A worker productivity model.

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1. INTRODUCTION

A model with the purpose of explaining the behavior or the productivity of a worker was constructed at the Engineering Institute of the National Autonomous University of Mexico (II-UNAM). The objectives of this work are:

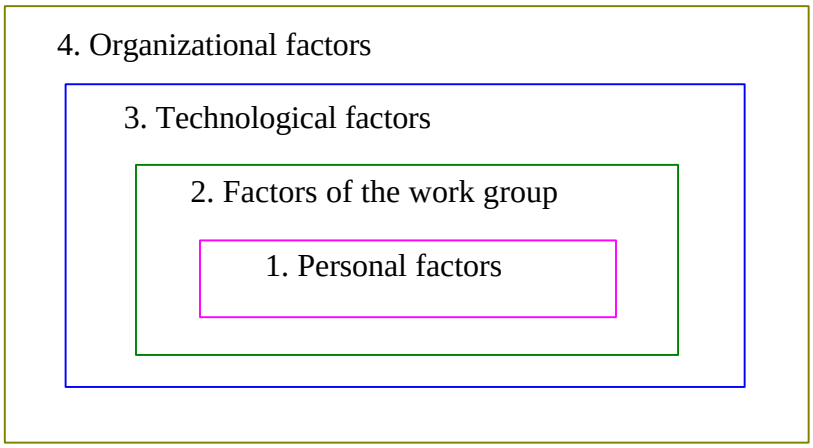
- To obtain a clear causal model that identifies in a simple manner how certain factors relate to yield a productivity level.
- To have a model that can be used to simulate the response of the productivity of a worker to different actions. This would help companies in diagnosing the quality of their treatment of human resources and in designing new policies to improve that treatment.
- To have a model which helps managers, directors and supervisors in learning the impact of their decisions on the complex phenomenon of the productivity of a worker.

In 1978 James C. Hershauer and William A. Ruch (Hershauer and Ruch, 1978) developed at the Arizona State University, a similar model to illustrate the way in which certain factors interact to achieve the productivity level of a worker. This model was considered a novelty and was cited in a good number of publications about productivity.

Hershauer and Ruch reported that the model was used at Lincoln Electric as a training tool for supervisors at the production lines and it proved to be valuable in explaining the complexity of the relations that lead to the level of productivity of a worker. In spite of this, the model was never traduced into a program, nor was it used for simulation. The authors considered impossible to measure the factors of human behavior and business management in a quantitative manner in order to feed a simulator.

The model developed at II-UNAM takes into account four levels of influence to the productivity of a worker:

1. Personal factors
2. Factors of the work team
3. Technological factors
4. Organizational factors



2. BASIS OF THE PROPOSED MODEL

The proposed model considers ten factors that influence the productivity of a worker. They are located inside the four levels of the picture above.

2.1 Personal factors

Responsibility

Responsibility consists on the compromise of the worker to the execution of the tasks he/she is responsible for. It is a complex psychological process which's result depends on the attitude of the worker and on several external factors that influence the worker's satisfaction.

Learning capacity

It refers to the abilities possessed by the worker to learn and to use his/her knowledge to perform the tasks he/she carries out. It is linked to the education level and to the willingness to learn.

Satisfaction

Satisfaction is a factor which motivates the unlimited display of responsibility and learning capacity of a worker. It is a complex factor which synthesizes several factors generated in the three levels of factors that are above the personal factors.

2.2 Factors of the work group

Leadership

It refers to the immediate superior or manager of the worker. The supervisor's appropriate leadership allows the creation of an adequate working atmosphere within the work group. The leadership abilities of the supervisor are a crucial element in increasing the worker's satisfaction.

Work team organization

Good relationships and organization within the work team allow an adequate balance of the effort and makes possible a positive motivation of each member of the team.

2.3 Technological factors

Training

It refers to the continuous effort to improve the abilities and knowledge of the worker.

Working methods

This factor refers to the characteristics of the productive processes that the worker performs: safety, comfort, required physical effort, etc.

2.4 Organizational factors

Qualitative incentives

It refers to the non-monetary incentives that allow to increase the worker's satisfaction: rewards, honors, social activities, etc.

Quantitative incentives

This factor is about the monetary incentives that the worker receives according to the productivity achieved by him/her and his/her work group.

Productivity indicators

An adequate measurement of the worker's productivity is a relevant factor for the definition of incentives and, consequently for the worker's satisfaction. Also, good productivity indicators give the worker an important feedback on his/her performance.

3. DEVELOPMENT OF THE MODEL

The development of the model consists on two stages. In the first stage, the dynamic model is constructed based on the causal cycles developed for each factor and each level of factors. Based on those causal cycles the dynamic diagram with 10 level or accumulation variables was built.

All the level or accumulation variables have an initial value of one that corresponds to an index.

Simulation runs were performed in order to adjust the behavior of the model.

The second stage consists on using the model at different companies with the purpose of adjusting the values assigned to several auxiliary variables.

4. CONCLUSIONS

The main differences between this new model and the Hershauer and Ruch model are:

- The new model presents the 10 productivity factors grouped in fourth levels or subsystems. This fact facilitates the comprehension of the model.
- The Hershauer and Ruch model was only a conceptual model; it was not programmed as a dynamic model. The new model was developed and programmed in Powersim software.
- Therefore, the new model can be tried and adjusted with enterprises results associated to work productivity improvements. At present, the new model is being tried by two enterprises.

Back to the Top