CASE STUDIES

ROADWORKERS – REDUCTION OF PHYSICAL STRAIN

1. Organisations involved

Municipality of Delft

2. Description of the case

2.1. Introduction

Roadworkers in the Municipality of Delft are exposed to considerable physical strain, which resulted in a high prevalence of knee and back problems. A physiotherapist was consulted to study the physical strain and to map the roadworkers' working methods in order to define the causes of the problem. Solutions were devised and implemented successfully. As a result the absenteeism rate decreased by 3.9 %, mainly because of the decrease in the physical effort required to do the job.

The main reason to start with the project was a request from the roadworkers themselves. They complained mainly about knee and back pain. Based on this request, a periodic study concerning occupational health (PAGO[1]) was performed in 1999.

> *[The] PAGO or periodic study concerning occupational health finds its origin in Article 18 of the Law on working conditions (Arbowet)[2]. In case of presence of occupational risks, the employer is obliged to provide the employees with the opportunity to undergo a periodic occupational health examination. The examination has to be focused on the prevention or limitation of the occupational health risks. The objective of the PAGO is to trace possible (early) health effects on individual workers, as a consequence of the occupational risks, in order to prevent professional diseases[3].*

The PAGO showed that physical strain is an important occupational risk for roadworkers. Many of the 40 roadworkers and service employees in the road maintenance department at the Municipality of Delft have problems with their knees or back. During participative consultation, the employees, management and the safety expert made a joint decision to consult an occupational physiotherapist, who came to play an important role in the project.

The results from the PAGO had already established that measures needed to be taken to improve working conditions for the roadworkers. However no action was taken until 2002 when the municipality's new prevention officer conducted several interviews with the workers. They complained that there had been no improvement in their working conditions, especially with regard to the heavy physical work they were required to do. In collaboration with the manager, the prevention officer therefore started a project that ran from 2003 to 2005.

2.2. Aims

The main objective of the project was to reduce physical strain in order to lower the prevalence of knee and back problems and cut the rate of absenteeism. To achieve this objective, the main sources of physical strain had to be defined and proper solutions had to be found. Those involved in the project soon realised that it wasn't enough to change the working method of the

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[1] PAGO — periodiek arbeidsgeneeskundig onderzoek.

[2] This law describes the rights and obligations of both employer and employees concerning working conditions. Source: Published by the Ministry of Justice, 29 April 1999 (http://wetten.overheid.nl/cgibin/sessioned/browsercheck/continuation=19659-002/session=039281986429963/action=javascriptresult/javascript=yes).

[3] Source: State University Groningen (http://www.rug.nl/bureau/expertisecentra/amd/gezondheiden welzijn/gewpago/index). More information on PAGO can be found on the website of the Ministry of Social Affairs and Work (http://www.arboportaal.nl/arbo_a_tm_z/a/arbobeleid).

workers. In some cases it is not possible to provide manual handling aids and the task itself has to be changed in this case, by altering the street design. Thus, a second objective was to address the designers and make clear to them that they have to consider human factors when designing a street.

2.3. What was done, and how?

The results from the PAGO showed a high prevalence of knee and back problems among road construction workers. Therefore the prevention officer and the manager agreed that a specialist in the field of anatomy who was familiar with occupational hygiene strategies would be necessary for the development and implementation of the project. They decided to contact an occupational physiotherapist. The physiotherapist succeeded in gaining the attention of the workers by adapting his strategy to the target group, which was necessary because of the specific characteristics of the group.

The different steps of the project were as follows:

1. A meeting was held to discuss the high absenteeism rate in view of the heavy physical strain incurred by the road construction workers during their work.

2. The PAGO was performed to collect quantitative and qualitative data about the situation.

3. Discussions took place between management, a safety expert and the participative body representing the workers. They decided to consult a physiotherapist.

4. The physiotherapist studied the physical strain and used videos to map the working methods of the workers. Based on the images, they were able to define some problem areas.

5. The municipality set up a working group representing both workers and management.

6. The physiotherapist informed all members of the working group about the guidelines and risks related to physical strain.

7. Discussion of the results and bottlenecks concerning physical strain.

8. Discussion of possible solutions within the field of ergonomics: techniques, organisational factors and individual factors. An approach plan was set up. The plan is based on regulations from the 'Arbowet' (the law on working conditions), which requires the provision of solutions in the following order: first technical adaptations, then organisational solutions and, as a final option, an individual solution.

9. Measurement of the situation before the implementation of the solutions by using the *Arbomonitor Gemeenten*. This is a questionnaire on working conditions from SKB specifically designed for municipalities[4].

10. The following solutions were implemented:

(a) a small motorised vehicle that is able to transport stones and sand (called a 'skidster', these skidsters were considered for a subsidy on the basis of the 'Farbo' arrangement[5]);

(b) buying stones weighing less than 4 kg;

(c) mechanical paving instead of manual;

(d) special tool for lifting larger stones;

[4] SKB (the Foundation for Quality in Occupational Health) is the largest institute in the Netherlands concerned with occupational health. See SKB online on http://www.skbvs.nl/ .

[5] The 'Farbo' arrangement provides entrepreneurs with the possibility to request a subsidy for the purchase of equipment that decreases the risk of health problems. (Source: http://home.szw.nl/navigatie/dossier/dsp_dossier.cfm?set_id=99)

(e) attune work between the roadworker and the stone supplier;

(f) using special knee protection;

(g) using a crane in the preparation phase.

11. Another meeting was held to discuss the progress of the project with the working group.

12. The physiotherapist was consulted a second time to advise on:

(a) educating road designers about physical strain sustained by road builders;

(b) making agreements about pavement material in dialogue with a few street workers.

13. Impact measuring by means of the *Arbomonitor Gemeenten* (this also enabled the project to approach the A+O Fund[6] for financing to help co-fund the services of the physiotherapist). The results from this second *Arbomonitor* revealed that the roadworkers felt that the physical strain had diminished.

The project was co-financed by the A+O Fund for 50 % of the costs for the occupational physiotherapist. This amounted to two instalments each of EUR 10 000; one at the beginning of the project and one after the evaluation.

2.4. What was achieved?

Between 2003 and 2005 absenteeism among the roadworkers declined by 3.9 %. The roadworkers now feel that their concerns are taken seriously and that the road designers now understand their position better. The manual (public space) that specifies the types of materials used to construct the various parts of the road has been amended. Lighter stones are now permitted to be used for street paving, which means that the occupational risk during manual handling has been diminished.

Designers are more conscious of the risks of physical strain among the executors (roadworkers). The main occupational risk in their work has been dealt with and diminished.

Problems faced

According to the safety and health team manager, the following were the main problems faced by the project.

- The project lasted for two years, which is quite a long time, and which made it sometimes difficult to stay focused on the topic.
- Workers do not like filling in questionnaires. For this reason, they decided to let the workers fill in the questionnaires in groups during work time with support provided.
- Sometimes, attention focused too much on the non-cooperating workers instead of on the cooperating workers.
- A new standard concerning occupational strain on roadworkers was published recently, specifying that when the surface that has to be paved is above a certain threshold (1500 m2), a mechanised method must be used. However, this has meant that some designers now specify that work is done in smaller ‘batches’, apparently to avoid having to apply the new standard. This indicates that not all road designers are committed to reducing the workload of the road construction workers.

2.5. Success factors

The involvement of the workers themselves was an important factor in the success of this project. Workers accept solutions much more readily when they can participate and when they feel that they are taken seriously. The workers are the only party that knows what will really work in practice.

The focus wasn't only on the working methods of the workers but also on the design of the streets. When the street is designed in such a way that the physical strain of the workers is high, a change in working methods won't solve the problem. An integrated solution is indeed the best.

Figure 1. Variations from zero in a group of roadworkers

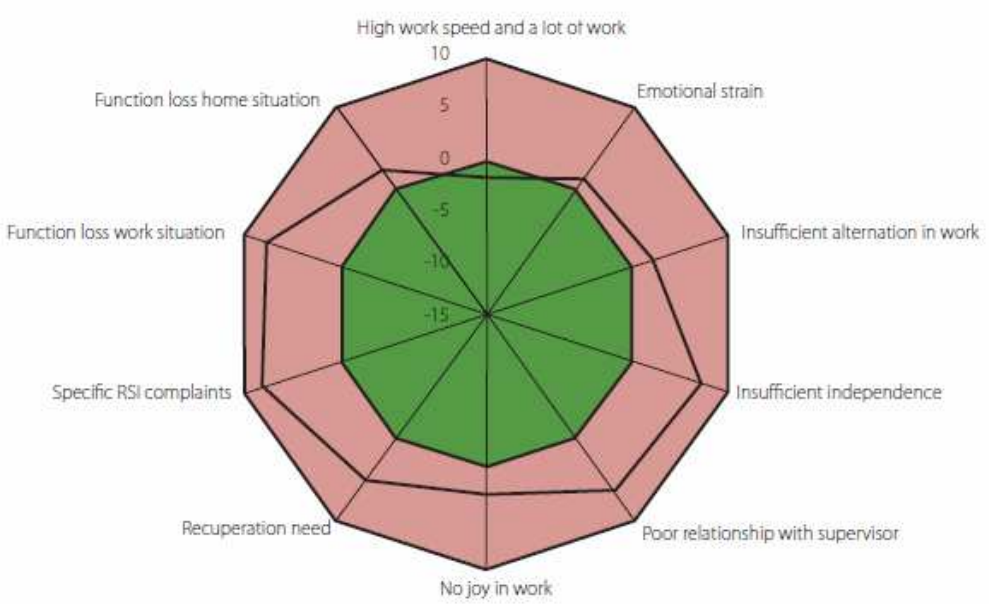
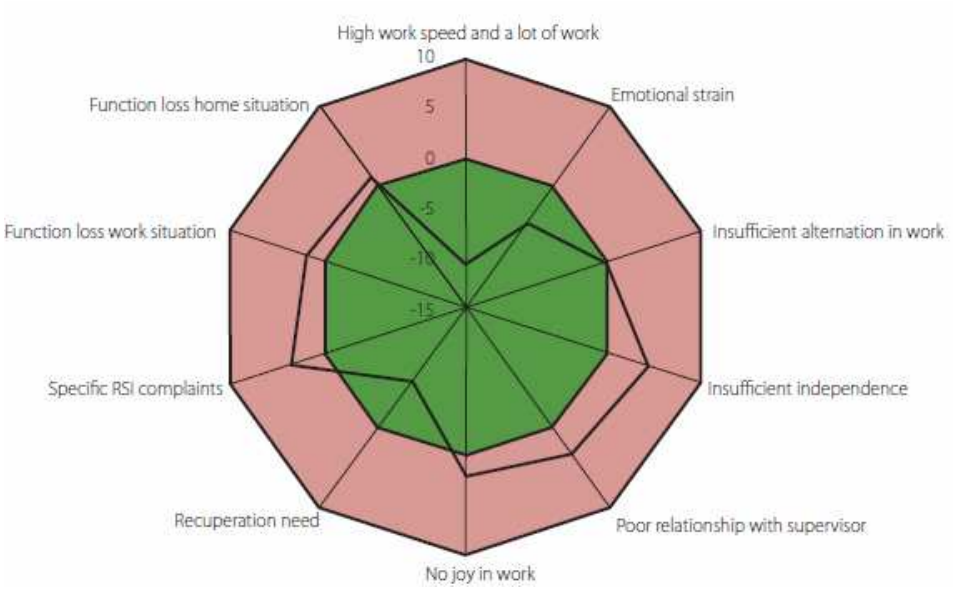


Figure 2. Figure showing the effect of intervention.



Source: Municipality of Delft

Figures 1 and 2 give after results. In these diagrams, the reference group is set on zero. This is indicated by the black line around the green circle. The other black line presents the difference between the examined group and the reference group. If this line falls in the green circle, then the examined group scores favourably compared to the reference group. If the line falls outside the green circle, then the examined group scores unfavourably compared to the reference group. The stars indicate to what extent the score for a specific factor is significant.

The factors on the diagram, starting at the top and then moving clockwise are: high work speed and a lot of work, emotional strain, insufficient alternation in work, insufficient independence, poor relationship with supervisor, no joy in work, recuperation need, specific RSI complaints, function loss work situation, function loss home situation.

Zero measurement

The results from the zero measurement (see Figure 1) show that the examined group scores unfavourably compared to the reference group for all but one factor. Only for the factor 'high work speed and a lot of work' does the examined group score favourably.

Effect measurement

The results from the effect measurement (see Figure 2) show that the effort really paid off. The results for the examined group for most of the factors are much better compared to the reference group than in the previous measurement. Especially for the factors 'high work speed and a lot of work', 'recuperation need' and 'emotional strain' the examined group scores compared favourably to the reference group.

2.6. Further information

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2.7. Transferability

According to the safety and health team manager, there is great potential in making the designers of public spaces responsible not only for their own personnel, but also for the contractors so that these parties also take human factors into account.

3. References, resources:

- http://osha.europa.eu/en/publications/reports/TEWE09001ENC