

# MANAGEMENT OF THE HUMAN RESOURCES CORRELATED TO THE SUSTAINABLE ROAD CONSTRUCTION TECHNOLOGIES

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**Abstract:** This paper aims to present the efficiency of human resources management in the industry of road construction and, therefore in its business market. In order to become useful for human resources activities, the information obtained from the job analysis is presented in a standard form called the job description. The recruitment of human resources must be continuous and systematic even if there are currently no vacancies or if the organization is in a period of reduced activity. Human resources experience and expertise have to be correlated to the technologies applied for the road construction and, therefore one important issue in selecting it should be the fit to the technological phases developed for sustainable road construction. The training of human resources is an extremely important issue in any organization because it contributes to the development of knowledge, skills of the employees and implicitly to organizational efficiency. Unfortunately, in Romania, professional training and development are perceived as absolutely necessary more at the individual level than organizationally. The novelty of this paper consists in the fact that, by statistical data processing, it highlights the efficiency of human resources management from the point of view of training correlated to the knowledge and expertise required by the industry of road construction.

**Keywords:** human resources management, industry of road construction, training of human resources

## 1 INTRODUCTION

The objectives that the human resource management seeks to achieve is to develop and administer various policies and programs to provide capable employees to the administrative

structure [3]. The company leadership must assess the mission and, further development strategies on the long and short terms to be developed and divided into the departments. This is called the cascade method.

With regard to human resources management, this must be done in an anticipatory manner, in the sense that what the firm has set out to do with human resources must anticipate possible problems or difficulties that may arise in the future [8], [6]. Referring to the objectives of the organization, it is stated that they are closely related to the objectives of human resources management [7].

In order to achieve best results by human resource management, it has to envisage future

development correlated to the rest of the organizational processes [4]. Also, the managers and overall strategy of the organization should focus on the dissemination and implementation of human resources guidelines (on selection, training, evaluation, remuneration). One basic model used in HR management is that of Standard Casual Model (Figure 1) that it is applied for the study of relationship between HRM and performance [2].

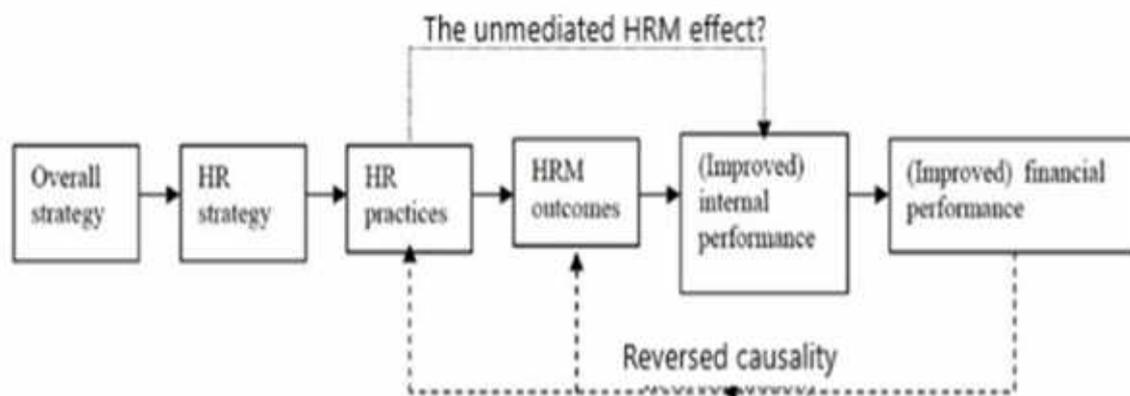


Figure 1. The standard causal model for the relationship between HRM and performance [2]

## 2 DEMAND FOR HUMAN RESOURCES AND ITS SKILLS

As mentioned in [5] „perhaps the principal advantage to construction employers is the flexibility which contracted-out labor forces provide”. Due to this characteristic, it is mentioned Atkinson’s flexible firm model [1] as an approach to HR management and focused on the three types of flexibility mentioned next:

- functional flexibility - multiskilling and ability of the employees to switch between different tasks;
- numerical flexibility - the ability of an organization to expand or contract to cope with fluctuating workload demands through the use of short-term

contracts, subcontracted and outsourced labor;

- financial flexibility - to flexible pay systems based on the local conditions as opposed to nationally negotiated rates.

It is emphasized the unbalanced situations that involve the long-term HR strategy and periodically urgent needs for HR when last minute projects have to be implemented. The challenges of the HR process, specific to the construction company acting on the market are pointed out in Figure 2.

From the point of view of human resources demand, the goal is to determine right skills and abilities necessary to achieve the objectives. This will result into the number and type of human resources required. Further, there is the need

for training the HR, accordingly to their job description and to monitor the training process efficiency (by some key performance indicators, KPIs).

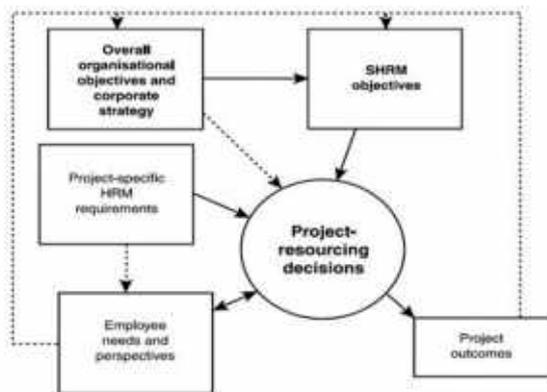


Figure 2. A model of the competing pressures and interdependent functions involved in the resourcing of the project teams [5]

There are several methods for forecasting human resource demand, out of which some are mentioned next.

*Estimated nature:* estimates based on the experience gained by the management group or an expert group. It is divided into management estimation and the Delphi method.

*Mathematical basis:* more complex methods based on external and internal historical information. They can be statistical or modelling.

*Delphi method:* is a procedure to obtain a forecast from a group of experts in some aspects of the phenomenon to be predicted.

### 2.1 The characteristic stages of HR demand

Characteristic stages of human resources demand are evidenced in the followings (Figure 3).

*Anonymous answer:* Participants express their opinions and evaluate themselves on anonymous questionnaires or forms.

*Controlled interaction and feedback:* Participants know the opinions of others at this stage and make new estimates.

*Statistical representation of the group:* The opinion of the group, in the final round, is an aggregation of individual opinions.

### 2.2 Determining the need for human resources and its training

After establishing the need for the number and the qualification of human resource, we will compare it with the current human resources. For which there will be an analysis of current staff (skills inventory) and a forecast of expected changes.

An inventory of skills tries to gather basic information about the company's human resources. In terms of staff changes, some are easy to predict, such as pensions or transfers and promotions, while, on the other hand, such as redundancies, sizes or voluntary redundancies are more difficult to predict.

Correlated to the aspects mentioned above, there is also the need for training HR so that to cope with the technology and the equipment used in roads building.

### 2.3 Phases of human resources management

There are several specific phases of the HR management as mentioned next (Figure 4).

P1. *Administrative:* bureaucratic phase, based on organisation and correlation of work to labour remuneration. The actions to be performed are reactive ones.

P2. *Management:* there are envisaged both social and sociological needs of workers. The actions to be taken are proactive.

P3. *Development:* involves the symbiosis between the needs of workers and the economic needs of the company. People is the key resource for gaining competitive advantage in a company. Thus, it seeks to motivate the workforce to streamline results.

P4. *HR strategic management*: workers become the most important source of competitive advantage.



Figure 3. Stages of HR demand

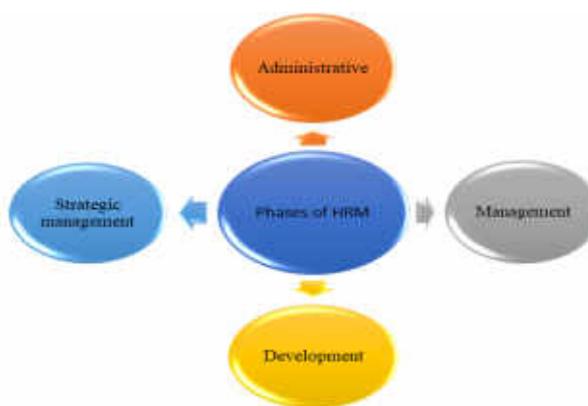


Figure 4. Phases of the human resources management

### 3 TRAINING HUMAN FACTOR IN ROAD CONSTRUCTION

The directors and managers of the companies are practical people, who can make decisions quickly, being, at the same time, very technical. Fast and safe solutions, technical skills, experience, the courage to make prompt decisions, efficiency and hierarchy are capitalized.

Based on the standard casual model (Figure 1) used in HR management, this paper deals with aspects related to human resources practices, more precisely, training in relevant an

appropriate skills, as well as making information easy to access and understand by those who need it. Considering the case study developed for an important “actor” in road construction market (from Romania) there has been conceived a questionnaire for evidencing the need of human resources training. There have been considered both hard skills (ex. basic knowledge on road foundation, operating the drum roller, the road excavator, basic knowledge on geotechnical soil's characteristics) and soft skills (ex. few knowledge on communication, time management and team work) for the employees. The filled in data have been selected

(after ignoring extreme, not relevant answers) and further processed so that, finally, resulted the necessary allocated training time, number and expertise of trainers – all converted into material resources, founded by the company.

The efficiency of human resources training is evaluated by key performance indicators, KPIs, out of which are: training graduation rate; increasing rate of productivity when operating road equipment (drum roller, excavator); cost reduction with labours etc. For the studied case, the KPI was considered the training graduation rate, when the final examination marks are from 1 (very bad) to 10 (excellent). For the soft skills courses, there were 2 trainers and 24 hours allocated for each of the two courses. For the hard skills courses, there were 3 trainers and 30 hours allocated for each of the three courses. The soft skills courses are graduated if the mark is, at least, 6. For the hard skills courses, the graduation mark should be, at least, 7. The number of attenders (workers in road construction company) was estimated at 125 and this study is focused on a sample of 30 (randomly chosen).

Once the training process is over, after graduation, each of the trained labours are further monitored, in post-training evaluation surveys, by: follow-up on the job, sustainability assessment, refresh of knowledge.

For the process of sustainable roads construction, all in situ and laboratory tests do need qualified human resources, while the work in field, most of it, needs people with heavy equipment training license. Also, there are people doing manual and hard work – these do not need any special qualification. Images taken while the road construction process is on, in a village of Romania are presented in figure 5.

The obtained results at the final evaluation, once training being over, for the sample of 30 trained people considered are shown in Table 1.

Statistical data analysis and processing pointed toward a normal distribution with specific values: mean,  $\bar{x} = 6.4$ , and standard deviation,  $s = 2.11073$  - for the soft skills courses and, respectively,  $\bar{x} = 6.83333$ ,  $s = 2.32057$  - for the hard skills courses (Figure 6).

Due to the fact that the sample size is large enough (30), it is assumed that accurate estimation is when extended over the whole size of the studied “population” (125). That is why, for example, probability estimation of “failures” (marks lower than 6 and respectively, 7) could be calculated - using statistical tables for the normal standard variable. As example, the probability of failure for each of the soft and hard courses would be 42.49 % and, respectively, 35.98 %.



Figure 5. Road construction phase images – working with drum roller and excavator

Table 1. Graduation marks at HR training course in road construction

Soft skills Mark range [...]	Mark	Frequency, $n_i$ ( $i = 1, \dots, 4$ )	Hard skills Mark range [...]	Mark	Frequency, $n_i$ ( $i = 1, \dots, 4$ )
1 ÷ 2	1	1	1 ÷ 2	1; 1	2
3 ÷ 4	3; 3; 3; 4	4	3 ÷ 4	3; 4	2
5 ÷ 6	5; 5; 5; 6; 6; 6; 6; 6; 6; 6	10	5 ÷ 6	5; 5; 6; 6; 6; 6; 6; 6; 6	9
7 ÷ 8	7; 7; 7; 7; 8; 8; 8; 8; 8; 8; 8; 8	11	7 ÷ 8	8; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8; 8	11
9 ÷ 10	9; 9; 9; 10	4	9 ÷ 10	9; 9; 9; 9; 10; 10	6
$\sum_{i=1}^4 n_i$		30	$\sum_{i=1}^4 n_i$		30

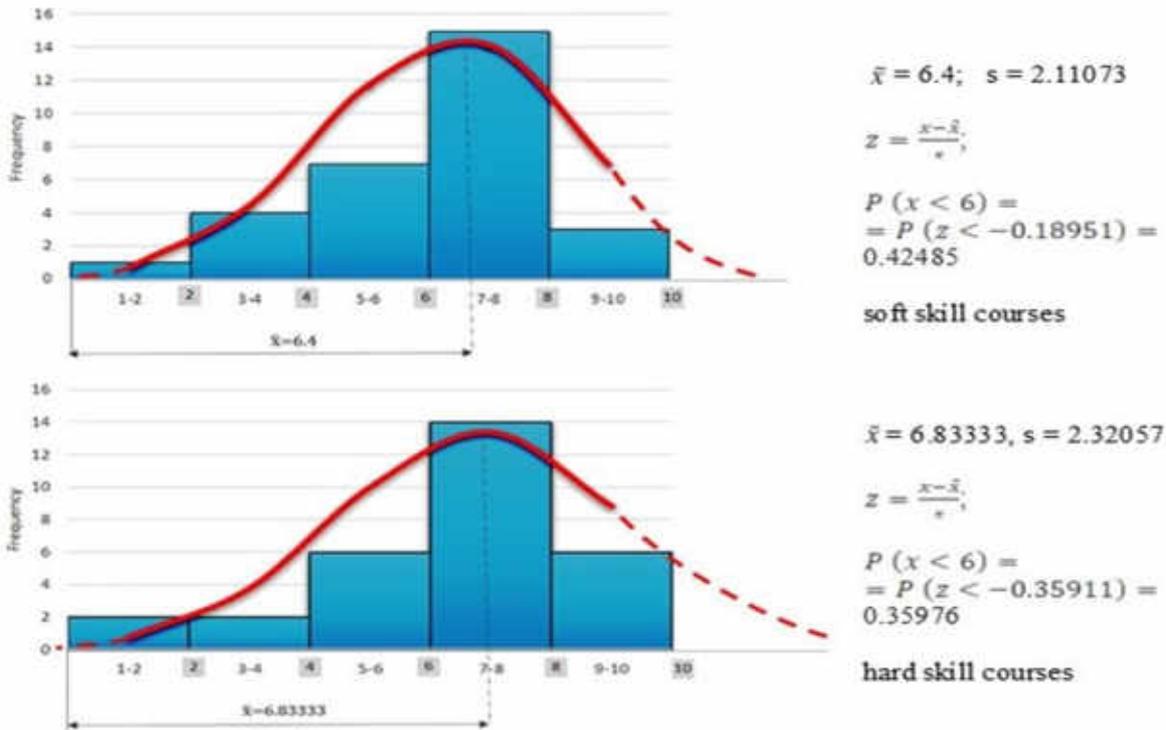


Figure 6 Normal distributions graphs - for the graduation marks

Further, considering all the mentioned stages of post-evaluation survey and also, for example, additional the KPI of cost reduction with labors, the HR management executive, could evaluate the efficiency of considered training courses – reported to the training costs.

For the studied case, the result was a good one, and the training proved to be of benefit.

From the qualitative aspects, the main features of the construction worker that have been synthesized in recent years (2011 – 2019 – available on website) are presented in Table 2.

Table 2 Features of the workers in road construction

Worker Feature	
Good	Bad
<ul style="list-style-type: none"> <li>- The clarity for problem-solving/- Claritatea pentru rezolvarea problemelor</li> <li>- Over 95% are male/Peste 95% sunt bărbați</li> <li>- Low education and low training/Educație și pregătire redusă</li> <li>- Medium or low productivity/Productivitate medie sau scăzută</li> <li>- Solidarity with colleagues/Solidaritate cu colegii</li> <li>- Ability to work in a team/Abilitatea de a lucra în echipă</li> </ul>	<ul style="list-style-type: none"> <li>- A high percentage of workers with alcohol problems/ Un procent ridicat de lucrători cu probleme de alcool</li> <li>- Poor vertical communication/ Comunicare verticală slabă</li> <li>- Risk trend/ Tendință de risc</li> <li>- Low commitment to the company/ Angajament scăzut față de companie</li> </ul>

#### 4 CONCLUSIONS

There is to be assumed that if construction companies have shortcomings in certain key areas of management, they will also have shortcomings in human resource management. In fact, managing the human factor in an organization nowadays is a huge challenge as the human resources stands for the only "resource" that can be continuously improved, that can be reinvented and generate a transformative synergy.

The research results presented in this article stand as the basis for estimation of the efficiency of human resources training courses – when referring to training sustainability and, further, when referring to road construction sustainability, from the point of view of skills and expertise of the human resources. Basically, if the graduation percentage of workers at hard skills training courses exceeds 35%, then it could be assumed that knowledge achieved by courses' attenders stands as background for good work, with less failures and, by extension, the company's costs / investments in trainers and courses to be of benefit.

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