3.60	1.140
1c. The organisation does not spend enough time on educating its employees	5	2.20	1.095
➢ 2a. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues.	5	4.20	0.447
➢ 2b. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior	5	4.20	0.447
➢ 3a. I can regain motivation when I suffer a setback.	5	4.00	0.000
3b When work only exist of project work, go to A, otherwise go to B. A: I can stay motivated for an entire project.	0	-	-
➢ B: I find it hard to be motivated during my work	5	1.60	0.548
➢ 4. It is clear which targets and results my employer expects from me	5	4.00	0.000
➢ 5a. My superior is inspiring and supportive	5	4.00	0.707
5b. I am allowed to make mistakes	5	3.60	0.548
➢ 5c. My colleagues are inspiring and supportive	5	4.00	0.000
➢ 5d. I think my colleagues do not listen enough to me	4	1.75	0.500
5e. Partners in the network are inspiring and supportive	4	3.75	0.500
➢ 6. Whenever there are setbacks I have the possibility to improvise	5	3.80	1.095

Statements group level	N	Mean	SD
➢ 7a. My superior only intervenes when it is really necessary	5	4.40	0.548
7b. My superior clearly shows who is the boss	5	3.40	1.140
➢ 7c. My superior does not tolerate diverging opinions whenever a decision has been taken	5	2.20	0.837
7d. My superior controls whether I achieve my targets and perform my tasks correctly	5	3.00	0.707
8a. I believe that the organisation has a hierarchical structure	5	3.40	0.548
➢ 8b. There are too many managers within the organisation	4	2.50	0.577
8c. The top-down communication is going well	5	2.80	0.837
8d. The communication with my colleagues is going well	5	3.80	0.447
9a. I have the possibility to participate in the decision making process	5	3.80	0.447
➢ 9b: My superior delegates tasks and responsibilities	5	4.20	0.447
9c: I feel involved in the decision making process	5	3.60	0.548
9d: My organisation strives for a correct method of letting employees co-decide	5	3.40	0.894

Statements organisation level	N	Mean	SD
10a: It is easy to get information within the organisation	5	3.40	0.548
10b: It is easy to obtain information about my work activities	5	3.80	0.447
10c: It is easy to obtain information about my organisation as a whole	5	3.80	0.447
➢ 10d: I receive insufficient information about changes within the organisation	5	2.00	0.707
11a: There is enough contact between colleagues and to build friendships	4	3.50	0.577
➢ 11b: There is a lot of contact with people up and down in the hierarchy of the organisation	4	4.00	0.000
11c: I know what other people in the organisation are doing	5	3.40	0.894
12: Management provides all recourses available that I need to be able to do my work	5	3.60	0.894
➢ 13: There is consensus within the organisation about its goal and mission	4	2.00	0.000
➢ 14: My employer shows his appreciation of my work	5	4.20	0.447

Statements barriers	N	Mean	SD
➢ 15: It is clear to me who is the customer	5	4.40	0.548
➢ 16a: I think that there are too many procedures that I have to take into account during crisis	5	2.40	0.548
➢ 16b: I think that I have to document too much concerning about my activities	5	2.40	0.548
17a: People most of the time work alone	5	2.60	0.548
➢ 17b: People are cooperation well in times of crisis	5	4.20	0.447
➢ 18: The organisation has too many goals that I have to take into account	5	2.40	0.548
19a: I receive sufficient information about the goals of the organisation	5	3.20	0.447
19b: I receive sufficient information the strategy of the organisation	4	2.75	0.500
19c: I know exactly what the goal and mission of the organisation is	5	2.80	0.837
20a: I do too much work	5	3.20	1.304
➢ 20b: I think that I am underpaid	5	2.00	0.000
➢ 21: I know exactly what the concepts system thinking, process flow and 8 type of waste mean	5	1.80	0.837

APPENDIX VII: MEAN AND STANDARD DEVIATION SURVEY – RESULTS WATERBOARD RIVIERENLAND

Extreme statements which scored < 2.5 or > 4.0 are marked in purple with an arrow in the front of the statement.

Statements individual level	N	Mean	SD
➢ 1a. My education fits my current position	5	4.00	0.000
1b. My work activities are done for a long time	5	3.00	0.707
1c. The organisation does not spend enough time on educating its employees	5	2.60	1.140
➢ 2a. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to colleagues.	5	4.40	0.548
➢ 2b. If I do not agree on something related to the project I am working on, there are no barriers that prevent me to report these issues to my superior	5	4.80	0.447
➢ 3a. I can regain motivation when I suffer a setback.	4	4.00	0.000
3b When work only exist of project work, go to A, otherwise go to B.			
➢ A: I can stay motivated for an entire project.	2	4.00	0.000
➢ B: I find it hard to be motivated during my work	4	1.25	0.500
➢ 4. It is clear which targets and results my employer expects from me	5	4.20	0.447
5a. My superior is inspiring and supportive	5	3.40	0.894
5b. I am allowed to make mistakes	5	3.40	0.894
5c. My colleagues are inspiring and supportive	5	3.80	0.447
➢ 5d. I think my colleagues do not listen enough to me	5	1.60	0.894
5e. Partners in the network are inspiring and supportive	5	3.40	1.517
➢ 6. Whenever there are setbacks I have the possibility to improvise	5	4.00	0.000

Statements group level	N	Mean	SD
7a. My superior only intervenes when it is really necessary	5	3.60	0.140
➢ 7b. My superior clearly shows who is the boss	5	2.00	0.707
7c. My superior does not tolerate diverging opinions whenever a decision has been taken	5	3.00	1.414
7d. My superior controls whether I achieve my targets and perform my tasks correctly	5	3.40	0.894
8a. I believe that the organisation has a hierarchical structure	5	3.40	0.894
8b. There are too many managers within the organisation	5	2.40	0.548
8c. The top-down communication is going well	5	3.20	0.837
➢ 8d. The communication with my colleagues is going well	5	4.40	0.548
9a. I have the possibility to participate in the decision making process	5	3.00	0.707
➢ 9b: My superior delegates tasks and responsibilities	5	4.25	0.500
9c: I feel involved in the decision making process	5	3.20	0.447
9d: My organisation strives for a correct method of letting employees co-decide	5	2.80	1.095

Statements organisation level	N	Mean	SD
10a: It is easy to get information within the organisation	5	3.60	0.548
➢ 10b: It is easy to obtain information about my work activities	5	4.00	0.000
10c: It is easy to obtain information about my organisation as a whole	5	3.40	0.894
➢ 10d: I receive insufficient information about changes within the organisation	5	2.40	1.517
11a: There is enough contact between colleagues and to build friendships	5	3.60	0.894
11b: There is a lot of contact with people up and down in the hierarchy of the organisation	5	3.40	0.894
11c: I know what other people in the organisation are doing	5	2.80	0.447
12: Management provides all recourses available that I need to be able to do my work	5	3.80	0.447
13: There is consensus within the organisation about its goal and mission	5	3.80	0.447
➢ 14: My employer shows his appreciation of my work	5	4.20	0.837

Statements barriers	N	Mean	SD
➢ 15: It is clear to me who is the customer	5	4.20	0.447
➢ 16a: I think that there are too many procedures that I have to take into account during crisis	5	2.40	0.548
➢ 16b: I think that I have to document too much concerning about my activities	5	2.00	0.000
17a: People most of the time work alone	5	2.60	0.548
17b: People are cooperation well in times of crisis	5	3.40	0.894
➢ 18: The organisation has too many goals that I have to take into account	5	2.20	0.447
19a: I receive sufficient information about the goals of the organisation	5	3.60	0.894
19b: I receive sufficient information the strategy of the organisation	5	3.40	0.894
➢ 19c: I know exactly what the goal and mission of the organisation is	5	4.00	0.000
20a: I do too much work	5	2.60	0.894
➢ 20b: I think that I am underpaid	5	2.60	0.894
➢ 21: I know exactly what the concepts system thinking, process flow and 8 type of waste mean	5	1.20	0.447

APPENDIX VIII: INTERVIEW QUESTIONS (DUTCH)

1. Algemene vragen

1. Kunt u vertellen wie u bent?
2. Wat is uw functie en hoe ziet uw takenpakket eruit?
3. Binnen welke afdeling werkt u?
4. Hoe lang bent u werkzaam binnen deze organisatie?

2. Kwaliteitssystem

5. Wat voor systeem hebben ze bij het KMNI?
6. Wat verstaat u onder een kwaliteitssysteem?
7. Hoe staat u hier tegenover?
8. Hoelang werkt u al met dit kwaliteitsysteem?
9. Kunt u vertellen hoe een kwaliteitssysteem in elkaar zit?
10. Heeft u het idee dat het kwaliteitssysteem er voor zorgt dat er effectiever gewerkt wordt?
11. Vindt u dat uw wensen 'eisen' opgenomen zijn in het kwaliteitssysteem?
12. Of van de samenleving?
13. Waar denkt u dat het systeem vooral op gefocused is (voorkomen van problemen? Maar dit moeten ze zelf aandragen).
14. Bent u tevreden in de mate dat uw organisatie informatie over de handhaving van kwaliteit, doorgeeft aan u en haar werknemers?
15. Op welke wijze controleert uw organisatie dat deze informatie op een juiste wijze overkomt?
16. Op welke wijze wordt het type kwaliteitsysteem gecommuniceerd met partners binnen het netwerk waar uw organisatie opereert?
17. Op welke manier houdt het gebruikte kwaliteitssysteem rekening met de aanwezigheid van partners binnen uw netwerk?
18. Welke activiteiten verrichten jullie om jullie kwaliteit te waarborgen? (trainingen?)

3. KR-8 Organisatie

11. Waarom is er volgens u gekozen voor dit kwaliteitsysteem?
12. Wat is het beleid van uw organisatie inzake kwaliteitssystemen?
13. Wat voor kwaliteitsparameters kent u binnen uw organisatie?
14. Met welk doel is volgens u dit kwaliteitssysteem ingevoerd? (klant? markt? Efficiënter?)
15. Hoe is de implementatie verlopen?

4. KR-8 Klantgerichtheid

16. Wie ziet uw organisatie volgens u als 'klant'?

17. Wie ziet u zelf als 'klant' voor uw organisatie?

18. (Indien er een discrepantie is:) hoe verklaart u de discrepantie tussen klantbeleving van de organisatie en u?

19. Op welke wijze draagt hetgeen wat u nu doet bij aan het bedienen van de klant?

20. Hetgeen wat u nu doet, is dat beredeneerd vanuit wat de organisatie denkt dat de klant wilt of wat u zelf denkt dat goed is of om de interne processen te waarborgen (geen 'gedoe' hebben met collega's)?

21. Heeft u het idee dat de vraag van de klant aan het veranderen is?

22. Wat voor gevolgen heeft het als de klantvraag verandert?

5. KR-8 Professionaliteit

23. Hoeveel verschillende projecten bent u nu mee bezig?

24. Op welke wijze hebben de hoeveelheid projecten invloed heeft op uw functioneren?

25. Hoe verdeelt u uw aandacht over deze projecten?

26. Heeft UW ORGANISATIE huidige beschrijvingen over de beste wijze om resultaat te krijgen?

27. Indien nodig, worden deze beschrijvingen aangepast?

28. Hoe vaak worden deze beschrijvingen aangepast?

29. Vindt u dat u werk bestaat uit standaard werk?

30. Op welke wijze maakt u gebruik van standaard formulieren?

31. Hoe vind u deze formulieren?

32. Door wie worden deze formulieren gemaakt?

33. Op welke wijze wordt er binnen uw afdeling zichtbaar gemaakt hoe de projecten vorderen?

6. KR-8 Kwaliteit

33. Op welke wijze komt de informatiestroom bij 'klanten' aan? (In een keer? Versnipperd?)

34. Is naar uw mening de informatie die de klant krijgt in een keer helder?

35. Heeft u zelf het gevoel dat u verantwoordelijk bent voor het juist overkomen van de informatie naar de klant?

7. KR- 8 Efficiency (Muda – 8 types of waste)
(bij iedere vraag om een voorbeeld vragen)

36. Heeft u het idee dat er precies genoeg energie gestoken wordt in de vraag van de klant?

37. Wordt er meer detail gegeven dan de klant om vraag?

38. Moet u vaak wachten op informatie (collega's die iets moeten aanleveren, mail)?

39. Heeft u het idee dat informatie te vaak rond gaat binnen UW ORGANISATIE?

40. Kan alles binnen een vergadering/overleg afgestemd worden?

41. Controleert u uw eigen werk (meerdere malen) voor u vindt dat u het af heeft?

42. Vindt u dat het werk er -mooi- uit moet zien?

43. Bent u vaak tijd kwijt op zoek naar informatie? Gegevens of kantoormateriaal?

44. Hoe vindt u de indeling op kantoor? (bijv. andere collega's, bestanden, bereikbaarheid van mensen?)
45. Heeft u wel eens klachten gehad dat de gegevens niet klopten en ze hersteld moesten worden?
46. Wordt u betrokken bij het verbeteren van processen?
47. Flow: 'het lekker doorwerken' heeft u het idee dat u dat goed binnen uw organisatie kan doen?

8. KR-8 Leren en verbeteren

48. Op welke wijze is er ruimte binnen uw organisatie om onderling feedback te geven?
49. Wordt dit ook naar het management gedaan?
50. Heeft u wel eens gehoord van het PDCA-model?
51. Op welke manier wordt het PDCA-model in uw werkzaamheden ondergebracht?

9. KR-8 Integriteit en samenwerken

52. Op welke manier probeert uw management u te betrekken om het proces te verbeteren?
53. Worden daarbij ook externe partijen uitgenodigd?
54. Op welke manier steunt aan uw management?

10. Afronding

55. Worden er in de toekomst nog aanpassingen verricht binnen KR8?
56. Welke zaken ziet u graag beter worden binnen uw organisatie?
57. Welke zaken ziet u graag beter worden tussen uw organisatie en uw partners?
58. Welke zaken ziet u graag beter worden binnen uw organisatie en haar klanten?

Memo – Anonieme vragenlijst

Deltares

Aan
Anoniem

Datum	**Aantal pagina's**	
April 5th 2012 / 16:00	6	
Van	**Doorkiesnummer**	**E-mail**
Amy Maduro	+31 (0)88 33 56 331	v.c.maduro@student.utwente.nl

Onderwerp
[Thesis WMCN / Deltares] Survey

Geachte lezer,

Mijn naam is Amy Maduro en ik ben een masterstudent Policy and Governance aan de universiteit Twente te Enschede. De reden waarom ik u nu benader is naar aanleiding van mijn masterthesis. In dit onderzoek wordt bekeken in welke mate het Lean Management geïmplementeerd is binnen uw organisatie. Gezien uw functie binnen deze organisatie zou ik u graag willen vragen een korte vragenlijst in te vullen ten behoeve van mijn onderzoek. Deze vragenlijst heeft als doel inzicht te krijgen in welke mate organisatie factoren invloed hebben op deze implementatie.

Deze survey bestaat uit vier delen: individueel niveau, groep niveau, organisatie niveau en mogelijke barrières. Als u geen antwoord weet op de vraag, kunt u de vraag open laten. Achter ieder onderdeel heeft u de mogelijkheid om uw eigen mening over het onderwerp te geven.

Het invullen van deze survey zal ongeveer 10 minuten duren. U kunt mij de survey via email terugsturen, of ik kan de survey indien gewenst op komen halen bij u op kantoor. Indien u nog vragen heeft over deze survey of over de thesis, kunt u mij mailen op v.c.maduro@student.utwente.nl.

Hartelijk dank voor uw tijd.

Met vriendelijke groet,

Amy Maduro

Bij de antwoorden kunt u aangegeven hoe *kenmerkend* de uitspraken voor u zijn.
Gekozen kan worden tussen: niet / zeer weinig / enigszins / wel / zeer *kenmerkend*.

Individuele niveau

	Niet (1)	Zeer weinig (2)	Enig-zins (3)	Wel (4)	Zeer (5)
1. a. Mijn opleiding (vooropleiding of binnen de organisatie gevolgd) sluit aan binnen de functie die ik bekleed.	☐	☐	☐	☐	☐
b. Ik voer mijn werkzaamheden binnen de organisatie al een geruime tijd uit. Indien ik een korte tijd werk binnen deze functie, sluiten mijn vorige werkzaamheden aan binnen mijn huidige functie.	☐	☐	☐	☐	☐
c. Ik vind dat mijn organisatie te weinig investeert in de ontwikkeling van haar medewerkers.	☐	☐	☐	☐	☐
2. a. Als ik het niet eens ben met een onderdeel van een project, kan ik dat tegen mijn collega's zeggen.	☐	☐	☐	☐	☐
b. Als ik het niet eens ben met een onderdeel van een project, kan ik dat tegen mijn leidinggevende zeggen.	☐	☐	☐	☐	☐
3. a. Als ik mijn werk even niet zie zitten, lukt het mezelf uiteindelijk weer om de motivatie te vinden om mijn werkzaamheden te vervolgen.	☐	☐	☐	☐	☐
Indien werk bestaat uit projectwerk, ga naar A, indien werk niet bestaat uit projectwerk ga naar vraag B.					
A: ten tijde van het gehele project kan ik mezelf gemotiveerd houden.	☐	☐	☐	☐	☐
B: ik vind het moeilijk om mijn werkzaamheden gemotiveerd uit te voeren	☐	☐	☐	☐	☐
4. a. Het is duidelijk welke doelen en resultaten mijn werkgever van mij verwacht.	☐	☐	☐	☐	☐

	Niet (1)	Zeer weinig (2)	Enig- zins (3)	Wel (4)	Zeer (5)
5. a. Mijn leidinggevende zorgt voor steun en inspiratie.	☐	☐	☐	☐	☐
b. Mijn collega's zorgen voor steun en inspiratie.	☐	☐	☐	☐	☐
c. Ik vind dat mijn collega's onvoldoende naar mij luisteren.	☐	☐	☐	☐	☐
d. Partners in het netwerk zorgen voor steun en inspiratie van mijn werkzaamheden.	☐	☐	☐	☐	☐
6. Wanneer tegenslagen in mijn werk zijn, heb ik de mogelijkheden om geïmproviseerd te handelen.	☐	☐	☐	☐	☐

Opmerkingen over het onderdeel "individueel niveau"

Groep niveau

	Niet (1)	Zeer weinig (2)	Enig- zins (3)	Wel (4)	Zeer (5)
7. a. Mijn leidinggevende grijpt alleen in situaties als het echt nodig is.	☐	☐	☐	☐	☐
b. Mijn leidinggevende laat duidelijk zien dat hij de baas is.	☐	☐	☐	☐	☐
c. Mijn leidinggevende duld geen afwijkende meningen als een beslissing genomen is	☐	☐	☐	☐	☐
d. Ik mag fouten maken.	☐	☐	☐	☐	☐
8. a. Binnen de organisatie is een hiërarchische structuur.	☐	☐	☐	☐	☐
b. Er zijn naar mijn mening te veel managers binnen de organisatie.	☐	☐	☐	☐	☐
c. De communicatie van boven naar beneden gaat naar mijn mening goed.	☐	☐	☐	☐	☐
d. De communicatie met mijn collega's gaat naar behoren.	☐	☐	☐	☐	☐
9. a. Binnen de organisatie heb ik de mogelijkheid om te participeren bij besluiten	☐	☐	☐	☐	☐
b. De leidinggevende delegeert taken, verantwoordelijkheden en bevoegdheden.	☐	☐	☐	☐	☐
c. Ik voel me betrokken bij het nemen van besluiten binnen de organisatie.	☐	☐	☐	☐	☐
d. Ik vind dat de organisatie waar ik werk op een juiste wijze streeft naar het mee laten beslissen van medewerkers bij besluiten.	☐	☐	☐	☐	☐

Opmerkingen over het onderdeel "groep niveau"

Organisatie niveau

	Niet (1)	Zeer weinig (2)	Enig- zins (3)	Wel (4)	Zeer (5)
10. a. Informatie is makkelijk te krijgen binnen de organisatie.	☐	☐	☐	☐	☐
b. Informatie over mijn werkzaamheden zijn makkelijk te verkrijgen.	☐	☐	☐	☐	☐
c. Informatie over de organisatie als geheel zijn makkelijk te verkrijgen.	☐	☐	☐	☐	☐
d. Ik krijg onvoldoende informatie over veranderingen binnen de organisatie.	☐	☐	☐	☐	☐
11. a. Er is veel contact met andere collega's, om een band met hen op te kunnen bouwen.	☐	☐	☐	☐	☐
b. Er is veel contact met mensen boven en onder je.	☐	☐	☐	☐	☐
c. Ik ben op de hoogte wat andere mensen binnen de organisatie doen.	☐	☐	☐	☐	☐
12. a. Het management stelt alle middelen beschikbaar die ik nodig heb om mijn werk naar behoren uit te voeren.	☐	☐	☐	☐	☐
13. a. Binnen de organisatie is er consensus over wat het doel en missie is.	☐	☐	☐	☐	☐
14. a. Mijn werkgever laat merken dat hij mijn werk waardeert.	☐	☐	☐	☐	☐

Opmerkingen over het onderdeel "individueel niveau"

Barrières

	Niet (1)	Zeer weinig (2)	Enig- zins (3)	Wel (4)	Zeer (5)
15. Het is mij duidelijk wie ik als klant bedien.	☐	☐	☐	☐	☐
16. Ik vind dat er teveel procedures zijn waar ik rekening mee moet houden ten tijde van crisis.	☐	☐	☐	☐	☐
Ik vind dat ik teveel moet vastleggen wat betreft mijn werkzaamheden	☐	☐	☐	☐	☐
17. Mensen werken in de organisatie voornamelijk op zichzelf.	☐	☐	☐	☐	☐
Binnen de organisatie werken mensen goed samen (in tijde van crisis)	☐	☐	☐	☐	☐
18. Ik vind dat de organisatie teveel doelen heeft waar ik rekening mee moet houden.	☐	☐	☐	☐	☐
19. Ik ontvang voldoende informatie met betrekking tot de doelen van de organisatie.	☐	☐	☐	☐	☐
Ik ontvang voldoende informatie over de strategie van de organisatie om haar doelen te kunnen bereiken	☐	☐	☐	☐	☐
Ik weet precies wat de doel en missie van de organisatie is.	☐	☐	☐	☐	☐
20. Ik ben van mening dat ik te veel werk verricht.	☐	☐	☐	☐	☐
Ik vind dat ik onderbetaald word voor de werkzaamheden die ik verricht.	☐	☐	☐	☐	☐
21. Ik weet precies wat de concepten system thinking, processs flow, 8 type verspillingen betekenen	☐	☐	☐	☐	☐

Opmerkingen over het onderdeel "barrières"

Einde vragenlijst. Bedankt voor uw medewerking.

APPENDIX X: OVERVIEW CRITERIA

A.   Chapter 4

To evaluate if the quality system is suitable for the organisation
1. Applicable or adapted to governmental organisations or more business focused.
2. Focus on customer service (external) or focus on the organisation (internal) (B3, B5 & C16)
3. Is well known by partner organisations
4. Broad focus areas or small focus areas
5. Suitable for complex processes or suitable for standardised processes
6. Bottom up or top down (C12)
7. Faster processes or not (B2)
8. Gives structure by describing processes or gives a philosophy on how quality should be improved
9. Easy to understand for employees or not (B1)
10. Ask little recourses (e.g. employees) of the organisation or ask a lot recourses
11. Possible to implement by yourself as an organisation or external parties are needed for implementing the model into the organisation
12. Promoting communication or not
13. Flexible or controlled (C3)

Bouckaert & Thijs (2003, p.144):
"Good quality system"
1. The system is understood by the employees (A9)
2. The system is effective (A7)
3. The system ensures that the demand of the society (intern and extern) is satisfied (A2)
4. The system is focussed on preventing problems to occur (B9)

B.   Chapter 5

Lean:
5. Focus on customer service (A2 & C16)
6. Strategic goals (C5, C14 & C20)
7. Professionalism (C2)
8. Quality
9. Efficiency: "8 types of waste" (B4)
   9.1 doing too much
   9.2 waiting;
   9.3 transportation and transfer;
   9.4 putting too much effort in a product;
   9.5 searching;
   9.6 unnecessary motion;
   9.7 correcting your work;
   9.8 missing talent.
10. Learning and improving (C1 & C9)
11. Integrity and collaboration (C6 & C8)
12. Strong teams (C6, C10 & C18)

C.   Chapter 6

Individual level:
1. For learning and creativity intrinsic motivation is a key driver (B10)
2. Relevant skills such as expertise, technical skills and talent improve the learning and improvement abilities (B7 & B10)
3. The ability to cope with interference or opposition to a project (A13)
4. The ability to stay motivated the entire duration of the project
5. Clear initial view of the results that are desired (B6 & C20)
6. The ability to get support not only from management but also from their colleagues (extrinsic interventions) (B11, B12 & C18)
7. Employees should be encouraged to take calculated risks (when setbacks occur)

Group:
8. group creativity will decrease by autocratic leadership styles (B11)
9. group learning and sharing is enhanced by organic (B10)
10. Leaders who are good at getting people into action (B12, C6 & C18)

Organisation:
11. free flow of information
12. close and frequent contact between work sections and emphasis lateral as well as vertical relationships (A6)
13. necessary recourses and support have to be available
14. Importance of shared vision and strategy (B6, C5 & C20)
15. Top management support

Barriers:
16. lack of clear customer focus (A2 & B5)
17. too many procedures
18. people working in silos (B11, B12, C6 & C10)
19. too many targets
20. lack of awareness of strategic direction (B6, C14 & C5)
21. general belief that staff are overworked and underpaid
22. lack of understanding of the effect of variation, systems thinking & process flow (B4 & B9)