Professional Technical Evaluation of Workers for their Incorporation in the Industry 4.0

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Abstract: At present the global and economically volatile world there is a set new requirements for the acquisition of new workers who are able to share professionally skilled work for progressive European manufacturing companies. For their degree of automation, the condition of effective skills and skills of workers is very important. In attracting workers from other countries outside of Slovakia is the condition of professional quality and technical skill still primordial. Technical skill is to be understood as the conditions and quality of the technical observation of the worker's growth from the introduction to the work process to the complex working activity in the process chain [2].Creating significant limits for worker selection often precedes the verbal observation of the environment that was given to him to realize his own implementation into the working environment. The solution is the renewal of the three-part education with the technical output of observing the skill level of the worker. The paper presents the idea of possible technical solutions for observing the status of technical excellence of workers in automated and semi-automated manufacturing corporation.

***Keywords**: evaluation, technical skill, model performance, identification, employment act*

1. Work habits and skills of job-seeker

Employee self-consciousness itself needs to be built on work and not only to engage in work. Professional training of work staff shows on the adequate realization to operate the complex technical systems, prone on automated technical control. Because of this awareness, educational models are created for workers that can be used to test for engineering work so that the employee does not feel the job insecurity of preserving work that is important to an enterprise. Therefore, the systematic educational pressure is the result of our workforce being stimulated to work and creating habits that make the work process more visible through their

own skills. The complexities of technical skills are identifiable for workers from other countries where they are missing or their differences in work habits differ. It is necessary to understand that at the moment of the occurrence of bad habits that may have an impact on profit, another aspect of work must be created in order to preserve the balance in the working environment [3][9][10].

The idea of a three-tier education (three-tier means the process-based educational and technical growth of a secondary technical force with a view to the development of engineering forces demanded by newly created technical action enterprises) aims to create an area in which the selected worker learns to understand the technical habits for a specific area of production . The area in which a worker learns to understand the importance of individual work in the construction of the entire corporate order has a range of individual work activities. Such a worker creates incentives to develop individual abilities and habits and will provide the necessary impulses for willingness to work. The willingness to work for a given company can ignite the actual relationships that will create a worker who is able to regulate his / her rights to all other workers where he / she needs to know a series of social habits. One should think that such relationships create a willingness to work [11][12][13].

2. Performance evaluation workers with implications for environmental workload

The long-term viability and competitiveness of any work institution depends on its ability to effectively evaluate employees and examine their ability to achieve the desired goals assigned to their managers. Therefore, it is necessary to be able to evaluate the performance of employees, which is always important when entering management tasks [5]. Employee assessment is also a valuable tool and an indispensable element in the functioning of any company. Ratings that managers use as an incentive tool for the expected performance of employees give them feedback. The evaluation process is also the ability to identify exact employee work for improvement needs. The evaluation provides opportunities for recognition, positive reinforcement and improved employee performance. Performance models can be presented in the form of employee outputs to evaluate the quality achieved in a specific product creation [12].

There are many models and procedures for staff performance ratings that are described in h professional journals. Many of them describe performance from different perspectives. As a practical example of the Employee Performance Assessment Model, it can be used for employee review. On the other hand, new workers provide this additional information to support and complement the practical model for its improvement [1][4].

Employee performance quantifies the level of achievement of the goals. This should be a definition for managers and other employees who are responsible for the achievement of the objectives in accordance with the organizational regulations and standards of the fund. [7][9].

Evaluation of employees in organizations has two general tasks:

- Administrative decisions on employees (compensation, promotion, dismissal, reduction, etc.).
- Identify and plan oportunities for the employee growth (identify strenghts and weakness, or area for growth, develop careeer etc.).

Employee Performance Assessment is part of Performance Management, which consists of the following five activities[7]:

1. Setting performance and development goals,
2. Providing continuous feedback and recognition,
3. Employee development management,
4. Perform mid-year and end-of-year assessments.

Employee performance models can use methods that classify them as individual assessment methods, multiple ratings, and methods based on individual and multi-person ratings. These include performance tests [9][10].

Subjective assessments are about evaluating the performance model itself, which consists of steps such as measuring actual performance, analyzing measured data, interpreting the results of analyzes, and returning these results to improving current performance and target stage model. Evaluation of the performance model itself consists of five steps: preparation, measurement, analysis, interpretation and feedback. Effective and fair performance evaluation is a process based on key building blocks that include an agreed set of competencies, accurate declaration of responsibilities and consistent standards of practice [14].

The first component in the evaluation process is competence, which is a set of complementary skills, knowledge and attitudes that enable the employee to perform the job. Competence is the use of the knowledge and skills necessary to perform the work. The expected level of competence of the individual employees is determined by their profession, the role of their manager, management body and the responsibility of their department within the organization [8][15].

The second part of the evaluation process is practice standards, also known as performance expectations. The standard is a description of the competent level of performance for a particular employee's duty. Practical standards are necessary to reduce subjectivity in the performance of the evaluation process. Each standard contains measurement criteria. The standard to be fulfilled by these criteria must be met. Working standards that are left over during working hours may be revised

more frequently to reflect progress in working arrangements and practice. These standards often talk about what is to be done and what the working time (normo-hour) should be done. Obligations that are brief and clear list of the essential elements of the tasks or areas of work done for a given position are performed according to standards. Statement of duties speaks of what is to be done, not how it is to be done and describes the employee's expected working behavior. Work operations are listed in order of importance [8]. The model is identified in the MATLAB program environment [16][17].

Heuristic model of worker efficiency:

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Relation of the worker's burden to solving technical problems
is their skill: "workload (x) - resistance (y)".

N=[1:1:20], order of gradual observation of worker's activity,

Relation: "Workload (x) - Resistance (s)".

N=[1:1:20]; the order of progressive adjustment of the
workload of the worker presented with the probability of
success of the solved tasks according to the work standard
(performance of the task),

x=[1.87 2.02 1.92 2.15 1.9 2.04 2 1.88 2.08 2.13 1.86 2 1.94
1.79 2.06 2.1 1.96 1.12 2.06 2.14];

y=[3.28 3.06 3.42 3.36 3 3.2 3.08 3.02 3.4 3.3 3.13 3.4 3 3.41
3.02 3 3.12 3.2 3.08 3.5];

Rank (N) of determined workload values (x) [bar], resistance
estimate (s) [bar].

[N;x;y],

According to the data x, y, and commands in the Matlab
environment, we find distributive functions (F) and
probability density (f) of the file.

Fxcdf=cdfplot(x), the experimental distribution function (eF)
of the file,

[h,stats] = cdfplot(x), Statistical data eF.

xnorm=norm(1.951,0.2210), view eF normal distribution,

[f,xf]=ecdf(xnorm),

xx=linspace(1.12,2.15,100); the smallest, the largest data in
the file, the number of displayed checkpoints.

FXX=normcdf(xx,1.9510,0.2210); expression of eF by normal
distribution,
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```
n=1:1:100; number of points displayed for standard.F;

plot(n,FXX,'k'),

hold on,

Set function f:

fXX=normpdf(xx,1.951,0.2210);  show  the  normal  probability
density.

plot(n,fXX,'k+'),

Y - resistance.

y=[3.28 3.06 3.42 3.36 3 3.2 3.08 3.02 3.4 3.3 3.13 3.4 3 3.41
3.02 3 3.12 3.2 3.08 3.5];

Fycdf=cdfplot(y), an experimental distribution function of a
worker's resilience file,

[h,stats] = cdfplot(y), statistical data of the experimental
distribution function.

ynorm=norm(3.1990,0.170),    cdfplot    view    (s)    normal
distribution.

[f,yf]=ecdf(ynorm),

yy=linspace(3,3.5,100);

FYY=normcdf(yy,3.1990,0.170);

plot(n,FYY,'r'),

hold on,

Density  of  probability  of  worker's  resistance  at  specified
workload.

fYY=normpdf(yy,3.199,0.17);

plot(n,fYY,'r+'),

xlabel(' Number of displayed argument points F,f'),

ylabel( 'Value distribution of F, f, workload resistance, the
worker'),

hold off,
```

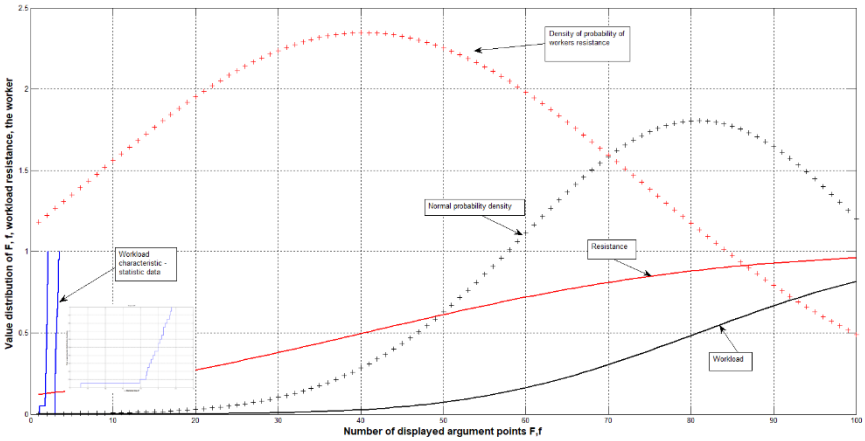

Figure 1

The statistical reciprocity: workload - resistance

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Workload - Resistance. Condition: Y >X.

plot(n,(fYY-fXX),'g+'),

hold on,

xlabel('Number of observed inspection points of the observed
technical system Workload - resistance'),

ylabel(' difference: workload - resistance),

hold off,
```

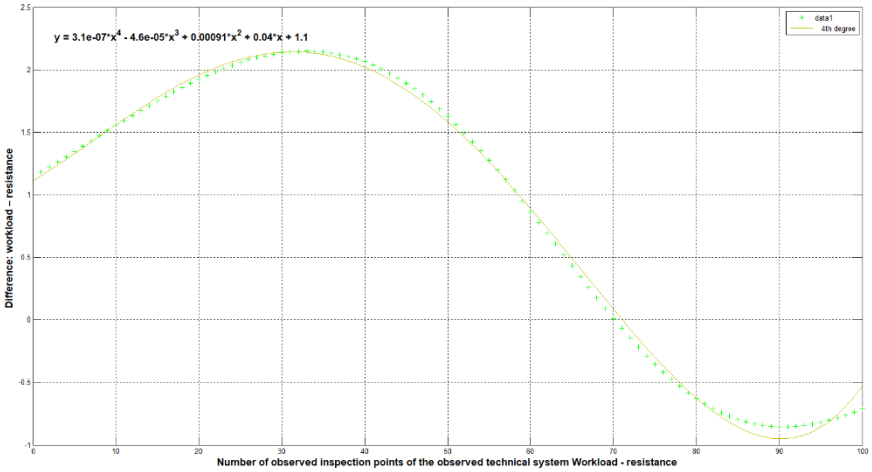

Figure 2

The evaluation of the worker workload by operating a technical device

In this case, it is possible to predict the possibility of loading a worker in the technical equipment to check the state of the complex systems with a specified erudition rate (completed training) and the condition: Y > X.

Ignoring the condition requires a worker's quality control, which implies the spending of funds for the company. For this reason, it is possible to set simulation conditions in a company environment that is willing to employ workers from other countries and evaluate their technical skills. The number of performed actions can be seen in their success in the work process, where it is possible to determine with precision the data that will a priori prove that the given person can handle the technical work [3][1][1].

Conclusions

Slovakia companies has the potential to leave two components in the EU, namely a component of precision and technical skills. Such a development can not only be seen from the past but developed into concrete conclusions that are already recognized by Europe today. The unequivocal need of technicians is mainly due to the current need to put in place accurate, efficient work in companies of major importance with market enforceability. Their technical skills are observed and often not fulfilling the exact question but quantitative work operations. Obviously, by introducing new methods into technical practice, it will also require the establishment of upper and lower technical limits of skill for recruiting workers from other countries outside Slovakia. Their output may be a routine of work when it is possible to learn many tasks without understanding the continuous processes. Colliding technical skills and technological awareness activities can result in the imperfections and also a decrease in fusing safety. In figure 1 is a visible heuristic model of operations without a higher potential technical skill, where in a non-varied work there is a drop in technical skill in 35 different operations. The model was applied to technical operations in the aircraft components and components construction of a small aircraft manufacturing plant. This model shows only a multilevel character of the decline in skill. In addressing the correctness and technical accountability that may be high in the aeronautical industry requires that aeronautical workers go through minimum technical three-part training in aeronautical engineering. These problems can be avoided in a step-by-step selection of tasks by identifying their demanding technical application. It is also the intention of further research of assigning workers to intelligent smart factories.

References

[1] Fekete, M., Rozenberg, I.: The practical model of employee performance evaluation, 2014,Portorož , Slovenia.

[2] Stefanska, R.: Subjcive discrimination Warsaw University Centre of Migration Research
[3] Eonomicka univerzita v Bratislave, Fakulta medzinárodných vztahov, 2016 zbornik z workshopu
[4] Huang,J.L.,Ryan, A.,M., Zabel, K.L.: Personality and adaptive at work, meta analyticInvestigation, Journal of Applied Psychology © 2013 American Psychological Association, 2014, Vol. 99, No. 1,162–179 0021-9010/14/$12.00 DOI: 10.1037/a0034285
[5] Migration Advisory Committee Full Report July 2014
[6] Ekonomika práce, Československý výzkumný ústav práce a sociálnych vecí, 1989, Cornellova univerzita,
[7] Okalí, I.: Ekonomika Slovenska na začiatku transformačného procesu, Slovak Academic Press, 1992
[8] Stanek, V., Krausová, A.: Transformácia sociálnej sféry v Slovenskej Republike: nezamestnanosť sociálna práca, ISBN 8088848164
[9] Štefančík,R., Lenč, J.: Mladí migranti v slovenskej spoločnosti: Medzinárodná migrácia, moslimovia, štát a verejná mienka, ISBN 8026303113
[10] European Commission. Directorate-General Communication: Migrácia a azyl: budovanie otvorenej a bezpečnej Európy, ISBN 9279241567
[11] Csámpai,O., Haládik, J: Medzinárodná migrácia: (sociálny problém a bezpečnostné riziko), Akadémia policajného zboru, 2002, ISBN 8080542309, 9788080542306
[12] Stanek, V., Krausová, A.: Transformácia sociálnej sféry v Slovenskej Republike: nezamestnanosť sociálna práca, ISBN 8088848164
[13] Kozár, F. Zeman: Otázky vývoja zamestnanosti v ČSSR a osobitne na Slovensku, VPL, t. Pravda, 1968
[14] Steiner, R.: Schopnosť pracovať, ochota pracovať a trojčlenný sociálnyorganizmus.Uverejnenénainternete http://referaty.aktuality.sk/diagnostika-pohybovych-zrucnosti/referat-24780
[15] Ekonomická fakulta TU KE: Podoby regionálneho a miestneho rozvoja, ISBN 8055301174
[16] Duleba, A.: Ukrajina a Slovensko: geopolitické charakteristiky vývinu a medzinárodné postavenie Ukrajiny; implikácie pre Slovensko, Veda, 2000, ISBN 8022406562
[17] Jurečková, J.: Slovenská spoločnosť pre zahraničnú politiku: Slovenská republika: štúdia o životnej úrovni, zamestnanosti a trhu práce, ISBN 8096815547