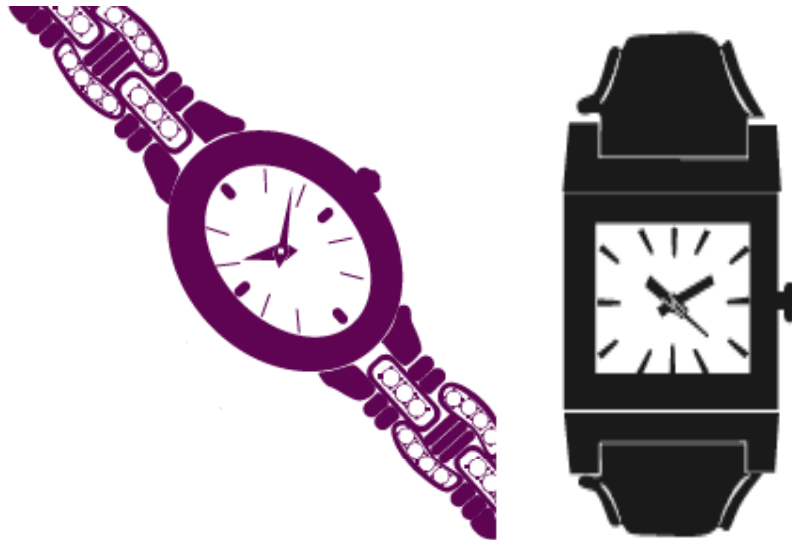


Self-rostering at NS: a track to follow?

Exploring the conditions that contribute to a successful design and implementation of self-rostering.



Marieke Lam

University of Twente
Business Administration, track Human Resource Management

COLOPHON

Self-rostering at NS: a track to follow?

Exploring the conditions that contribute to a successful design and implementation of self-rostering.

Student of the University of Twente

Master: Business Administration
Track: Human Resource Management
Studentnumber: 0159581

M.H.P. Lam
Molenstraat 34
6645 BV Winssen
Lammetje6@hotmail.com

Supervisors University of Twente

Dr. Ir. J. de Leede
Dr. M. van Velzen



Supervisor TNO

Drs. E.J. van Dalen



Date of colloquium

17-10-2008

Preface

I have reached the end station!

With this thesis an end has come to my career as a student at the University of Twente. Writing the thesis was an intense project, but I look back at it with a feeling of satisfaction. To me, self-rostering was a new topic and I am glad I got the chance to gather more knowledge about it. Parts of this report are confidential but up to the theoretical framework it is public and I hope you will find it interesting to read.

I am proud of this thesis, but I would not have reached this result without the support and advice of different persons. Therefore, I want to thank my supervisors Jan de Leede and Martijn van Velzen for their critical feedback and their advice on how to improve my thesis. I also like to thank TNO and specifically Erik Jan van Dalen for his willingness to be my TNO supervisor. Besides his feedback with respect to the content of this thesis, he also helped me to manage this project.

Furthermore, I like to thank NS for giving me the opportunity to use their experiment as a case study for my research.

Finally, I would like to thank my family, friends and boyfriend for their support and encouraging words but also for the distraction that I sometimes very much needed!

Hoofddorp, October 2008

Marieke Lam

Management summary

Introduction

NS wants to introduce self-rostering into its company so that it can increase its attractiveness as an employer and therefore gain a better position at the labour market. Moreover there are many rules attached to the roster NS currently uses and by implementing self-rostering NS wants to decrease those rules.

NS has initiated a self-rostering experiment for its engine drivers and conductors at four locations. Den Bosch, Dordrecht and Enschede volunteered to join the experiment and Amsterdam was asked to join while it is a bigger location with more complex circumstances.

The main question for this research is:

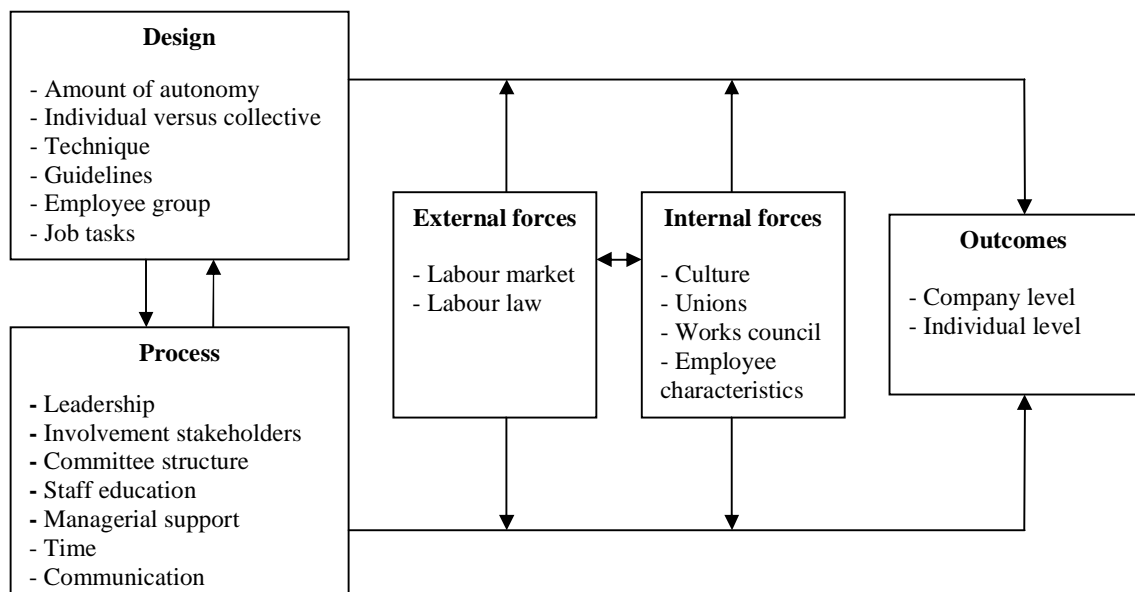
What are the conditions that NS must meet in order to design and implement self-rostering successfully for its engine drivers and conductors?

In this case, successfully means that self-rostering is supported by the employees.

Theory

A definition has been created from what has been written so far about self-rostering: 'Self-rostering is a system where an employer creates a framework based on the organizational requirements in which employees can indicate their preferences concerning working hours, working days or shifts, that, by means of an authorized scheduling group or individual, and possibly with the support of computer software and/or after a compromising dialogue between employees, results in working schedules where the needs of the employee and the demands of the employer converge.'

Based on the theory, the following conceptual model has been created:



Methodology

In order to answer the main question, several steps have been taken. A literature research has been conducted and several interviews have been held to get to know why and how NS wants to introduce self-rostering. From the theory it stemmed that there are different forms of self-rostering. The form that NS wants to introduce is individual rostering; the rosters are not created by the employees themselves but they can indicate their preferences and based on that, a specific roster for each individual will be created. A questionnaire has been set out among the engine drivers and conductors of the four locations in order to find out what they think of individual rostering and what their opinion about the process is. At each location a focus group was held to determine the topics for the questionnaire. The response on the questionnaire was 37% (N=249). The results have been analyzed and independent sample t-tests have been executed to see whether or not there are significant differences in opinions between groups (e.g. between locations or between men and women). After the analysis, the results have been presented to several employees to discuss them and to make sure that they are interpreted in the right way.

Finally, the outcomes of the literature research are reflected in the case studies at NS to come to the conclusions and recommendations of this research.

Results

Confidential.

Conclusions

Confidential.

Contents

Management summary	5
1. Introduction.....	9
1.1 Reason of this research	9
1.2 Research question	10
1.3 Relevance	10
1.4 Outline of the report.....	11
2. Theoretical frame work.....	13
2.1 Employment relation.....	14
2.2 Individualization	15
2.3 Harvard Model	17
2.3.1 Human Resource Flow.....	18
2.3.2 Work systems.....	19
2.4 Self-rostering.....	25
2.4.1 Creating a definition	25
2.4.2 Typology	28
2.4.3 Advantages and disadvantages	30
2.4.4 Implementation process	32
2.5 Change process	34
2.6 Summary and conceptual model.....	36
3. Methodology	39
3.1 Literature study	39
3.2 Case Study	39
3.3 Data collection	40
3.3.1 Representativeness.....	41
3.3.2 Analysis.....	42
3.4 Operationalization.....	43
4. Self-rostering at NS.....	45
5. Results	46
6. Conclusions and recommendations	47
References.....	48
Appendices	
Appendix 1 Interview protocol field experts	53
Appendix 2 Interview protocol initiator experiment	55
Appendix 3 Interview protocol project leaders	56
Appendix 4 Set up first round of focus groups.....	58
Appendix 5 Questionnaire	59
Appendix 6 Comparison sample and population.....	60

1. Introduction

This first chapter explains why this research has been carried out, what the research questions are and what the relevance of the research is. The chapter ends with an outline of what will be examined in this report.

1.1 Reason of this research

Self-rostering is becoming a new trend in working life, more and more organizations show interest in it. Agnes Jongerius, chairwoman of FNV, referred to self-rostering in her 2008 New Year's speech as 'a concept that we are going to promote this year'. FNV is the largest union in the Netherlands with over 1.2 million members.

An employee can determine his or her own roster when an organization works with self-rostering. The employees design their own roster by taking their preferences, wishes and demands into account. The design takes place within the boundaries of the fixed demands of the employer. An optimal combination of the preferences of the employee and the needs of the employer will arise this way.

Research demonstrates that self-rostering can yield a lot of benefits; it can increase the flexibility of both the organization and the employee, the employee is able to create a better work-life balance, employees show more commitment and are more motivated (e.g. Silvestro & Silvestro 2000; Bailyn et al. 2007). Moreover, self-rostering can lead to less sickness and more productivity (Teahan 1998; Hung 2002).

This master project will try to bind the theory that is known about it and link it to a practical work situation, that from NS.

NS wants to introduce self-rostering into its company so that it can increase its attractiveness as an employer and therefore gain a better position at the labour market. Moreover there are many rules attached to the roster NS currently uses and by implementing self-rostering NS wants to decrease those rules.

NS plays an important role in the mobility of the Netherlands. It provides 4500 train rides per day, where 1.1 million travelers make use of. Almost 3000 trains and 240.000 seats are being used for that purpose. The main goals of the policy of NS are: traveling on time, provide information and service, contribute to social security and take care of clean trains and stations.

NS has started a project in April 2007 to test self-rostering within its organization. An experiment is being held at four different locations; Amsterdam, Enschede, Den Bosch and Dordrecht. In each city a project group is created, which will coordinate and supervise the experiment for their location. Those project groups consist of engine drivers, conductors, schedulers and one project leader. Each engine driver and conductor from the four locations was asked to indicate their own preferences concerning their working times. Based on those preferences, each employee has received an individual roster, created with the help of a software program. Though, the employees kept working according to their fixed schedule, the individual rosters served as a comparison. Thereupon, the employees received a questionnaire to evaluate the experiment on three aspects: the comparison of their current roster and their roster based on self-rostering, the process was evaluated and the questionnaire ended with the question whether or not employees would like to continue with self-rostering.

The evaluation of the pilot, which took place from June till August 2008, has been done by TNO and the master student. Based on the evaluation NS wants to decide whether or not they will continue with self-rostering. Another aspect that contributes to that decision is the availability of the right software. However, this aspect is outside the scope of this research; it will be examined by NS self.

1.2 Research question

The goal of this research is to identify the necessary conditions for successful design and implementation of self-rostering at NS. This results in the following main research question:

What are the conditions that NS must meet in order to design and implement self-rostering successfully for their engine drivers and conductors?

The following sub questions are formulated:

1. What is self-rostering?
2. Why and how does NS wants to implement self-rostering?
3. What do the engine drivers and conductors think of the experiment concerning self-rostering?
4. What conditions should be met in order to design and implement self-rostering successfully at NS?

In order to answer the sub questions, and therefore the main research question, several steps have been taken. First, four field experts have been interviewed in order to get more familiar with self-rostering. Moreover, a literature research has been conducted to see what has been written so far about self-rostering and about topics related to self-rostering. As a next step, several interviews have been held to find out why and how NS wants to introduce self-rostering. To evaluate the experiment at NS, a questionnaire has been set out among the engine drivers and conductors of the four locations. Finally, the outcomes of the literature research are reflected in the case studies at NS and based on that, the conclusions for this research are presented.

Chapter 3 elaborates further on the methodology of this research.

1.3 Relevance

There is not much written yet about self-rostering in the field of science. The scientific articles that are known so far discuss self-rostering in the health care setting where most of the employees are women. This research is focused on NS, which is an organization in the transport sector and where 88% of the engine drivers and conductors are men. Therefore, this research contributes to the knowledge development of the topic.

If self-rostering is implemented in an organization, it can yield several advantages for both the employer as the employee. The employer gains by creating a more efficient way of working and the organization can profile itself as an attractive employer. It can enable the employee to create a better personal work-life balance and to have more control over their roster. So, with self-rostering there are a lot of advantages to gain in a social respect as well. Moreover this research advises NS on the conditions it should meet in order to implement self-rostering successfully; which means that it is supported by its conductors and engine drivers.

1.4 Outline of the report

This first chapter has described the reason of and the relevance of this research and what the research questions are. The following chapter is the theoretical framework which outlines the theory relevant to self-rostering. The chapter starts with the employment relation; it describes how this relation has become more individualized and what the consequences of that are. It then describes the Harvard model, which is based on giving employees more influence over different human resource policies, and it elaborates on the policies human resource flow and work systems. Then the step to self-rostering will be made, while self-rostering can be a tool to give employees more influence over their working times. A definition and typology will be created, the (dis)advantages will be examined and implementation issues will be discussed. The chapter continues with an overview of theories concerning change management while the implementation of self-rostering means an implementation of something new and this comes along with a change process. Chapter 2 ends with a summary and the conceptual model. Chapter 3 discusses the methodology; it explains how the research is executed. Chapter 4 describes why and how NS wants to implement self-rostering. The next chapter analyses the experiment and the last chapter, chapter 6, presents the conclusions and recommendations of this research.

2. Theoretical frame work

This chapter gives an overview of the literature that is related to self-rostering. It starts with a closer look at the relation between an employee and an employer, which can be characterized as an employment relation. In section 2.2 it will be explained that the employment relation has become more and more individualized and what the consequences from that for the employment relation are. As a next step, the Harvard model will be outlined (§2.3), while that model is based on the thought of giving employees more influence on different human resource policies, which is also linked to individualization. Human resource flow and the work system are the policies which are the most interesting for this research and therefore those will be examined in section 2.3.1 and 2.3.2. In section 2.4, the concept of self-rostering will be discussed. First, a definition will be created and based on that definition a typology of self-rostering will be made. Then, different case studies will be evaluated to come up with the advantages and disadvantages of self-rostering. The last step of this section is to define success factors for the implementation of self-rostering.

The implementation of self-rostering is attached to the implementation of something new, which means a change. Therefore, in section 2.5 the literature about change management will be investigated in order to find out how an organization should deal with a change process. The chapter ends with section 2.6, where the summary and the conceptual model are given.

2.1 Employment relation

Boxall & Purcell (2003) state that Human Resource Management (HRM) is about the management of *work and people* in the firm. In other words, HRM is concerned with both the structure of work in a firm and with all the related employment practices that are needed to carry out the work. An employer and an employee have a mutual agreement that the employee will deliver work and the employer will reward the employee in return. The relation between an employee and an employer can be characterized as an employment relation. Huiskamp (2003) refers to the employment relation as: ‘the implicit and explicit expectations with which the employer decides to buy the labour of an employee and the employee decides to sell his labour to an employer. The coherence between time, qualification and performance arises and takes place in the employment relation’ (p.66). Figure 1 shows the relation between work and reward combined with the three aspects that form the core of the employment relation.

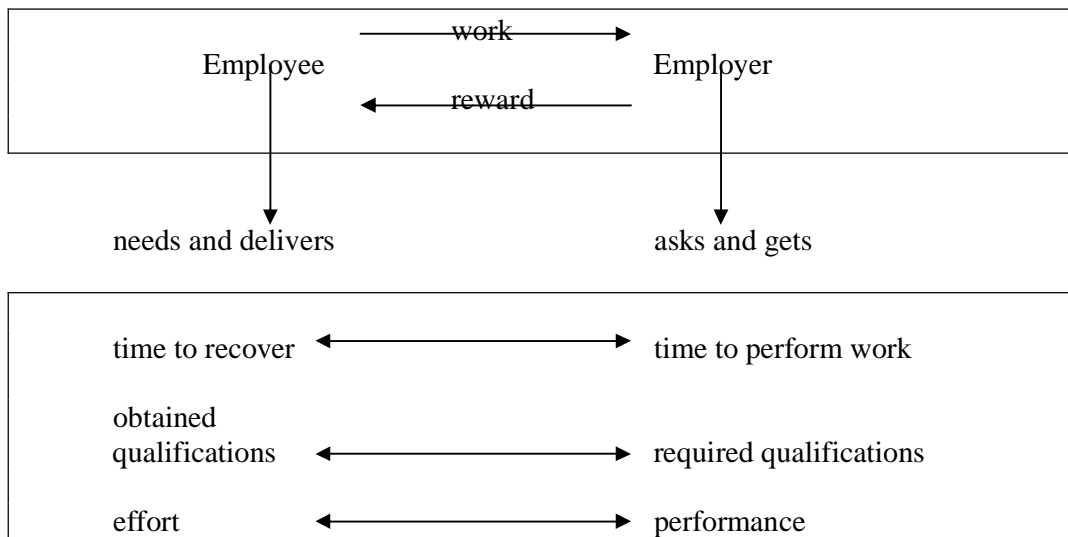


Figure 1. Relation between work and reward (Huiskamp, 2003)

The dimensions exchange, authority and collaboration are distinguished by Kluytmans (1999) as the three core dimensions of the employment relation. As stated above, the employment relation is characterized by *exchange* between the employer and the employee. The employee puts, among other, time, knowledge and performance into the employment relation and in return the employer offers, among other, rewards, development and education. The dimension *authority* reflects the fact that from the moment an employer and an employee sign a contract, the employee is subjected to the employer. However, the employment relation is two-sided and therefore *collaboration* is needed for good performance. Employees have their own ideas on how they need to carry out their job and they sometimes like to think along with management about the best way to fulfill their tasks. Therefore, feedback and communication are essential elements within this dimension of the employment relation. The sort of collaboration between the employer and the employee depends on the job design and the design of the organization; those aspects determine the amount of freedom that the employer can give the employee (Huiskamp, 2003). What has to be kept in mind is that not every employee is the same; each individual has different

expectations of the employment relation (Iellatchich et al. 2005). So, the kind of employee also determines the sort of collaboration between the employer and the employee.

The employment relation has gone through several changes over time. Until 1982 employers and unions showed little interest in part-time jobs and in most collective agreements employment rights and benefits favoured full-time workers. This has changed radically; part-time work is nowadays common and accepted, in particular through the increased presence of women who combine paid work and care (see p.20) (Hemerijck & Visser, 1997). Another important development is that agreements about the employment relation are not purely collective anymore, there is more space for individual preferences and therefore for custom made agreements. This has to do with the economic recession of the 80s and the high unemployment rates that stemmed from that. It created a new point of view for the public, the politics, organizations and unions, which made new employment contracts possible while the strict and rigid protection of labour on the labour market was relaxed, allowing market forces to regulate. This called for a fundamental restructuring of the institutional context, which created room for companies to maneuver and therefore, space for more individual agreements (de Lange & van Lent, 1994). The next section will elaborate on the individualization of the employment relationship.

2.2 Individualization

Human resource management contains a tension between on the one hand, the view that employees groups are similar and on the other hand, the view that employee groups differ from one another and that human resource policies must be different for different groups and situations (Beer et al. 1984). However it seems that differences between employees and groups of employees get more prominent and that more emphasis has been put on the individualization of the employment relation over the last years (Lobel 2004; Bogaert & Vloeberghs 2005). Individualization of the employment relation is defined by Huiskamp (2003) as ‘the process in which explicit and implicit expectations concerning the exchange, collaboration and authority are less directed by stable and collective expectation patterns and more on an individual level’ (p. 93). The individualization of the employment relation can be divided into four policy areas, according to Huiskamp et al. (2002):

- form of contract
- working times and forms of leave
- reward and performance
- content of the job and development of qualifications

Changes in demographic factors, like the ageing workforce, a more culturally diverse workforce and an increased level of education enlarge the heterogeneity of the workforce. These factors positively affect individualization. The various employees have different needs and the employer reacts by creating individualized employment relations. Another factor that contributes to individualization is the enhanced labour market participation of women. It used to be normal that the woman took care of the household and the man provided the income. However, this distinction is not the reality anymore. Figure two shows the participation of men and woman at the Dutch labour market; the number of women participating has doubled since 1970.

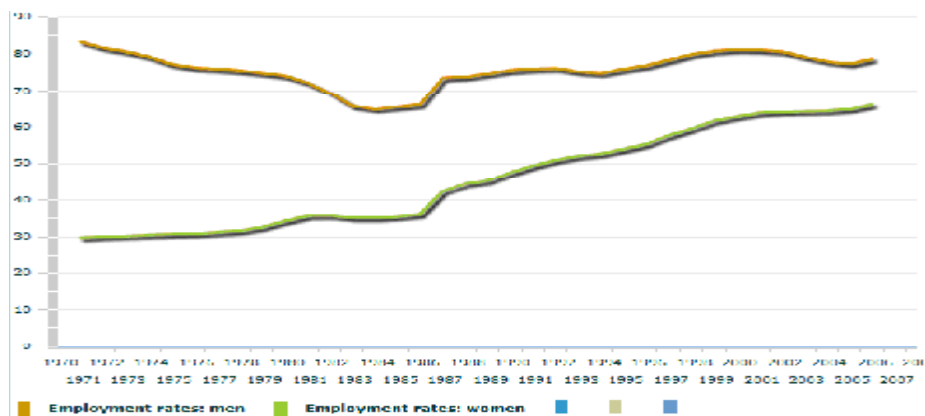


Figure 2. Employment rates in the Netherlands
Source: OECD

The effect of this development is that people need to balance work and family life, for themselves as well as with each other. A third explanation for individualization is labour scarcity. When it is difficult to attract and retain employees, the organization has to fulfill specific needs of the employees in order to become (or stay) an attractive employer (Iellatchich et al., 2005).

Goudswaard et al. (2007) plead for custom-made employment relations; employers and employees should make arrangements that are tailored to the individual needs and interests of both the employer and management, so that both parties benefit optimal from each other. Moreover, the relation between the employer and the employee is not static; the expectations concerning what the employee needs and delivers and of what the employer asks and gets, changes over time. It is easier for an organization to adapt to these changes when parts of the employment relation are individualized and custom-made instead of collective. However, there are aspects that make those employment relations difficult to achieve (Goudswaard et al. 2007):

1. conflicting interests of the employee and the employer
2. cynicism and distrust within the organization
3. conflicting institutions

Another critical note comes forth from the fact that individualized employment relations bring along a lot of paperwork and it is easy to lose the total view over all the agreements. So it is questionable to what extent the employment relation should be custom made. It is important to realize that custom-made employment relations should not be an organizational goal in itself; it can be a tool for concrete issues in an organization, like self-rostering. Goudswaard et al. (2007) advocate employment relations that are designed for the largest part by employees. This motivates the employee to work to his or her full potential, the commitment increases and the organization will benefit from that as well. However, a win-win situation should be created, so that both the employees' as the employers' interests are served. Rousseau (2005) describes agreements that only serve the interests of the employees; those agreements are based on preferential treatment or improper appropriation.

Management of an organization wants to put emphasis on the collaboration side of the employment relation and soften the business character of the exchange dimension to create a more equal relation between the employer and the employee, instead of a strict authority character (Bolweg, 1997). Giving the employee more influence is a key starting point of the Harvard model, developed by Beer et al. (1984), which will be discussed in the next section.

2.3 Harvard Model

Beer et al. (1984) propose that many diverse employment relations activities fall in four human resource policy areas: employee influence, human resource flow, reward systems and work systems. Employee influence refers to the amount of responsibility, authority and power the organization should voluntarily delegate to their employees. The managerial task is to develop the organization's policy regarding the amount of influence that the employees should have with respect to matters such as pay, working conditions, career progression and the task itself. Human resource flow concerns managing the flow of people into, through and out of the organization. Managers must try to ensure that the personnel flow meets the corporation's long-term strategic requirements for the amount of work that has to be fulfilled. Moreover, decisions made concerning the in- through- and outflow of employees must meet the needs of employees for job security, career development, fair treatment and they must meet legislated standards of society. Rewards are a tool for organizations to send a message to their employees as to what kind of organization management seeks to create and maintain, and what kind of behavior and attitudes management is looking for from its employees. The work systems reflect the defining and designing of the work; managers face the task of arranging people, information, activities and technology. Beer et al. (1984) developed a framework in which the relation between the four human resource policy areas is shown:

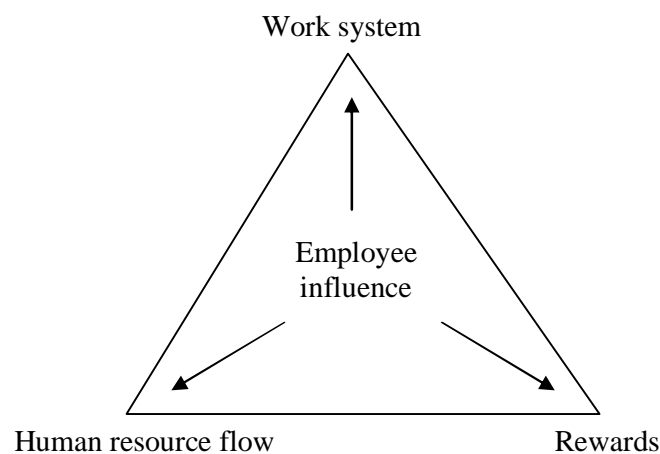


Figure 3. The Harvard Model (Beer et al. 1984)

Choices concerning the four policies must be made consciously because those choices influence the nature of the relationship between the organization and its employees. The policy choices that are made effect the overall *competence* of employees, the *commitment* of employees, the degree of *congruence* between the goals of employees and those of the organization and the overall *cost effectiveness* of HRM practices. An organization needs to strive to enhance these 'four Cs' in order to come to favorable long term consequences for individual well-being, organizational effectiveness and societal well-being.

The next two sub sections will elaborate on two policies of the model, human resource flow and work system, while those are the most relevant policies for this research.

2.3.1 Human Resource Flow

The number of vacancies in the Netherlands declined slightly in the first quarter of 2008, however the number of open vacancies is still very high; 242.000. Compared to 2004, the number of open vacancies has even doubled. Figure 4 shows the unemployment rates since 1970, it is clear that the highest point since 1974 was reached in 1983. After an increase from 2001 on, the number of unemployed people is now declining since 2005; 4% of the labour force was unemployed at the end of 2007, compared to 6% at the end of 2005¹. These numbers illustrate the current labour scarcity in the Netherlands.

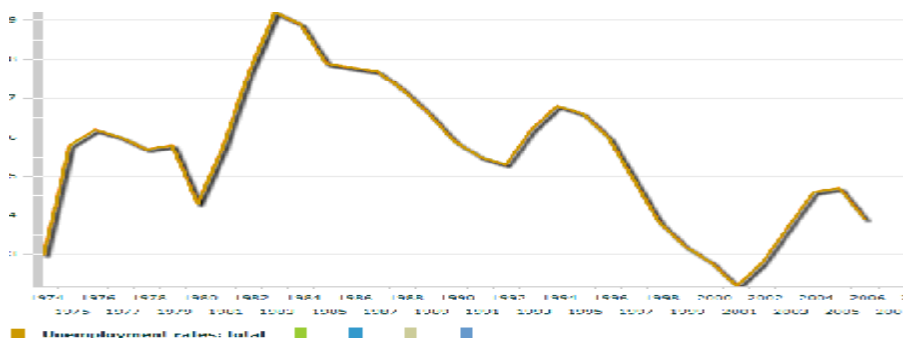


Figure 4. Unemployment rates in the Netherlands **Source:** OECD

It is difficult for employers to attract and retain employees in a tight labour market; firms must compete with others to secure their staff. More than half (54%) of the organizations in the Netherlands state that they have problems with attracting new employees (Intermediair, 2006). In 2006 research was executed in order to find out what employees consider as push- and pull factors when looking for an employer. Over 15.000 employees responded and almost 6500 of those respondents belonged to the target group, so their results were analyzed. The most important pull factors were a good balance between work and social life and variety in job tasks (both 47%). Development possibilities were also seen as an important pull factor (40%). When the respondents were asked what they value most about their current employer, flexible working times came in as fourth, even though it can be used as an instrument to improve the work-life balance. Autonomy, variety in job tasks and the fact that the job was close to home were considered as more important aspects.

A lack of development possibilities, a high work pressure and unfavorable primary working conditions were considered as push factors; reasons to leave the current organization. Striking is that missing a good balance between work and social life was not mentioned at all as a push factor. The target group of this research were higher educated people, who had no more than ten years of work experience. It is therefore questionable whether these results can be generalized to other employees (e.g. lower educated) as well, however it does give a good indication of what employees are looking for in an employer (Intermediair, 2006). Research carried out for het Ministerie van Sociale Zaken en Werkgelegenheid showed that employees value the possibility to adapt their working times to the demand with 7.7 on a ten point scale, where women grade it as more important (7.9) than men (7.4). Employees in the age group of 25-34 years and of 35-44 value flexible working times the most (7.8 and 7.9) (AVON Monitor, 2005).

¹ Central Bureau voor de Statistiek

Image

A positive image can also help organizations to attract and retain employees, especially in times of labour scarcity. But what is the image of an organization and how can an organization improve their image? Dowling (1986) defines image as 'the set of meanings by which an object is known and through which people describe, remember and relate to it. That is, it is the result of the interaction of a person's beliefs, ideas, feelings and impressions about an object' (p.110). Corporate image is described as the overall impression made on the minds of the public about a firm (Leblanc & Nguyen, 2001). Van Riel (1992) believes that a positive image is the ground condition for diverse stakeholders to shape a direct or indirect relationship with an organization. The impression is created by controllable and uncontrollable elements, therefore, it is difficult to influence the impression individuals have. Concerning the controllable elements, the organization should have a clear goal about what they want to radiate, and how they want to communicate that to others (Blauw, 1994). However, research executed among 10.000 people who are or were registered with an employment agency, showed that image is seen as a relatively unimportant aspect when looking for an employer, specially for young people (until 30 years). According to the researchers, this can be explained by the fact that young people are growing up in an area where they are used to image campaigns, so they are able to see them through. Finally it is stated that a good image does not bring much for an organization, but a bad image can cause a lot of problems (Manpower, 2006).

2.3.2 Work systems

Work system is the second HR policy of the model of Beer et al (1984) that will be explained, it is about the design of the work in an organization. Giving employees more influence over the design of work can be promoted through the flexibilization of work. Flexibilization in general is for an organization a strategy to enhance the adaptability and the maneuverability of the organization (Van Hooff et al. 1998). From the viewpoint of employees, flexibility is the ability to balance their working- and their (changing) personal life (Haan et al. 1994).

Flexible work arrangements (FWA) are benefits provided by the employer that permit employees some level of control over when and where they work outside of the standard workday (Ferris et al. 2001). FWAs have been cited as the key in the effort of employees to manage their work-family conflict (WFC) (Allen & Shockley, 2007); they may be more effective in preventing WFC than flex places (Bryon, 2005). An organization makes a decision for a specific form of flexibilization based on their strategy and on the goals that an organization wants to achieve with flexibilization. Those goals can be conflicting for employers and employees; employers expect passive flexibility from their employees so that they are able to adjust the amount of labour towards their needs, while the employees are seeking more active flexibility in order to create an optimal work-life balance. Often those conflicting goals are singled out in the literature. However, flexibilization depends on both the employer and the employee, therefore both parties have a negotiating position when deciding on how and what kind of flexibilization can be introduced into the company and both parties can gain from positive outcomes of the negotiation.

The different forms of flexibility of work, which will be called labour flexibility from now on, will be described in the following.

Labour flexibility

There are a lot of forms of labour flexibility; De Lange (1994) makes a distinction based on the working times, the employment contract, the content of work, the labour relation and the conditions of employment. Cornelissen & Van Schilfgaarde (1988) made a division based on time, task, function and workplace. Often, a distinction is made between internal and external flexibility (e.g. Lendfers & Nijhuis 1989; Hooff et al. 1998; Haan et al. 1994). Internal flexibility is related to the flexibility of the fixed employees whereas external flexibility is related to the recruitment of personnel from the external labour market. A subdivision is often made in numerical and functional flexibility (Atkinson, 1984). Numerical flexibility can be defined as a situation where the number of staff and the number of hours worked can be increased or decreased depending on the demand for labour. Functional flexibility is the adaptability of the way in which the labour is executed. Atkinson (1984) also identified outsourcing with respect to flexibilization of work. Outsourcing means that the collective agreement between the employer and the employee is being replaced by a commercial contract between organizations. Table one gives an overview of the distinction that different authors make when they talk about labour flexibility.

Author	Distinction of labour flexibility based on
Heesters & Volkers (1996)	<ul style="list-style-type: none">- deviate from the normal working hours- variety in working time per day/week/season- deviate from the working hours and working time in reaction to unexpected situations
De Lange & Van Lent (1994)	<ul style="list-style-type: none">- working times- employment contract- content of work- labour relation- conditions of employment
De Haan et al. (1994)	<ul style="list-style-type: none">- internal numerical flexibility- external numerical flexibility- internal functional flexibility- external functional flexibility
Lendfers & Nijhuis (1989)	<ul style="list-style-type: none">- internal flexibility- external flexibility- operational flexibility (outsourcing)- flexibility in reward
Cornellissen & Schilfgaarde (1988)	<ul style="list-style-type: none">- time- task- function- workplace
Atkinson (1984)	<ul style="list-style-type: none">- numerical flexibility- functional flexibility- outsourcing

Table 1. Forms of labour flexibility

For the goal of this research, a specific form of internal numerical flexibility, flexible working times, will be investigated further.

Flexible working times

Internal numerical flexibilization means adjusting the volume of hours worked without changing the size of the workforce (De Haan et al. 1994). Different forms of internal numerical flexibilization are part-time work, flexible working times, shift work and overtime (De Haan et al. 1994). Hicks & Klimoski (1981) use the term flexitime when they talk about flexible working times. They state that ‘flexitime refers to a policy in which the traditional fixed times that employees start and finish the working day are replaced by a framework or set of rules within which employees are allowed some freedom to choose their starting and quitting times’ (p. 333). The start and quitting times are based on the differing needs of the employees. Flexible working times can take a number of forms, but all forms offer the employee some control over the work schedule. In the most limited variant, schedule flexibility is restricted to daily starting and ending times, and the worker still has to put in eight hours each day. In less limited variants, the employee can vary his or her total daily hours. Within more flexible variants, the employee is allowed to carry hours forward from week to week and from month to month, although often an upper limit is placed on those systems (Owen, 1977). This corresponds with a time bank, where a system of plus and minus hours is adopted. With this system, employees can work more or less hours than the contract, depending on the work demand. The extra hours that are worked, are put into the bank and these hours can be withdrawn when there is less work (Hewitt, 1994). Another form of flexible working times is the annual hours contract. Whereas the traditional contract of employment specifies a basic or normal working week, an annual hours contract specifies the total number of hours over an entire year. The total demand for staffing throughout the year can be met by the permanent workforces, whose weekly hours will vary considerably depending on the time of the year.

Lendfers and Nijhuis (1989) identified five core elements by which flexible working times can be characterized:

1. ‘a band with’
The total numbers of hours per day in which the employee can choose his or her work hours;
2. ‘a core time’
The hours per day that an employee is obligated to be at work;
3. ‘a flexible bank of hours’
The number of hours before and after the core time, in which the employee can start or finish the work;
4. ‘a bank system’
An employee can save or withdraw hours of work with a bank system. This creates the possibility for an employee to work more or less hours per day than according to the contract;
5. ‘variability of schedule’
The variability of schedule refers to the ability for employees to choose and make changes in their roster without approval of their supervisor.

So far, it has been described which different forms of labour flexibility and flexible working times exist. In the following, the (dis)advantages of flexible working times will be given, the applicability of flexible working times will be described and it will be explained how external forces influence flexible working times.

Advantages and disadvantages

A lot of research has been carried out towards the advantages and disadvantages of flexible working times for employees and employers. Advantages for the employee are improved quality of (working) life, easier travel and parking, more control over rosters, easier to adjust working times to unpredicted circumstances, better work-life balance, reduction of stress and an increase of perceived organizational support (Newstrom & Pierce 1983; Halpern 2005; Hicks & Klimonski 1981; Lendfers & Nijhuis 1989; Haan et al. 1994; Heesters & Volkers 1996; Goudswaard et al. 2007). Owen (1977) found that those who prefer flexible working hours report that they seem to have more time for leisure activities, even though their working times are not reduced. The biggest disadvantages for the employees are insecurity and irregularity concerning the working times, loss of extra payment for irregular working times and an unfair division of work between employees. (Volkers & Heesters 1996; Goudswaard et al. 2007).

The advantages of flexible working arrangements for organizations are an increase of organizational effectiveness, increased efficiency, decrease of absenteeism, easier to react on (unexpected) changes in the environment and improved employee morale (sometimes to the point of lowering quit rates). Loss of control over (the creation of) the rosters, anarchy, and administrative fuss, can occur as disadvantages for the organization. Moreover, employees are not unlimited flexible and some employees are more flexible than others, therefore, organizations should take a close look at the possibilities and limitations of their employees to enlarge the prospect that flexibility has the desired effects. (Dalton & Mesch 1990; Owen 1977; Newstrom & Pierce 1983; Haan et al. 1994; Hooff et al. 1998; Goudswaard et al. 2007).

Applicability

Flexible working times can be applied in white-collar as well as blue-collar settings. The applicability of the system is determined by the way in which the workflows are organized and by the technical requirements of the work (Owen, 1977). It is relatively easy to introduce flexible schedules in an organization where employees work in isolation from each other. If full isolation is not possible, it could be an option to spend a part of the day in contact with others, the remaining work time can be spent in isolation, based on a flexible schedule. However, in an assembly line it would be difficult to work with flexible working times, because of the close interactions between workers. So, the interdependence of workers needs to be considered when thinking of introducing flexible schedules. Moreover, the work demand must be predictable to some degree. Another aspect that determines the applicability of such a system is the composition of the group of employees. The more variation exists among the employees the more varied their preferences of working times will be and therefore it will be easier to grant the preferences of the employees. The applicability can also be broadened by modifying the freedom given to employees, so that they are able to create their own working times. The last possibility Owen (1977) describes to enlarge the chance of successful implementation of flexible working times is the number of people doing, or able to do the same job. By making use of job rotation or job enlargement, a larger number of employees is capable of performing the same job (tasks), which enlarge the applicability of the system. What should be kept in mind is that not all employees desire flexible working times. Employees who experience a high inter role conflict are more attracted to an organization which offers flexible work times than an organization which does not offer that. Employees with a low inter role conflict, however, are slightly less attracted to an organization when flexible

working times are offered (Hyland & Rau, 2002). Beutell & Greenhaus (1985) defined inter role conflict as: 'when pressures arising in one role are incompatible with pressures arising in another role' (p. 77). Competing demands between work and personal life form the source of inter role conflicts. Employees with greater personal lifestyle determinants are therefore more likely to make use of flexible working arrangements; this hypothesis was particularly supported for employees in jobs without supervisory responsibilities, because they have less autonomy over their time (Gueutal et al. 2008). Therefore, flexible work schedules may be more beneficial to lower level employees with more rigid schedules. Perceived workgroup use of flexible work arrangements is another determinant of whether or not employees will make use of the agreement; seeing colleagues successfully making use of the agreement will stimulate others to engage in the same behavior. The same research showed that job tenure was a significant predictor of the likelihood of the use of flexible work arrangements, suggesting that the longer one has been at an organization the more likely they are to use those arrangements. The explanation for this is that people with a longer tenure feel more comfortable within their environment and probably have more seniority and therefore, can and dare to ask for greater flexibility (Gueutal et al. 2008). To end, Golden (2001) found that people who work an average of 40 hours per week tend to make less use of flexible work arrangements than people who work less than 40 hours per week.

External forces

It used to be normal that the man was the breadwinner of the household and the woman stayed at home to take care of the household, however from the 1970's on this started to change. In 1997 the number of one-breadwinner households showed a decline of 51 percent compared to 20 years earlier. The traditional male breadwinner model was therefore replaced by the dual-earner model (Steiber, 2007). Though, households with two full-time jobs or two part-time jobs remain exceptional. The Netherlands has developed a 'one-and-a-half-job-per-household' economy, and thereby the Netherlands have been characterized as the only 'part-time economy' in the world (Freeman, 1998). In 2006, 67 percent of all employed women worked part-time, compared to 45 percent in 1981 (CBS). The expansion of part-time work is sometimes presented as an outcome of public policy. Others believe that the 'rapid diffusion of part-time employment was mostly the outcome of a spontaneous process driven by the late entry of married women in the labour force, which shaped, rather than was shaped by, the policies of governments, unions and firms' (Visser 2002, p. 26). Another factor that contributes to the increase in female participation at the labour market is the education; women are nowadays higher educated and labour force participation tends to increase with education. Besides that, institutional and normative changes made it easier and more attractive to enter the labour market. Finally, a cultural change supported women to work after they had children. In 1965, 84 percent of the adult Dutch population expressed reservations concerning working mothers of school age children; in 1997 this had decreased till 18 percent (Visser, 2002). According to Steiber (2007) tends the female labour participation to be higher in countries which have a 'family friendly' policy framework and where a modernized gender culture can be found. Yet this statement can not be generalized to all countries; women are strongly involved in the labour market in countries as Portugal or the Baltic states, while the childcare infrastructure is poorly developed there. The enhanced participation of women at the labour market does not mean that men and women divide house hold jobs more equally. Women, employed or not, still tend

to perform more household and childcare work than men and the jobs the men do perform, are the 'soft' household jobs, like taking the children to school and doing groceries (Intermediair, 2006). Therefore, flexible scheduling seems to provide more benefits for women than for men. Moreover, the research of Allen & Shockley (2007) showed that flexible working arrangements appear to be uniformly beneficial for women with greater family obligations. For women with lower family responsibilities, no relationship between flexible working arrangements and work interference with family was found, which led to the conclusion that flexible working arrangements neither helps or harms women with low family obligations to balance their work-family life. In contrary to these results, Wiscobe (2002) found that flexible work arrangements do not only appeal to employees with families, women without children are also likely to request it.

If an organization wants to offer their employees flexible working times, it has to take institutional forces into account; the maneuverability depends on the framework that is given by those forces. In the *Arbeidstijdenwet* (ATW) rules about working times are captured. The goal of the ATW is to secure the safety, healthy and well-being of employees. In April 2007 a new, simplified, ATW was put into action. This meant a more flexible law with fewer rules and less administrative burden. Due to this simplified law, employers and employees have more possibilities and latitude to work with flexible schedules. Another institutional force is the trade union. A trade union is an organization of workers who have banded together to achieve common goals in key areas such as wages, hours, and working conditions, forming a cartel of labour. The trade union, bargains with the employer on behalf of union members and negotiates labour contracts with employers. Dutch unions have gone through the learning curve of first trying to deny, then to prohibit flexibility. When that did not work, they demanded quantitative restrictions. Still later, they have come around and adopted a policy of negotiating flexibility (Hemerijck & Visser 1997). According to Passchier et al. (1998) are trade unions in principle not for or against flexible working times, but they are particularly critical. It is likely that unions will develop a negative attitude towards flexible scheduling if the employer introduces those schedules without involving the union in its design and implementation. Moreover, labour union spokesman have argued that flexible working times can increase the amount of time given by the employee for the same weekly wage, that the compensation for irregular work times will disappear since employees choose that time to work, that longer working hours are encouraged and that management profits will increase without raising wage rates (Owen, 1977). However, instead of resisting this form of individualization, unions could take the initiative in establishing a framework of agreed procedures, terms and conditions and legal rights within which individuals could have far greater choice of working hours (Hewitt, p. 163).

The last important institutional force is the workers' council. Unlike a trade union, in a workers' council the workers are assumed to be in actual control of the workplace, rather than merely negotiating with employers through collective bargaining. The workers' council has an approval right when an employer wants to create, change or withdraw rules concerning the working times, unless those changes are arranged with the union with regard to the content (Jaarboek OR, 2000).

This last subsection has described how employees can have more influence on the work systems in an organization by means of labour flexibility. The next section will elaborate on self-rostering which is a specific form of flexible working times by which employees are able to gain more control over their rosters.

2.4 Self-rostering

Self-rostering is a relatively new subject in the field of Human Resource Management (HRM) in the Netherlands. However, scientists have proven the positive results of self-roster systems in other countries. The case studies that have been written about self-rostering will be examined in this section. The section is divided in four sub sections. The first tries to create a definition by examining the articles that have been written so far about self-rostering. Next, a typology will be created which will be based on the definition. The third sub-section outlines the advantages and disadvantages of self-rostering. The section ends with factors that contribute to a successful implementation of self-rostering.

2.4.1 Creating a definition

The name for self-rostering that scientists use in their research differs. The most common used concept is ‘self-scheduling’, which is used by Hung (1992), Zimmerman (1995), Dearholt & Feathers (1997), Hoffart & Willdermood (1997), Teahan (1998), and Bailyn et al. (2007). Silvestro & Silvestro (2000) call it ‘flexible rostering’, Ala-Mursula et al. (2002) use ‘worktime control’ and Drouin & Potter (2005) refer to it as flexible scheduling’. The concept ‘self-rostering’, which will be used in this research, is also used by Sheldon & Thornthwaite (2003) and Grierson-Hill & Wortley (2003).

Even though the scientists use different names, the descriptions resemble self-rostering. To be able to create one definition, the different descriptions of self-rostering used in the literature are summarized in the table below:

AUTHOR	DEFINITION SELF-ROSTERING	MAIN TYPIFICATIONS
SCIENTIFIC ARTICLES		
Hung (1992)	<i>“Self-scheduling means employees, usually as a group, develop their own schedules.” (p. 6)</i>	<ul style="list-style-type: none"> - Employees choose their own work hours (scheduling working hours) - Schedule developing could be in a group
Teahan (1998)	<i>“Self-scheduling may be described as a system wherein a group of staff [members] or a self-scheduling committee, when presented with the staffing needs for a particular unit or area by a manager, make their own schedule.” (p. 361)</i>	<ul style="list-style-type: none"> - Group makes their own working schedules on the base of staffing needs
Silvestro & Silvestro (2000)	<i>“Flexible rostering is where each rostering period is planned individually (typically 4 – 6 weeks at a time). Shifts are allocated on the basis of manning requirements which reflect anticipated demand patterns, as well as myriad other rostering parameters, including staff’s preferences for off-duty.” (p.527)</i>	<ul style="list-style-type: none"> - Individual work schedule planning - Demand of employer and staff preferences are regarded - Scheduling shifts
Ala-Mursula, Vahtera, Kivimäki, Kevin, Pentti	<i>“[Worktime control is] operationalised as perceived control over starting and ending times of a workday, the opportunities to take breaks and to deal with private matters</i>	<ul style="list-style-type: none"> - Flexibility - Adjusting working time to personal needs

(2002)	<i>during the workday, the scope for influencing the scheduling of shifts, the scheduling of paid days off and vacations, and the opportunities to take unpaid leave.” (p. 272)</i>	<ul style="list-style-type: none"> - Scheduling working hours and days
Thornthwaite & Sheldon (2004)	<i>“Employee self-rostering systems enable individual employees to tailor working hours to maximise their compatibility with domestic responsibilities. Such rosters would (...) allow employees to choose to work mornings, afternoons or school hours only, or some combination of different hours each day.” (p. 239)</i>	<ul style="list-style-type: none"> - Work-life balance - Flexibility - Scheduling working hours
Drouin & Potter (2005)	<i>“Self-scheduling [is] a form of flexible scheduling in which [employees] can determine their own work hours.” (p. 72E)</i>	<ul style="list-style-type: none"> - Employees schedule their own work hours
Nederlands Centrum voor Sociale Innovatie	<i>“Bij zelf roosteren ontwerpen werknemers het eigen rooster langs hun voorkeuren, eisen en wensen aan de arbeidstijden en het combineren van werk en privé.” (p. 1)</i>	<ul style="list-style-type: none"> - Employees design their own roster based on their own preferences
Lubbers (2008)	<i>“Bij zelfroosteren bepaalt eerst het management hoeveel personeel op welke dagen en uren nodig is (bezettingseisen). Daarnaast maken werknemers hun wensen kenbaar door aan te geven welke uren zij willen werken (persoonlijke werkrooster). [De informatie] gaat in de computer en daar rolt iets moois uit, namelijk een ideaal rooster voor werknemer en werkgever.” (p. 15)</i>	<ul style="list-style-type: none"> - Scheduling of hours - Demand and wishes of employer and employee are reconsidered - Computer could give a perfect work schedule for employer and employee
Vos (2008)	<i>“ [Met] ‘zelfroosteren’ ontwerpt een kleine groep werknemers voor een periode van vier tot twaalf weken in onderling overleg de eigen werktijden. (...) Vooraf bepaalt de manager voor de hele planingsperiode voor elk uur hoeveel personeel hij minimaal nodig heeft en maximaal kan gebruiken. Daarbij geeft hij ook de vereiste kwalificaties aan. (...) De tweede stap is dat werknemers binnen het aangegeven tijdskader aangeven wanneer wij willen werken en wanneer zij vrij willen zijn. (...) Bij zelfroosteren geldt echter de eis dat de einduitkomst binnen de minimum- en maximum grenzen moet vallen. Het is aan de werknemers zelf om zodanige compromissen te sluiten, dat aan die eis wordt voldaan.(...) De eindoplossing geeft de manager een bezetting die voldoet aan de door hem gestelde randvoorwaarden” (p. 15)</i>	<ul style="list-style-type: none"> - A working schedule is made on the basis of staffing needs and employee preferences - Compromise of employees
Zeggenschap (2008)	<i>“Zelfroosteren betekent dat een groep werknemers eigenhandig de roosters maakt. Dit op basis van een door de werkgever vastgesteld bedrijfstijdskader, waarbinnen is aangegeven aan welke kwantitatieve en</i>	<ul style="list-style-type: none"> - Company time frame determined by employer - Starting and ending time determined by

	<i>kwalitatieve eisen moet worden voldaan. Bij het ontwerpen van de roosters bepalen de werknemers zelf de begin- en eindtijden c.q. de duur van hun diensten en worden geacht met elkaar in gesprek te gaan om de individuele wensen te synchroniseren met de door de werkgever vastgelegde eisen” (p.6)</i>	employee - Synchronise wishes (compromise of employees)
--	---	--

Table 2. Descriptions of self-rostering in several articles

The different definitions and descriptions have several resemblances concerning the intention and execution of self-rostering:

- The requirements of the employer are taken into consideration;
- The needs of the employees are taken into consideration;
- Flexible scheduling of hours, days or shifts;
- Scheduling is realized in a group or individually;
- A computer program can support the scheduling process;
- The working schedule is a result of a compromise between employees.

Although there are different descriptions and terminologies for self-rostering in scientific articles, the essence of the described systems overlap. All the definitions and descriptions are based on the idea that the needs of the employee and the requirements of the employer have to converge. The goal of self-rostering is creating two-sided flexibility: for both employers and employees.

Employers create the framework, based on their requirements, in which employees can choose their own working hours. This way the employer can take the flexible working demand into consideration. Employees, on the other hand, can choose those working hours (or days or shifts) that meet their own needs and create their own flexibility. When the inputs of the employer as well as of the employees are known, a provisional schedule can be formulated by an authorized group or individual. A computer program can be used as a supporting tool. When this provisional schedule is created, possible fits and misfits become visible. It may be that not all working hours, working days or shifts are fulfilled. A dialogue can be initiated by the employees to come to some kind of compromise, so all working hours, workings days or shifts are fulfilled. The result is an adjusted, definitive work roster. This process has been visualized in the figure below.

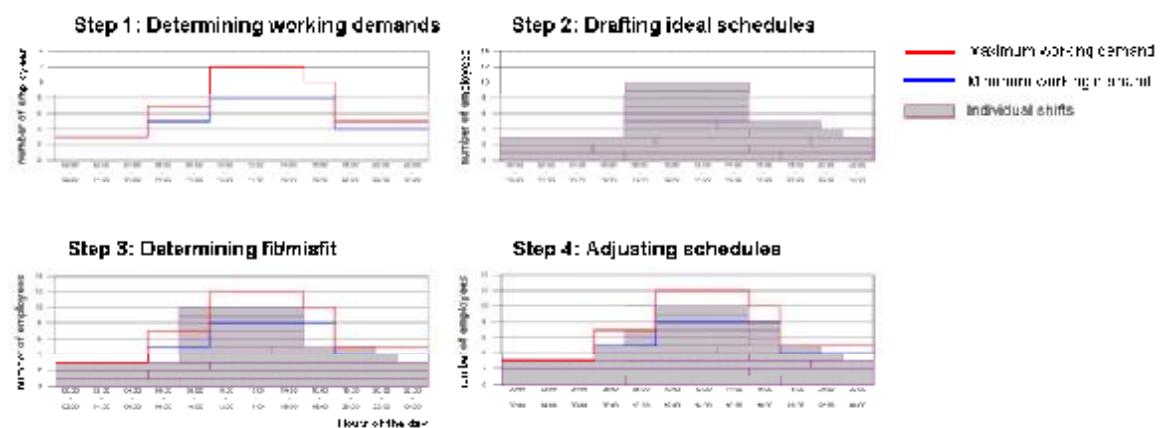


Figure 5. Steps to create individual rosters.

Source: Dehora

Taking the description into consideration, a definition can be formulated. This definition will be used in this research:

“Self-rostering is a system where (1) an employer creates a framework based on the organizational requirements in which (2) employees can indicate their preferences concerning working hours, working days or shifts, that, (3) by means of an authorized scheduling group or individual, (4) and possibly with the support of computer software and/or after a compromising dialogue between employees, (5) results in working schedules where the needs of the employee and the demands of the employer converge.”

This definition is visualized in the figure below².

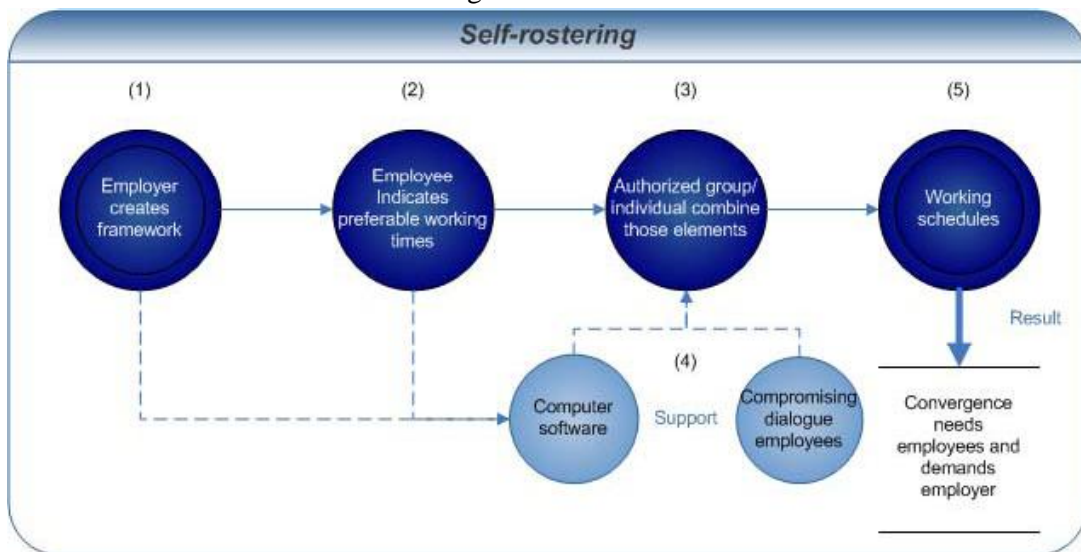


Figure 6. Visualisation definition self-rostering

2.4.2 Typology

Self-rostering is a system which can be applied in different forms. When looking at the definition, two dimensions can be deduced on which the forms can be distinguished. Self-rostering is defined as: *“a system where an employer creates a framework based on the organizational requirements in which employees can indicate their preferences concerning working hours, working days or shifts, that, by means of an authorized scheduling group or individual, and possibly with the support of computer software and/or after a compromising dialogue between employees, results in working schedules where the needs of the employee and the demands of the employer converge.”*

The first dimension that can be derived from the definition is autonomy. With self-rostering employees can indicate their preferences concerning working hours, while they used to have little or no involvement in the creation of the rosters. The term autonomy literally refers to regulation by the self. Its opposite, heteronomy, refers to controlled regulation, or regulation that occurs without self-endorsement (Deci & Ryan, 2006, p. 1557). The more autonomy the employees have over the creation of their roster, the more responsibility, control and influence they have over it. The

² The dotted lines represent possible but not necessary steps, depending on the form of self-rostering.

amount of autonomy is based on the demand set. For example, if an organization creates a fixed basis roster, where 60% of the amount of work is already divided and the other 40% can be filled in by the employees themselves, the amount of autonomy would not be as high as when the organization creates a basis roster where 10% is fixed and the other 90% can be determined by the employees.

A second dimension can be described in terms of the individual versus the collective. It is possible that each employee creates his or her own roster individually or that the roster is created by a group of employees. Those are the two most extreme variants; intermediate forms also exist, like when each individual indicates their own preferences but the group as a whole decides on the final roster by means of a compromising dialogue and taking all preferences into consideration.

Another distinction that can be made concerning the forms of self-rostering is whether the rosters are created manually or computerized. This however is a classification and does not lead to a third dimension.

When these elements are combined in a figure, the following model arises:

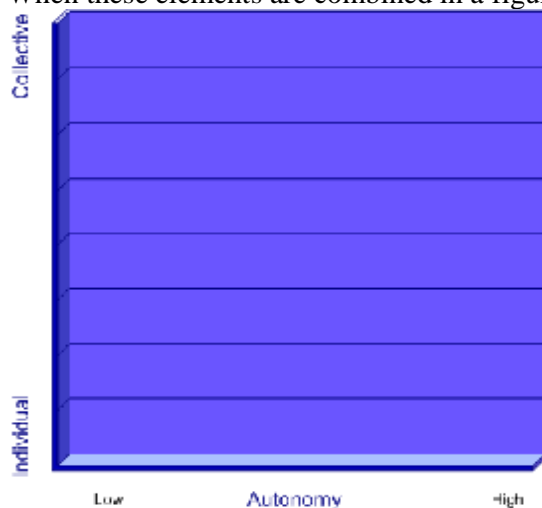


Figure 7. Self-rostering model

Forms of self-rostering placed in the model

The only classification of forms that is made so far is constructed by the NCSI (Nederlands Centrum voor Sociale Innovatie). They identified five forms of self-rostering:

1. Exchange of shifts; gives the employee the possibility to adapt their fixed roster to their own preferences by changing shifts with colleagues.
2. Making an inventory of preferences; the employee can indicate what his or her preferences are. The scheduler will try to honor those preferences, but this is not guaranteed.
3. Shift-picking; employees can choose between shifts that are determined by the organization.
4. Matching; the preferences of the employees will be matched to the needs of the organization by a software program. Bottlenecks that might occur will be solved in consultation with the employee and the employer.
5. Full self-rostering; the employee determines when he or she wants to work and the employer will adjust his needs and working times to the availability of the employee.

These forms are differentiated on the amount of autonomy an employee has. An employee has almost no autonomy when he or she exchanges shifts. The shifts are set and the employee can only try to change them with a colleague. However, in the full self-rostering variant the amount of autonomy is very high: the employee indicates when he or she wants to work and the employer will adjust his needs to that. This form is also characterized by an individual level. Each individual creates his or her own roster, without consultation with the colleagues. Making an inventory of wishes and matching also take place on an individual level. In addition, these two forms can also be described as individual rostering, while the rosters are not created by the employees themselves, but they are based on the preferences of each individual. The difference between these two forms is that a software program is used with matching and with making an inventory of preferences the rosters are created manually. The exchange of shifts moves away from the individual level, while an employee needs his or her colleagues in order to be able to exchange. Shift picking can occur on an individual level as well as on a collective level. With full rostering, the demand is completely set by the employee; the other forms of self-rostering are characterized by a demand set of the employer.

In the following, the forms identified by the NCSI are placed in the model:

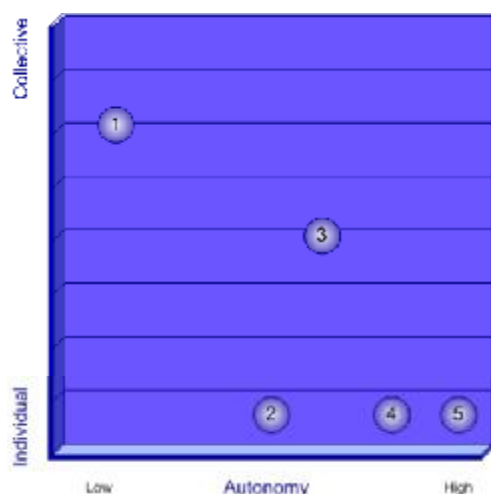


Figure 8. Forms of self-rostering

2.4.3 Advantages and disadvantages

There are different articles published in nursing trade journals that describe experiments with self-rostering at hospitals (Silvestro & Silvestro, 2000; Grierson-Hill & Wortley, 2003; Bailyn et al. 2007; Teahan 1998, Hung 2002). This section describes the advantages and disadvantages that stemmed from the examined case studies.

The set up of the examined experiments was basically the same; the creation of the rosters was a group process, employees were able to come up with a roster themselves based on their own preferences of working times. After an inventory of the wishes was made, a self-rostering committee created a roster. Possible blanks and overlaps were then showed to the employees and they had to solve those problems as a group. Dearholt & Feathers (1997) observed another form of self-rostering; a 10-hour shift was implemented at a hospital, which formed a flexible scheduling option for the nurses.

Many advantages of self-rostering came up during the different experiments. An increased control over the roster was found as an important advantage (Teahan 1998; Dearholt & Feathers 1997; Grierson-Hill & Wortley 2003; Hung 2002). As a result of that Bailyn et al. (2007), Grierson-Hill & Wortley (2003); Silvestro & Silvestro (2000) and Hung (2002) name the ability for nurses to integrate work patterns with home and social life as an important positive outcome. Further more, better team spirit as a result of enhanced communication turned out to be a positive result of self-rostering (Teahan, 1998; Dearholt & Feathers 1997; Silvestro & Silvestro 2000; Hung 2002; Grierson-Hill & Wortley 2003). Hung (2002) and Teahan (1998) found that the levels that levels of absenteeism and turnover decreased due to the implementation of self-rostering. Teahan (1998), Dearholt & Feathers (1997), Hung (2002) and Silvestro & Silvestro (2000) noted increased job satisfaction as a result of self-rostering and another positive outcome was the improved morale of the staff (Bailyn et al. 2007; Teahan 1998; Silvestro 2000). In some cases it was observed that self-rostering decreased the amount of time that nurse managers needed to spend on the roster, and they therefore gained time to address other issues (Bailyn et al. 2007; Teahan 1998; Hung 2003).

However, not all the outcomes of the experiments were positive. Complaints of favoritism and feelings of inequity were negative outcomes of the experiments (Teahan 1998; Silvestro & Silvestro 2000). Dearholt & Feathers (1997) noted peer pressure and the time it took to come to an agreement about the rosters as disadvantages of self-rostering. Grierson-Hill & Wortley (2003) found that selfish requests, which led to resentment from colleagues, had a negative impact on the experiment.

Overall, the positive outcomes of the experiments were stronger than the negative ones. The experiment that Bailyn et al. (2007) describe formed the exception. The negative outcomes overruled the positive outcomes and therefore the experiment was cancelled. According to the authors, this was caused by bad implementation. Grierson-Hill & Wortley (2003), Hung (2002) and Teahan (1998) also stress the importance of the implementation process, in order to create successful experiments.

The factors that contribute to a successful implementation will be examined in the next sub section.

To summarize, the different advantages and disadvantages are given in the next table:

Article	Advantages	Disadvantages
Bailyn et al. 2007	<ul style="list-style-type: none"> - increased control to balance work and personal lives - decrease in number of change requests - nurse manager spends less time on rostering - more flexibility at the workplace - increased morale 	<ul style="list-style-type: none"> - project was cancelled because nurses did not stick to the rules - nurses did not think of dual agenda - difficult to fill in a roster over three months, because events in the private life are not known yet
Teahan 1998	<ul style="list-style-type: none"> - staff more content with work - increased morale - decrease of staff turnover - increase of managers time for other business 	<ul style="list-style-type: none"> - complaints of favoritism - demand for certain days off could not always be met - lack of objectivity and fairness

	<ul style="list-style-type: none"> - better team spirit - increased control of staff over their schedule 	
Dearholt & Feathers 1997	<ul style="list-style-type: none"> - greater satisfaction with working hours - increased schedule flexibility - increase of perceived level of control in the workplace - improved communication 	<ul style="list-style-type: none"> - peer pressure - time it took to come to an agreement
Grierson-Hill & Wortley 2003	<ul style="list-style-type: none"> - staff feel in control over their roster - staff is able to plan social live more easily - responsibility not falling on one person - tendency to get requested shifts 	<ul style="list-style-type: none"> - selfish requests, which led to resentment from colleagues
Silvestro & Silvestro 2000	<ul style="list-style-type: none"> - increased morale - ability to integrate work patterns with home life - improved team spirit 	<ul style="list-style-type: none"> - perceived inequity by the junior staff
Hung 2003	<ul style="list-style-type: none"> - improved predictability of personal lives - nurse manager spends less time on rostering - better team spirit - decrease in absenteeism - more control on work 	

Table 3. Advantages and disadvantages of self-rostering

2.4.4 Implementation process

Hoffart & Willdermood (1997) evaluated the implementation of self-rostering in five medical/surgical units and identified five success factors for effective implementation: committee structure, staff education, negotiation skills, guidelines and managerial support. These factors turned out to be recurring elements in the examined case-studies. The amount of time that is spent on the implementation process and the group size also seem recurring success factors, and therefore those will be appointed as well.

Committee structure

Dearholt and Feathers (1997) noted three goals for a committee: to examine and evaluate scheduling options, to promote and maintain staff input and to educate the staff. Hoffart & Willdermood (1997) identified guideline formation as another important goal for a committee. The members of a committee would have to be perceived as objective, fair, and able to handle conflicts and peer pressure. Furthermore, the composition of the committee has to be a good reflection of the total group of employees that participate in the experiment (Teahan, 1998). Dearholt & Feathers (1997) found two important advantages of a committee: improved communication towards the other employees and a broad body of knowledge. The time it took to come to consensual agreement turned out to be a disadvantage. Changing committee membership is valuable, according to Hoffart & Willdermood (1997), because it helps more people to understand the process of self-rostering. However, this rotation should not occur too frequently, because of the time it costs for new members to understand the process.

Staff education

Grierson-Hill & Wortley (2003) named the education phase as the crucial phase of the implementation strategy. Silvestro & Silvestro (2000) remarked that managers emphasized the importance of training the staff members to make them aware of the

rostering problem and of the possibilities that self-rostering can offer. Hoffart and Willdermood (1997) found that providing early education to employees reduced the fears and concerns about self-rostering. An important element of staff education is to make employees conscious of the dual agenda of self-rostering. Bailyn et al. (2007) experienced that employees began to see the schedules as an entitlement, not as one part of a joint agreement to enhance both the lives of the employees and the functioning on the floor, therefore the experiment in that specific hospital failed.

Negotiation skills

Time is needed for employees to learn how to negotiate, Zimmerman (1995) address this as a primary step to accomplish successful self-rostering. Hoffart and Willdermood (1997) found that in all of five medical units they evaluated, lack of negotiation skills turned out to be a significant barrier to successful implementation of self-rostering. Hung (2002) expressed the (un)ability of employees to cooperate with one another to construct schedules as a major concern.

Guidelines

The guidelines are 'the rules of the game' and must be set before the implementation of self-rostering can take place. Hoffart & Willdermood (1997) state that written guidelines can become the cornerstone of success for self-rostering (p.45). Each organization and/or department that wants to implement self-rostering has to develop their own set of rules according to the specific circumstances; there is not one best way that fits every situation (Grierson-Hill & Wortley 2003; Hoffart & Willdermood (1997). When employees do not adhere to the rules, the implementation of self-rostering is doomed to fail (Bailyn, 2007).

Managerial support

The managerial support is the amount of support that the nurse manager executes. Before the implementation of self-rostering, the nurse manager was the person who was responsible for creating the rosters. Without support of the nurse manager, the implementation of self-rostering is bound to fail (Hoffart & Willdermood, 1997). However, the manager must realize that self-rostering is a democratic, participative process and therefore, the manager must know to let go of some power (Hung, 2002).

Time

As Hung (1992) describes, many employees are accustomed to receiving instructions and rosters that are ready made. When those employees are suddenly given the freedom to choose, they often do not know how to handle that freedom. Therefore, it takes a while before they are familiar with the new situation. An appropriate amount of time has to be planned for a trial period; a minimum of six months is recommended (Zimmerman, 1995; Grierson-Hill & Wortley 2003). This trial period is recommended to educate staff, to gauge their interest and acceptance, to understand and revise guidelines and to provide an opportunity for employees to participate in all aspects of scheduling (Hoffart & Willdermood, 1997, p 45). What must be kept in mind, is that self-rostering is a continuous evolving process, and therefore, the process of evaluation (revising, reanalyzing and fine-tuning) is ongoing (Teahan, 1998).

Size of the self-rostering group

Several authors suggest that the group for whom self-rostering is intended should not be too big (Drouin & Potter, 2005; Zimmerman 1995). Silvestro & Silvestro (2000) proposed a small group of fewer than 35 employees. This increases staff motivation and commitment. Besides, a smaller group has less complex rosters so it can be full and quickly evaluated by the manager who is responsible for signing of the roster (p. 533). This success factor does only count when the rosters are produced manually.

2.5 Change process

In the last section different aspects of self-rostering have been discussed, among which implementation issues. However, when self-rostering is implemented, it will probably mean a considerable change for an organization. These changes need to be guided carefully; therefore this section provides an overview of the literature concerning how to deal with a change process.

Kluytmans (1994) distinguish three dimensions of a change process: the content, the process and the context. The content represents 'what' should be changed, the process is about 'how' the change should be managed and the context forms 'the situation in which' the change takes place. The author points out five visions concerning change in organizations:

1. Change as a design problem: organizations are designed and can be changed based on strict rational considerations.
2. Change as an interpersonal problem: in order to change an organization successfully, problems concerning the relation between employees should be solved.
3. Change as a situational problem: the current situation and the desired situation should be identified; the misfit between those two situations should be solved based on key variables which determine the change direction.
4. Change as a problem of choice: change should be a continuous process in order to stay connected to the changing environment.
5. Change as a drift: organizations need to go with the flow and do not have influence on all the things that happen around them.

According to the change theory of Lewin (1951), a planned change process consists of three phases: unfreezing (the present level), moving (to a new level) and re-freezing (at the new level). Context characteristics, like leadership and organizational climate, are likely to affect how change is implemented and consequently, how employees react to change (Van Dam et al. 2008). Many authors stress the importance of good leadership in a change process (Carmicheal et al. 1988; Austin et al. 1997; Ruta 2005), this also emerged from the examined case studies concerning the implementation of self-rostering. Change processes often come along with emotions like cynicism, anxiety, hostility, conservatism and apathy. Therefore, positive leadership is essential; management must exhibit the drive, energy, belief and confidence necessary to make change efforts to a success. Trust in those leading the change is seen as a prerequisite for employees' to cooperate with the change process (Kotter, 2001). Trust is seen as a vital component for effective and satisfactory relationships among colleagues and between employees and their management (Burt et al. 1998). Austin et al. (1997) state that cynicism about change involves a loss of faith in the leader and often comes forth from a history of change attempts from which the results were not entirely or clearly successful. Cynicism can therefore become a self-fulfilling prophecy if cynics refuse to support change and it arises in spite of the best intentions of those that initiated the change. Van Dam et al. (2008) examined how characteristics of the leader-member exchange (LMX) relationship are related to employees' resistance to change. They found that in high-quality LMX relationships employees will receive more information about the change, will have a greater opportunity to participate, and will develop greater trust in management, compared to employees in low-quality LMX relationships. As a result, employees in high-quality

relationships will develop less resistance to change than employees in low-quality relationships (p. 319).

Austin et al. (1997) describe ways to manage and minimize cynicism about organizational change. An important aspect of managing cynicism is the provision of timely, appropriate and credible information. Employees need to be informed about the necessity for change, the progress and problems associated with the change process and the results. If there is a lack of communication, employees start filling in the blanks for themselves and are likely to conclude that the change process turned out to be a failure; poorly managed communication may result in widespread rumors. Furthermore, two way communication is essential; employees should be provided with opportunities to air their feelings concerning the change process (Carmicheal et al. 1988). Like also came forth from the implementation issues concerning self-rostering, educating employees is another way to guide them through the change process while changes almost always come along with a shortcoming in knowledge and experience.

It is more likely that change is accepted when employees have the possibility to participate in the planning and implementation of change (Oreg 2006; Koslowski & Sagie 1996); participation can increase the understanding of why change is necessary and it can create a sense of control and ownership over the change process (Armenakis et al. 1993). Finally, admitting mistakes when they occur, apologizing and quickly taking appropriate corrective actions are also important ways to minimize cynicism about change. Lippitt (1958) points out that resistance towards change can occur at any time during the change process, though during the beginning of the change process there is almost always a general form of resistance. This comes often forth out anxiety and the possible lack of information.

Armenakis et al. (2007) carried out research concerning readiness for organizational change. They found four factors that influence the readiness; the content (what is being changed), the context (circumstances under which the change is occurring), the individuals (characteristics of those being asked to change) and the process (how the change is being implemented). These four factors form the beliefs and behaviors of the employees towards the change. That individual differences affect the way how an employee responds to change is also supported by Oreg, 2006. Some people do not like alterations in their current work situation and therefore they are inclined to show resistance towards change. Others are not confident whether they have the right capabilities for the changed work situation. This last factor however, turned out not to be significantly related to resistance to change (Van Dam et al. 2008).

Caluwé et al. (2002) simplified the complex process of organizing in three main themes: goal setting, organizing and realizing. These themes can form a guideline in any change process, but the themes form general steps. Kotter (2001) identified more specific steps that come along with a change process. He believes that successful changes can be achieved by following eight steps:

1. Establishing a sense of urgency
2. Forming a powerful guiding coalition
3. Creating a vision
4. Communicating the vision
5. Empowering others to act on the vision
6. Planning for and creating short-term wins
7. Consolidating improvements and producing still more change
8. Institutionalizing new approaches

The process of going through these phases takes a considerable amount of time. However, skipping steps has a negative influence on the desired results and only creates the illusion of speed. Furthermore, critical mistakes in any of the phases can slow down the progress and negate hard won gains.

It is important to realize that the culture of an organization has a big influence on the change process (Kluytmans, 1994). Caluwé et al. (2002) define culture as ‘the common values and norms of a group of people and the behavior coming forth out of those values and norms’ (p. 45). On the one hand, it is believed that an open atmosphere in the organization is a necessary condition for effective change. On the other hand, it is believed that an open atmosphere is not a necessary condition but a goal that should be realized. On way or the other, the openness of the culture and the relation between the different actors in an organization influences the successfulness of a change process; if there is no willingness to change, the change process is doomed to fail.

2.6 Summary and conceptual model

The employment relation is based on a mutual agreement that the employee will deliver work and the employer will reward the employee in return. Differences between employees get more prominent and therefore emphasis has been put on the individualization of the employment process over the last years. In this case, individualization means that the employment relation is less directed by stable and collective patterns but more on an individual basis. This development comes forth from different aspects like changes in the demographic factors, enhanced labour market participation of women and the need of people to balance work and family life. Bolweg (1997) pleads for a more equal relation between the employer and the employee and Goudswaard et al. (2007) advocate employment relations that are designed for the largest part by employees. The Harvard model, developed by Beer et al. (1984) is based on the thought of giving employees more influence on different HRM policies. Self-rostering is a form of flexible working times that allows employees more influence over the creation of their rosters. It can be used as an instrument to attract and retain employees, especially in times of labour scarcity. Advantages for employees that can be achieved with flexible working times are enhanced level of control over the roster, improved work-life balance, increase of organizational support and improved quality of (working) life. Disadvantages for the employee are insecurity and irregularity concerning the working times, loss of extra payment for irregular working times and an unfair division of work. Flexible working times also bring advantages and disadvantages for employers. Advantages are increase of organizational effectiveness, increased efficiency, decrease of absenteeism and improved employee morale. Disadvantages that can occur are administrative fuss, loss of control over (the creation of) the rosters and anarchy.

Self-rostering is a relatively new topic in the field of Human Resource Management, and the articles that describe (experiments with) self-rostering do not have a uniform definition. The following definition of self-rostering has been created, based on a comparison of the already existing definitions:

‘Self-rostering is a system where an employer creates a framework based on the organizational requirements in which employees can indicate their preferences concerning working hours, working days or shifts, that, by means of an authorized scheduling group or individual, results in working schedules where the needs of the employee and the demands of the employer converge.’

Autonomy and individual versus collective are two dimensions of self-rostering that can be derived from the definition and the different forms of self-rostering are distinguished by those dimension. Apart from the two dimensions, the forms can also be categorized as being created manually or computerized.

Self-rostering is applicable when the group of employees is heterogeneous, the job tasks homogeneous and it must be possible to perform the tasks in isolation from each other. Moreover, the work demand has to be predictable.

Some advantages of self-rostering correspond to the advantages of flexible working times. Advantages that especially apply for self-rostering are better team spirit (when the rosters are developed by the team), greater satisfaction with working hours, increased schedule flexibility and the manager (or planner) needs to spend less time on rostering. Complaints of favoritism, lack of objectivity and the difficulty to predict events in the private life can occur as disadvantages of self-rostering. Critical success factors when implementing self-rostering are: the committee structure, staff education, negotiation skills of employees, guidelines, managerial support, time and group size. What should not be forgotten when an organization wants to implement self-rostering is that the institutional forces, like the trade union, the work council and the labour law have to be taken into account. Moreover, an organization can advocate self-rostering but without employee use and support the potential benefits for employer and employees will not be achieved.

When self-rostering is implemented in an organization, a change is set into action. Change processes often come along with feelings of anxiety and cynicism. Essential factors to manage those feelings are strong and positive leadership, trust in those leading the change, and timely provision of accurate information. Individual differences also affect the way how an employee responds to change. Finally, without an open culture and good relationships between the different actors of the change process, an implementation is practically doomed to fail.

Conceptual model

As discussed in the introduction chapter, the main research question is:

What are the conditions that NS must meet in order to design and implement self-rostering successfully for their engine drivers and conductors?

In order to find the conditions, literature about flexible working times, self-rostering and change process have been examined. The literature study, from which the results have been described in the preceding sections, leads to the following research model.

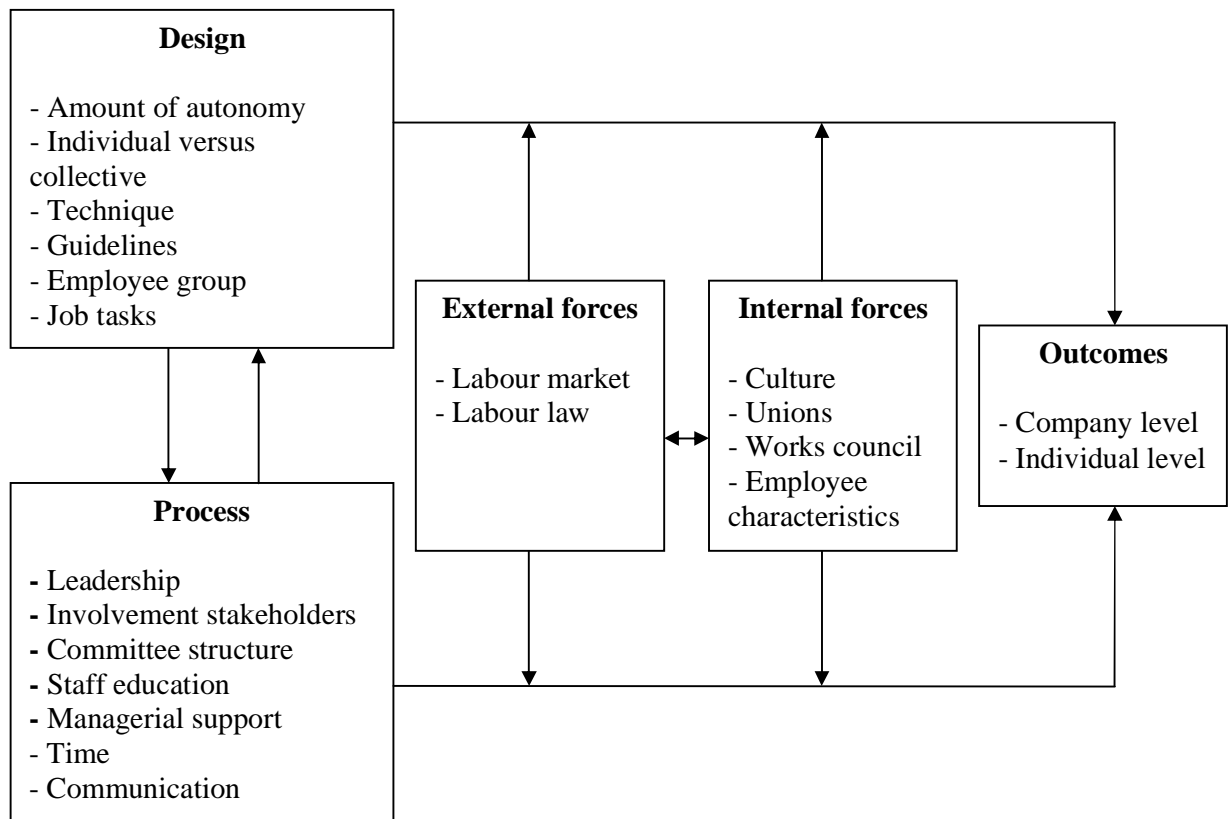


Figure 9. Conceptual Model

This chapter has examined on different theoretical aspects that relate to self-rostering. The next chapter will elaborate on the methodology for this research.

3. Methodology

In this chapter it will be explained how the research questions have been approached. The first section elaborates on how the literature study was carried out, the second section explains that the research at NS was a form of a case study and section 3.3 gives information about the data collection. The last section presents the operationalization for this research.

3.1 Literature study

The first research question, '*What is self-rostering?*' has been formulated in order to gain more information about self-rostering; what does the concept mean, what are the different types, what are (dis)advantages, what are experiences with self-rostering so far and what conditions should be met for an effective design and implementation? The study focused on (the individualization of) the employment relation, the Harvard model (specific on the human resource flow and the employment relation) and finally on self-rostering. Before and during the literature research, different people who have some experience with self-rostering have been interviewed in order to get familiar with the topic and to get more ideas on where to search for during the literature study. Information about the people that have been interviewed is added in appendix 1, together with the interview protocol. The interviews were semi-structured; the topics and questions were (partly) known beforehand. However, there is the possibility to ask more in-depth questions and to ask questions that were not formulated beforehand.

Section 2.4 which examined self-rostering, is divided in four sub sections. The first two sub sections (2.4.1 and 2.4.2) have been written together with two other master students. These students were graduating on the same topic, and therefore we combined our strengths in order to create an optimal definition and typology. Section 2.4.3 and 2.4.4 about (dis)advantages and implementation of self-rostering are mostly based on nine case-studies. A limitation with respect to those sections is that the case-studies all consider self-rostering in the health-care sector. It is therefore questionable to what extent these results can be generalized to other sectors.

3.2 Case Study

The second and the third research questions, respectively '*Why and how does NS wants to implement self-rostering?*' and '*What do the engine drivers and conductors think of the experiment concerning self-rostering?*' are answered by means of a single case-study of the experiment at NS. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin 1994, p. 13). The case study approach has the ability to generate answers to 'why' as well as 'what' and 'how' questions. A case is what a researcher focuses on in order to investigate a phenomenon. The data collection methods may include documentation analyses, interviews, observations, and questionnaires (Yin 1994; Lewis et al. 2003), Benbasat et al. (1987) mention different reasons for the use of case studies. The two main reasons which are also applicable to this research are that the case study provides the opportunity to research a 'fresh' research area, from which not much is known yet, and second, by using a case study, the study object can be studied in its natural setting.

Many different forms and combinations of case studies exist. A primary distinction in designing case studies is between single- and multiple case designs. Another distinction that Yin (1994) makes is based on a holistic or embedded design. A holistic design examines the global nature of a program or of an organization, while the embedded design examines more than one unit of analysis. An embedded design occurs when, within a single case, attention is also given to a subunit or subunits.

This study is a single embedded case study, where both the overall experiment as well as the experiments at the four different locations is examined by means of interviews and a questionnaire. The overall unit of analysis are the engine drivers and conductors of the four locations together.

The research is a multi method research (also known as mixed methods) while it involves both quantitative and qualitative methods to collect data. Combining those methods activates their complementary strengths and helps to overcome their weaknesses. Moreover, multi method research designs allow researchers to follow emerging questions rather than limiting their research to question that are amenable to a particular method (Stange 2006). In this case, a multi method research has been used to come to an optimal understanding of the engine drivers' and conductors' opinions and their underlying thoughts. So, (part of) the goal of the qualitative research methods (interviews and focus groups) was to explain and understand the outcomes of the quantitative research method (questionnaire).

The next section will elaborate further on the data collection.

3.3 Data collection

Five interviews have been held in order to answer the second and third research question, which resulted in a description of the current situation at NS concerning the roster systematic and an explanation of why and how NS wants to implement self-rostering. First, a member of the central steering commission, who is also the initiator of the project, was interviewed. The goal of this interview was to gather information with regard to the experiment; what were the goals, how was the experiment set up and what were the desired results? The four project leaders of the different locations have also been interviewed to get to know more about the specific situation at the four different locations. The interviews were structured; the topics and questions were determined beforehand but it was possible to ask more in-depth questions. An advantage of structured interviews is that the outcomes of the different interviews can be compared (Baarda et al. 2000). The interview protocols of the interview with the member of the central steering commission and of the interviews with the project leaders can be found in appendix 2 and 3.

As a next step, a questionnaire has been set out. The goal of the questionnaire was to measure the support of the employees for the individual rostering system in a quantitative way. At the end one open question was added where the employees could make remarks about aspects that were not in the questionnaire or about other aspects relevant to the experiment.

At each location a focus group have been held in order to find out what the topics for the questionnaire should be. In appendix four it can be found what the set up of the focus groups was. The questionnaire is divided in three parts; the first section handles topics that involve the design and content of rosters, the second section is about the process with regard to the experiment and the last section asks if and why (not) employees want to proceed with the experiment.

The participants were not randomly chosen but in consideration with the project leaders. Even though this goes at cost of the randomness of the research, it was a deliberate choice while the participants of the focus groups had to be representative for the total group of employees and while some employees are so negative and conservative that they are not capable of thinking about the topics in a critical, but objective manner. That such a can person influence the whole focus group showed in Dordrecht. One of the participants was very negative and dominant. More positive participants where interrupted by the negative participant, which finally led to a focus group where the dominant, negative participant did almost all the talking.

The concept of the questionnaire was tested by the participants of the focus groups and after their comments were processed, the definite questionnaire (appendix 5) was sent out to the employees of the four locations. The total numbers of engine drivers and conductors that received the questionnaire are given in the following table:

Location	Engine Driver	Conductor	Total
Amsterdam	232	172	404
Den Bosch	40	45	85
Dordrecht	51	39	90
Enschede	39	60	99
Total	362	316	678

Table 4. Number of engine drivers and conductors per location

The employees were given three weeks to fill out the questionnaire (either digital or on paper), and after one week a reminder was sent out to the employees to ask them once more to fill out the questionnaire. Every employee received a reminder, while the questionnaire was on an anonym basis and therefore it was not known who had or had not filled out the questionnaire yet.

A limitation with respect to the data collection is that the unions and the works council have not been interviewed. This was requested by the researcher, but the central steering commission thought that would not be wise, because of the unrest that the experiment had created.

3.3.1 Representativeness

In total, 258 employees started the questionnaire, 251 of them completed it, which comes down to a response of 37%. There are no rules of thumb when it comes down to judging a response; therefore it is wise to compare different categories of the sample to the total population.

Table 5 shows the comparison in percentages, but it also gives the mean and significance levels³. Those levels have been computed by executing One- Sample T Tests. This test compares the mean score of a sample to a known value, which is in this case the population mean. The null hypothesis is that there is no significant difference between the sample and the mean. The alternate hypothesis is that there is a significant difference between the sample mean and the population mean. When the significance level is smaller than 0.05 (5%) it means that there is a significant difference between the mean of the sample and the mean of the population, so that the null hypothesis has to be rejected.

³ The bold numbers in the table indicate a significant difference.

	Proportion sample	Proportion population	Mean sample	Mean population	Significance level
Men	88%	88.5%			
Women	12%	11.5%	1,12	1,116	0.939
Engine driver	63%	54%			
Conductor	37%	46%	1,40	1,412	0.690
Age < 40	12%	20%			
Age > 40	88%	80%	1,871	1,796	0.001
Working years < 15	30%	38%			
Working years > 15	70%	62%	1,697	1,625	0.009

Table 5. Comparison of sample and total population

Looking at the significance level, gender and function are representative for the total population. However, this does not mean that nothing can be said about the other categories; the mean figures and percentages show that there is indeed variation, but the variation is not enormous.

The category age and working years of the sample of Amsterdam are also not representative for the total population of Amsterdam. Statistical seen has Dordrecht the most representative sample for its population. The sample of Enschede and Den Bosch are not representative on the age category (respectively $p < 0.01$ and $p < 0.05$).

Appendix 6 shows the comparison of the sample and the total population per location.

3.3.2 Analysis

In chapter five the results of the questionnaire are given. The results have been tested on whether there are differences in opinions between groups (e.g. between locations or between men and women). This has been done by executing independent sample t-tests. Those tests compare the means of two independent groups. The null hypothesis would be that the means are the same. A low p-value (indicating a sufficiently large difference between groups) would suggest that the null hypothesis has to be rejected and therefore the conclusion would be that the opinions of two groups are significantly different.

Several parts of the questionnaire involve different questions which have been analyzed as separate questions, but also as one scale. This applies to judging the rosters on the 14 aspects (question one and two) as well as the process section (question 3). When one scale of the different aspects is created, the validity has to be guaranteed. This is possible by determining the Cronbach's Alpha, which can have a value between 0 and 1. The higher the alpha, the more consistent the scale is. An alpha is sufficient if it is higher than 0.7. There are six questions about the process, five of them form one scale, Cronbachs Alpha is 0.79. The fourth question, about the time span of the experiment, has not been taken into the scale. The respondents were also asked to judge their individual and their current roster on 14 aspects. Those aspects can also be formed to one scale (Cronbachs Alpha is 0.96) so that it is possible to calculate an average score for the rosters.

After the analysis, a second round of focus groups has been held. The most important results of the questionnaire were presented in those focus groups. The goals were to discuss the results and to make sure that they were interpreted the right way. The outcome of those focus groups can be found in §5.6.

3.4 Operationalization

From the first round of focus groups it came forth that there are several factors that determine the support of the conductors and engine drivers for individual rostering. The factors can be divided in two main categories, the design of the roster and the process concerning the experiment. These two categories stemmed from the literature research and that research also showed that those categories are influenced by internal and external forces. Table 6 shows the operationalization of the aspects of the two main categories and of the internal and external factors.

Not all the variables are being measured in the questionnaire, while NS wanted to concentrate on the design aspect and not so much on the process part. The different interviews (see section 3.3) have been used to gather information that could not be deducted from the questionnaire.

Category	Variables	Operationalization	Measured in
Design	Amount of autonomy	The scope of the employee group to regulate and control their own rosters.	Final questions + interviews
	Individual versus collective	The number of people that create the rosters.	Interviews
	Technique	The software system to support self-rostering.	4.4 + 4.6 + interviews
	Guidelines	The rules that apply to self-rostering.	2 + 4.4 interviews
	Employee group	The composition (age, gender, seniority) of the group of engine drivers and conductors.	General 1,2,3,4,5
	Job tasks	The activities that the employee group perform.	Interviews
Process	Leadership	Commitment and attitude of the project leader.	Interviews
	Involvement stakeholders	Involvement of the employees, unions and workers councils in the experiment.	Interviews
	Committee structure	Composition and attitude of the workgroup.	Interviews
	Staff education	Employees' knowledge about self-rostering and about the possibilities of self-rostering.	3.1 + final questions
	Managerial support	Support from the central steering commission.	Interviews
	Time	Time span of the experiment.	3.4 + Interviews
	Communication	Information exchange between the stakeholders.	3.1, 3.2, 3.3 3.5, 3.6 + interviews
Internal & external factors	Labour market	The market in which workers compete for jobs and employers compete for workers.	Interviews

Culture	The norms and values that (might) influence the experiment.	Interviews
Institutional forces	The influence that the unions and the workers council have.	Interviews
Employee characteristics	The features of employees that (might) influence the experiment.	Interviews

Table 6. Operationalization

The next chapter will explain why and how NS wants to implement self-rostering.

4. Self-rostering at NS

This chapter is confidential.

5. Results

This chapter is confidential.

6. Conclusions and recommendations

This chapter is confidential.

References

- Ala-Mursula, L., Vahtera, J., Kivimäki, M., Kevin, M.V. & Pentti, J. (2002). Employee control over working times: associations with subjective health and sickness absences. *Journal of Epidemiol Community Health*, Vol. 56, 272-278
- Allen, T.D. & Shockley, K.M. (2007). When flexibility helps: Another look at the availability of flexible work arrangements and work-family conflict. *Journal of Vocational Behavior*, 71, 479-493
- Armenakis, A.A., Field, H.S., Harris, S.G. & Holt, D.T. (2007). Readiness for Organizational Change: The Systematic Development of a Scale. *Journal of Applied Behavioral Science*, 43 (2), 232-255
- Atkinson J. (1984). Flexibilisering van de arbeid in de Engelse industrie en dienstverlening. *Te Elfer Ure*. 41. 181-200
- Austin J.T., Reichers A.E. & Wanous J.P. (1997). Understanding and managing cynicism about organizational change. *Academy of Management Executive*, 11 (1), 48-59
- AVON Monitor. (2007). *Arbeidsvoorwaarden en arbeidsverhoudingen op Ondernemingsniveau*. From: http://docs.szw.nl/pdf/92/2005/92_2007_1_9951.pdf
- Baarda D.B., Goede, de M.P.M. & Kalmijn, M. (2000). *Basisboek Enquêteeren en gestructureerd interviewen*, Houten: Educatieve Partners Nederland BV
- Bailyn L., Collins R. & Song Y., (2007). Self-rostering for hospital nurses: an attempt and its difficulties. *Journal of Nursing Management*, 15, 72-77
- Beer M., Lawrence, P.R., Mills, D.Q., Spector, B. & Walton, R.E. (1984). *Managing Human Assets*. New York: The Free Press
- Benbasat, I., Goldstein, D.K. & Mead, M. (1987). The case research strategy in Studies of information systems, *MIS Quarterly September*, 369 - 386
- Beutell, N.J. & Greenhaus, J.H. (1985). Sources of conflict between work and family roles. *Academy of Management Review*, 10, 76-88
- Blauw, E. (1994). *Het corporate image: over imago en identiteit*. Amsterdam: de Viergang
- Bogaert, S. & Vloeberghs, D. (2005). Differentiated and individualized personnel management: Diversity management in Belgium. *European Management Journal*, 23 (4), 483-493
- Bolweg, J.F. (1997). *De onmogelijkheid van consistent sociaal beleid*. Deventer: Kluwer Bedrijfsinformatie
- Boxall, P. & Purcell, J. (2003). *Strategy and Human Resource Management*. Houndmills, Basingstoke, Hampshire, New York: Palgrave MacMillan.
- Bryon, D. (2005). A meta-analytic review of work-family conflicts and its antecedents. *Journal of Vocational Behavior*, 67, 169-198

-
- Burt, R.S., Camerer, C., Rousseau, D.M. & Sitkin, S. (1998). Not so different after all: a crossdiscipline view of trust. *Academy of Management Review*, 23 (3), 393-404
- Caluwé L. de, Kor, R., Weggeman, M. & Wijnen, G. (2002). *Essenties van organiseren, managen en veranderen*. Schiedam: Scriptum management
- Carmichael C., McEwen N., Short D. & Steel A., (1988). Managing organizational change – a strategic approach. *Long Range Planning*, 21 (6), 71-78
- Cornelissen, W.J.M. & Schilfgaarde, P. (1988). *De flexibele onderneming, mogelijkheden en instrumenten om de flexibele inzet van personeel te vergroten*. Assen/Maastricht: Van Gorcum.
- Dalton, D.R. & Mesch, D.J. (1990). The impact of flexible scheduling on employee attendance and turnover. *Administrative Science Quarterly*. 35 (2), 370-378
- Dam, K. van, Oreg S. & Schyns B. (2008). Daily Work Contexts and Resistance to Organisational Change: The Role of Leader-Member Exchange, Development Climate, and Change Process Characteristics. *Applied Psychology*. 57 (2), 313-344
- Dearholt S.L. & Feathers C.A., (1997). Self-rostering can work. *Nursing Management*, August, 47-48
- Deci, E.L. & Ryan, R.M. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality*, 74, 1557-1586
- Dowling, G.R. (1986). Managing Your Corporate Images, *Industrial Marketing Management*, 15, 109-115
- Drouin, R. & Potter, M. (2005). Flexible scheduling. Exploring the benefits and the limitations. *American Journal of Nursing*, Vol. 105 (11), 72E-72F
- Ernst A.T., Jiang H., Krishnamoorthy M. & Sier D., (2004). Staff scheduling and rostering: A review of applications, methods and models. *European Journal of Operational Research*, 153, 3-27
- Ferris, M., Hawkins, A.J., Hill, E.J. & Weitzman, M. (2001). Finding an extra day a week: The positive influence of perceived job flexibility on work and family life balance. *Family Relations*, 50, 49-58
- Freeman, R.B. (1998). War of the Models: Which Labour Market Institutions for the 21st Century? *Labour Economics*, 5, 1-24
- Goudswaard, A., Huiskamp, R., Nauta, A. & Oeij, P. (2007). *Loven en bieden over werk, naar dialoog en maatwerk in de arbeidsrelatie*. Assen: Van Gorcum
- Grierson-Hill L. & Wortley V., (2003). Developing a successful self-rostering shift system. *Nursing Standard*, 17 (42), 40-42
- Gueutal, H.G., Lambert, A.D. & Marler, J.H. (2008). Individual differences: Factors affecting employee utilization of flexible work arrangements. *Journal of Vocational Behavior*, in press

-
- Haan, E.G. de, Jong, P. & Vos, P.J. (1994). *Flexibiliteit van de arbeid*. Amsterdam: Welboom Bladen bv.
- Halpern, D.F. (2005). How time-flexible work policies can reduce stress, improve health and save money. *Stress and Health*. 21, 157-168
- Heesters, M. & Volkers, M. (1996). *Handboek arbeidstijden en medezeggenschap, gebruiksaanwijzing bij de arbeidstijdenwet*. Amsterdam: FNV Centrum Ondernemingsraden
- Hemerijck, A. & Visser J. (1997). *A Dutch Miracle, Job Growth, Welfare Reform and Corporatism in the Netherlands*. Amsterdam: University Press
- Hewitt, P. (1993). *About Time, The revolution in work and family life*. London: Rivers Oram Press
- Hicks, W., & Klimoski, R. J. (1981). The impact of flexitime on employee attitudes. *Academy of Management Journal*, 24, (2), 333-341
- Hoffart N. & Willdermood S., (1997). Self-rostering in Five Med/Surg Units. *Nursing Management*, 28 (4), 42-46
- Hooff, A. van, Jonker, J. & Messchendorp (1998). *Flexibiliteit, Het vermogen van organisaties en mensen om te veranderen*. Assen: Koninklijke van Gorcum
- Huiskamp, R. (2003). *Arbeidsrelaties en onderneming*. Utrecht: Lemma
- Huiskamp, R., Leede. J. de & Looise J.C. (2002). *Arbeidsrelaties op maat : naar een derde contract?* Assen: Koninklijke van Gorcum
- Hung R., (2002). A note on nurse self-rostering. *Nursing economics*, 20 (1), 37-39
- Hyland, M.M. & Rau, B.L. (2002). Role conflict and flexible work arrangements: the effects on applicant attraction. *Personnel psychology*. 55, 111-136
- Iellatchich, M., Meyer, M., Mayrhofer W., Schiffinger M. & Steyrer J. (2005). Graduates' career aspirations and individual characteristics. *Human Resource Management Journal*, 15, 38-56
- Intermediair, Imago onderzoek 2007. From: <http://www.intermediair.nl/adverteren/static/imago/index.html>
- Kluytmans F. (red). (1994). *Interventies bij organisatieverandering*. Heerlen: Kluwer Bedrijfswetenschappen
- Kluytmans F. (1999). *Arbeidsrelaties tussen schijn en werkelijkheid*. Deventer: Kluwer
- Kolowski, M. & Sagie, A. (1996). Decision type, organizational control, and acceptance of change: An integrative approach to participative decision making. *Applied Psychology: An International Review*, 45, 85-92
- Kotter, J.P. (2001). *Leiderschap bij verandering*. Schoonhoven: Academic Service
- Jaarboek OR (2000). Alphen aan de Rijn: Samson Bedrijfsinformatie

Lange, W.A.M. de & Lent, C.M.E.P. van (1994). *Vernieuwingen in het Arbeidsbestel*. 's Gravenhage: Stichting Maatschappij en Onderneming.

Leblanc G. & Nguyen N. (2001). Image and reputation of higher education institutions in students' retention decisions, *International Journal of Education Management*. 15 (6), 303-311

Lendfers, M.L.G.H. & Nijhuis, F.J.N. (1989). *Flexibilisering van de arbeid en gezondheidseffecten*. Den Haag: Stichting Organisatie voor Strategisch Arbeidsmarktonderzoek (OSA).

Lewin, K. (1951). *Field Theory in social science*. New York: Harper & Bros

Lewis, P.H., Saunders, M. & Thornhill A. (2003). *Research methods for business students*. Harlow: Financial times/Prentice Hall

Lippitt, R. (1958). *The dynamics of a planned change: a comparative study of principles and techniques*. New York: Harcourt

Lobel, O. (2004). Between solidarity and individualism: collective efforts for social reform in the heterogeneous workplace. *Research in the Sociology of Work*, 14, 131-164

Lubbers, A. (2008). Het Zweedse wondermiddel. Innoveren met zelfroosteren. *Intermediair PW*, Vol. 3, 14-17

Manpower (2006). *De nieuwe werknemer*. From:
<http://www.vtbpro.nl/content/files/SITE370/Manpower%20Witboek%20-%20De%20nieuwe%20werknemer.pdf>

Nederlands Centrum voor Sociale Innovatie [NCSI]. *Startnotitie: Flexibele inzet van personeel en tijd*. Retrieved 13 February, 2008, from www.ncsi.nl

Newstrom, J.W. & Pierce, J.L. (1983). The design of flexible work schedules and employee responses: Relationships and process. *Journal of Occupational Behaviour*, 4, 247-262.

Oreg, S. (2006). Personality, context and resistance to organizational change. *European Journal of Work and Organizational Psychology*, 15, 73-101

Owen, J.D. (1977). Flexitime: Some Problems and Solutions. *Industrial and Labor Relations Review*. 30 (2), 152-160

Passchier, C.E., Rij, J.C. & Sprenger, J.W. (1998). *Alledaagse Flexibilisering*. Amsterdam: FNV

Riel, C.B.M. van (1992). *Identiteit en Imago: een inleiding in de corporate communication*. Schoonhoven: Academic Service, Economie en Bedrijfskunde

Ruta, D.C., (2005). The application of change management theory to HR portal implementation in subsidiaries of multinational corporations. *Human Resource Management*, 44 (1), 35-53

Rousseau, D.M. (2005). *I-deals: Idiosyncratic deals employees bargain for themselves*. New York, London: Sharpe

-
- Sheldon, P. & Thornthwaite, L. (2004). Employee self-rostering for work-family balance. Leading examples is Austria. *Employee Relations*, Vol. 26 (3), p. 238-254
- Silvestro, C. & Silvestro R., (2000). An evaluation of nurse rostering practices in the National Health Service. *Journal of Advanced Nursing*, 32 (3), 525-535
- Stange, K. C. (2006). Publishing Multimethod Research. *Annals of Family Medicine*, 4 (4), 292-295
- Steiber, N. (2007). The linkage between work and family: state of knowledge and policy implications. *Policy paper*, 2, 1-22
- Teahan, B., (1998). Implementation of a self-rostering system: a solution to more than just schedules! *Journal of Nursing Management*, 6 (6), 361-368
- Visser, J. (2002). The first part-time economy in the world: a model to be followed? *Journal of European Social Policy*. 12 (1), 23-42
- Vos, P. (2008). Geen diensten plannen, maar uren verdelen. Zelfroosteren: win-win voor werknemers en werkgevers. *Werkgeven*, Vol. 8, 14-19.
- Wiscobe R. (2002). Flexible work arrangements: a new solution? *Journal of Vocational Behavior*, 23, 168-175
- Yin, R.K. (1994). *Case study research: design and methods*. London: SAGE Publications
- Zeggenschap. (2008). Een nieuw wondermiddel? Zelfroosteren is in de mode. *Zeggenschap*, Maart 2008, 6-8.
- Zimmerman P.G., (1995). Self-rostering in the emergency department. *Journal Emergency Nursing*, 21 (1), 58-61

Appendix 1 Interview protocol field experts

Interviewees

Interviewee	Function	Organization
1	Program Manager	Nederlands Centrum Sociale Innovatie (NCSI)
2	Senior Adviser, team Processen	TNO Arbeid
3	Senior Adviser, team Personnel Management	TNO Arbeid
4	Advisor on working times	FNV Bondgenoten

Interview Protocol Field Experts

1. Algemeen

- A. Introductie van de interviewer
- B. Achtergrond geïnterviewde
- C. Doel van het interview: kennis over zelf roosteren vergroten
- D. Randvoorwaarden interview:
 - Het interview duurt ongeveer anderhalf uur;
 - Als de geïnterviewde een vraag niet kan of wil beantwoorden is dat mogelijk;
 - De vragen zijn per thema gestructureerd, aanvullende informatie over het thema is welkom.

2. Systematiek

- A. Definitie zelfroosteren
- B. Verschillende vormen, waarin onderscheiden ze zich
- C. Hoe kom je tot een ontwerp
- D. Voor welke organisatie is het geschikt
 - cultuur
 - primaire proces
 - omgeving
- E. Welk type zelfroosteren past bij welke organisatie
- F. Voorwaarden voor starten met zelfroosteren, zoals
 - groepsgrootte
 - systematiek
 - soortgelijke functies
 - wetgeving CAO/ATW
 - overig
- G. Voordelen
- H. Nadelen

3. Proces

- A. Wat verandert er voor de werkgever
 - waarin moeten ze opgeleid worden
- B. Wat verandert er voor de werknemer

-
- waarin moeten ze opgeleid worden
 - C. Wat verandert er in de relatie tussen werkgever en werknemer
 - D. Welke aspecten dragen bij aan succesvolle implementatie
 - E. Is een pilot nodig
 - welke stappen
 - hoe lang
 - F. Welke situationele factoren beïnvloeden het proces

4. Stakeholders

- A. Wie
- B. Algemene houding
- C. Hoe erbij betrekken

5. Spelregels

- A. Wat moet je van te voren vastleggen
- B. Wie moet erbij betrokken worden

Appendix 2 Interview protocol initiator experiment

Interview Protocol Initiator Experiment

1. Algemeen

- A. Introductie van de interviewer
- B. Achtergrond geïnterviewde
- C. Doel van het interview: kennis vergaren over het experiment individueel
- D. Randvoorwaarden interview:
 - Het interview duurt ongeveer anderhalf uur;
 - Als de geïnterviewde een vraag niet kan of wil beantwoorden is dat mogelijk;
 -

2. Achtergrond experiment

- A. Aanleiding tot het experiment
- B. Doel van het experiment
- C. Waarom nu
- D. Andere manieren bedacht/uitgevoerd om dat te bereiken

3. Opzet pilot

- A. Hoe is de opzet van het experiment
- B. Waarom op deze manier
- C. Waarom deze standplaatsen
- D. Hoe zijn de werkgroepen vast gesteld
- E. Hoe zijn de projectleiders gekozen
- F. Waarom wordt er geëxperimenteerd deze twee systemen
- G. Hoe staat het personeel tegenover het experiment
- H. Hoe staat de ondernemingsraad tegenover het experiment
- I. Hoe staan de vakbonden tegenover het experiment
- J. Zijn er nog andere stakeholders en zo ja, hoe staan zij tegenover het experiment

4. Proces tot nu toe

- A. Hoe ervaart u het verloop van het experiment tot nu toe
- B. Wantrouwend personeel, wat heeft u gedaan om dat wantrouwen te verminderen
- C. Welke andere (situationele) factoren beïnvloeden het proces

5. Resultaten

- A. Wat hoopt u te bereiken
- B. Zijn er resultaten vastgelegd
- C. Wat als er een duidelijk nee uitkomt (is de proef dan mislukt?)
- D. Hoe wordt er (eventueel) verder gewerkt, nog meer experimenten op andere standplaatsen

Appendix 3 Interview protocol project leaders

Interview Protocol Project Leaders

1. Algemeen

- A. Introductie van de interviewer
- B. Achtergrond geïnterviewde
- C. Doel van het interview: kennis vergaren over het experiment individueel
- D. Randvoorwaarden interview:
 - Het interview duurt ongeveer anderhalf uur;
 - Als de geïnterviewde een vraag niet kan of wil beantwoorden is dat mogelijk;

2. Standplaats

- A. Hoeveel machinisten en (hoofd)conducteurs zijn er op de standplaats werkzaam
- B. Is de standplaats op de hoogte gebracht van het experiment dat NS wilde uitvoeren
- C. Wie heeft besloten om als standplaats mee te doen aan het experiment (vrijwillig of niet?)

3. Werkgroep

- A. Uit hoeveel personen bestaat de werkgroep
- B. Wat zijn de functies van de werkgroep
- C. Welke verschillende functies zijn vertegenwoordigd in de werkgroep
- D. Hoe is er bepaald welke personen deel zouden nemen aan de werkgroep
- E. Is er ook een klankbordgroep? Zo ja: zie bovenstaande 3 vragen.

4. Pilot

- A. Wanneer is de pilot van start gegaan
- B. Hoe is de pilot van start gegaan
- C. Welke spelregels worden toegepast
- D. Hoe zijn de medewerkers geïnformeerd over het experiment
- E. Wanneer zijn de wensen uitgevraagd
- F. Hoe zijn de wensen uitgevraagd
- G. Over welke periode zijn de wensen uitgevraagd
- H. Wat was het reactiepercentage
- I. Zijn de wensen nog een tweede keer uitgevraagd
 - Zo ja:
 - waarom
 - wanneer
 - zijn er gewichten aan gehangen

5. Proces

- A. Wie heeft de opzet van het experiment bedacht
- B. In hoeverre mogen beslissingen rondom het experiment door de werkgroep zelf genomen worden (en wat wordt opgelegd)
- C. Hoe verloopt het experiment (volgens planning, en zo niet, waarom niet)
- D. Wanneer zouden de medewerkers de roosters te zien krijgen

-
- E. Is dat toen ook gebeurd? Evt. Waarom niet?
 - F. Wat is de algemene houding/de stemming op de standplaats ten opzichte van het experiment

6. Techniek

- A. Met welk systeem wordt er gewerkt
- B. Werkt het systeem goed

7. Communicatie

- A. Wie is verantwoordelijk voor de communicatie naar de medewerkers
- B. Wordt er vanuit de projectleiding (4-tal) ook gecommuniceerd naar de medewerkers
- C. Wat en hoe is er vooraf aan de medewerkers gecommuniceerd
- D. Wat en hoe is er tussendoor aan de medewerkers gecommuniceerd (over het verloop van het experiment)
- E. Heeft het personeel de mogelijkheid gekregen om feedback te geven
- F. Is er iets met deze feedback gedaan en is dit weer naar de medewerkers gecommuniceerd
- G. Vindt er communicatie plaats tussen de projectleiders van de verschillende standplaatsen

8. Stakeholders

- A. Hoe zijn de vakbonden en andere stakeholders erbij betrokken
- B. Hoe groot is hun rol in het experiment

9. Medewerkers

- A. Wat voor een cultuur heerst er op de standplaats (ons kent ons, veel verworven rechten etc.)
- B. Hoe is de veranderingsbereidheid van de medewerkers
- C. Zijn er aspecten specifiek voor deze standplaats die daar van invloed op zijn (personeelstekort, hoog ziekteverzuim, net ingevoerde veranderingen)

10. Mening Projectleiders

- A. Wat vindt u zelf van het experiment
- B. Wat verandert er voor het personeel als dit ingevoerd wordt
- C. Wat verandert er voor de planners als individueel roosteren ingevoerd wordt

Appendix 4 Set up first round of focus groups

00.00 I Introductie

Hierin bespreken wie de opdrachtgever is (NS holding), neutrale positie onderzoekers

- doel sessie: een goede evaluatie mogelijk maken door een top-vragenlijst
- vervolg op sessie: na de vragenlijst nog een focusgroep
- nadruk op experimentele kant
-

00.05 II Kennismaking

Iedereen stelt zich kort voor door in 1 minuut zijn ideale werkdag (bij de NS) te beschrijven.

00.15 III Ideale dag versus rampendag

Voortbordurend op de kennismaking, worden 2 borden opgehangen. 1 gaat over je ideale dag, 1 gaat over een rottag. (kan zowel over de huidige situatie als toekomstige situatie gaan)

- Deelnemers wordt gevraagd eerst zelf op post-its te schrijven welke dingen hun dag tot een topdag maakt (bijvoorbeeld leuke ritten, of wanneer aan hun wensen voldaan is, of misschien wel iets heel anders)
- Daarna vragen we ze op te schrijven welke dingen ervoor zorgen dat ze een rottag hebben (wensen niet ingewilligd, alleen maar dezelfde ritten of iets heel anders).
- Als ze alles hebben opgeschreven plakken ze het op de borden.

00.45 IV Discussie over individueel roosteren

1. wat zijn je verwachtingen als er individueel geroosterd wordt
2. wat verwacht je dat het voor positieve dingen brengt?
3. wat zijn de dingen waar je je zorgen over maakt als individueel roosteren ingevoerd wordt?
4. wat zijn randvoorwaarden om het te doen slagen? (wat is er nodig om de zorgpunten om te buigen tot succesfactoren?)

01.15 V Op welke punten beoordeel je een (individueel) rooster?

Dit is een soort van samenvatting van de punten uit III en IV.

De items groeperen rond bijvoorbeeld:

1. inhoud van diensten (aantal ritten, soort ritten, agressietreinen, etc)
2. samenstelling van de groep (collega's)
3. aard van het rooster (voorspelbaarheid, termijn waarop het duidelijk moet zijn, zekerheid van het rooster, zwaarte van het rooster, aantal beschikbaarheidsdiensten)
4. mate waarin wensen werk-privé gehonoreerd kunnen worden (vaste sportavond, ophalen van je kinderen, voorkeurooster, veto, etc)
5. proces van totstandkoming individueel rooster (hoe wensen invoeren, hoe vaak, hoe lang van tevoren, etc)
6. uitkomsten (eerlijk, rechtvaardig, betere afstemming werk-privé)

Appendix 5 Questionnaire

TNO-vragenlijst

V08533/031-20003.01.01

Vragenlijst Nederlandse Spoorwegen

Evaluatie individueel roosteren

Datum	12 juni 2008
Auteurs	Jan de Leede Tony Brugman Marieke Lam Ylva Scholtens-Couvret

Alle rechten voorbehouden. Niets uit deze vragenlijst mag worden vermenigvuldigd en/of openbaar gemaakt door middel van druk, fotokopie, microfilm of op welke andere wijze dan ook, zonder voorafgaande schriftelijke toestemming van TNO.

Indien deze vragenlijst in opdracht werd uitgebracht, wordt voor de rechten en verplichtingen van opdrachtgever en opdrachtnemer verwezen naar de Algemene Voorwaarden voor Onderzoeks- opdrachten aan TNO, dan wel de betreffende terzake tussen partijen gesloten overeenkomst. Het ter inzage geven van de TNO-vragenlijst aan direct belanghebbenden is toegestaan.

Appendix 6 Comparison sample and population

6A. Amsterdam*

	Proportion sample	Proportion population	Mean sample	Mean population	Significance level
Men	88	99			
Women	12	11	1,12	1,11	0.545
Engine driver	41	58			
Conductor	59	43	1,40	1,43	0.427
Age < 40	15	22			
Age > 40	85	78	1,85	1,78	0.026
Working years < 15	29	41			
Working years > 15	71	59	1,70	1,59	0.006

6B. Enschede*

	Proportion sample	Proportion population	Mean sample	Mean population	Significance level
Men	84	80			
Women	16	20	1,16	1,20	0.541
Engine driver	41	41			
Conductor	59	59	1,59	1,59	0.973
Age < 40	2	17			
Age > 40	98	83	1,98	1,83	0.000
Working years < 15	23	36			
Working years > 15	77	60	1,70	1,63	0.259

6C. Den Bosch*

	Proportion sample	Proportion population	Mean sample	Mean population	Significance level
Men	88	90			
Women	12	10	1,12	1,10	0.810
Engine driver	44	51			
Conductor	56	49	1,56	1,49	0.518
Age < 40	7	22			
Age > 40	93	78	1,92	1,78	0.018
Working years < 15	36	26			
Working years > 15	65	74	1,66	1,74	0.462

6D. Dordrecht

	Proportion sample	Proportion population	Mean sample	Mean population	Significance level
Men	94	92			
Women	6	8	1,06	1,08	0.632
Engine driver	67	56			
Conductor	32	44	1,35	1,44	0.204
Age < 40	20	14			
Age > 40	80	86	1,80	1,86	0.250
Working years < 15	30	34			
Working years > 15	70	66	1,69	1,66	0.602

* A bold number indicates a significant difference.