THE RESIZING OF ERGONOMIC RELIABILITY WITHIN HUMAN CAPITAL -TECHNOLOGY INTERACTION SYSTEMS

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ABSTRACT

In the increasing resizing of work systems complexity context the need to optimize the relationship between human capital and technology, located in a state of perpetual evolution, is being highly revealed.

As ergonomics was determined by technology, within a reactive approach to systems design interacting with human factor, in the future ergonomics should determine the evolutionary trend of technology, with the emphasis on the proactive approach towards design. In this respect it is being shown the purpose of engineering towards reshaping the natural world in terms of protecting human needs.

Therefore, the human capital-technology relationship substance materializes in promoting a holistic approach, focusing on human factors, leading to increased efficiency, productivity, performance and overall human welfare and not least on increasing the quality of life.

KEYWORDS: *ergonomic reliability, work systems, human capital, the evolutionary trend of technology, quality of life.*

Taking into account **the upward trend of promoting the need to protect human capital at work**, it is being shown on the same line the need to educate the organization's management and in particular the human operators, especially in the purpose of **optimizing the cost-benefit report of human capital-technology interaction**.

In this respect it must be primarily designed a paradigm of instruction of beneficial effects of **the compliance with ergonomic principles at work** and the methods and techniques for optimizing the human-technology interaction, that should adapt to the scientific standards established to focus on development in the field, in order to integrate theory, experience, design and practice.

Educating the human operators of automated systems and improving their abilities in the purpose of preparing to conduct, in optimal conditions, their role in the work environment has an **immediately beneficial effect to reduce or even eliminate the risks of human error.**

All this, given the fact that, it is being recognized at an international level the approach under which: **highly qualified human factor possesses a great degree of information and skills related to one or more specific areas of application of**

ergonomic nature. Therefore, educational ergonomics shows tendencies to become a prerequisite for implementing a coherent and competent ergonomic work organization.

The necessary purposes of ergonomic culture may be revealed also schematically as in Figure 1.

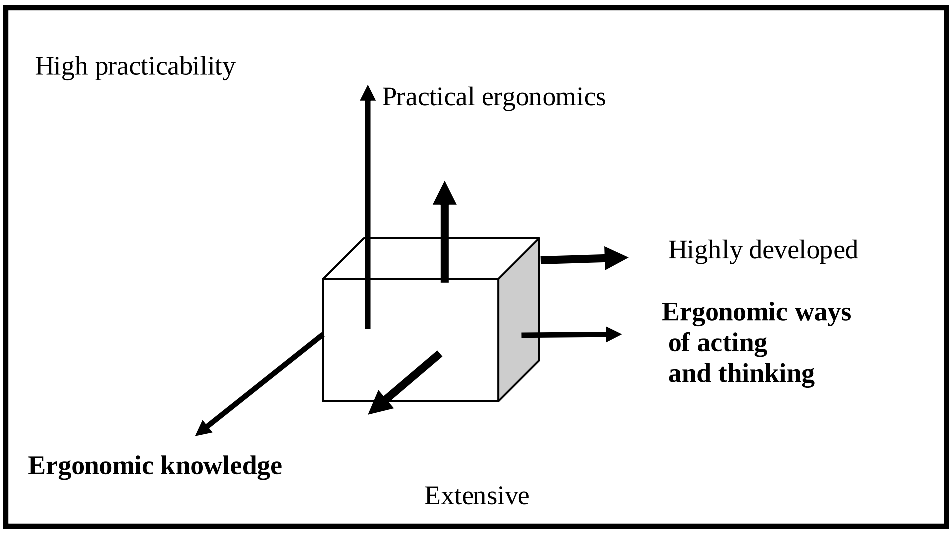

Figure 1 Desired purposes for ergonomic culture

It can be observed that **the advanced technology**, with which human capital interacts, in contemporary times, **is creating complex systems that presume promoting a high degree of integration at human resources management level** and also at system design level, the essential role of human capital within efficiently and effectively touching the organization's purposes, is being underlined.

From **the need for growth of ergonomic viability of existing human capital-technology interaction systems** and from the need of providing a favorable context for design of new systems in order to reduce and even eliminate the likelihood of human error and technological occurrence risk, it is initially imposed the assessment of human resources existing required conditions of work in the organization, the degree of **involvement of human factor in decision making** on the work systems modernization and automation assessment and last but not least assessing the usefulness of new systems to identify problems and difficulties arising in using the components of complex systems, such as we have shown in Figure 2, proposing a system that promotes human capital-technology interaction in reliability and safety conditions.

Using this system within human operators work program, we emphasize, in terms of human factor environmental work conditions assessment, the distinguish, as a central pillar of the ergonomic human-technology interaction system reliability dimensioning, of **optimizing life quality** by reducing the percentage of professional accidents and by simplifying the access, **in terms of health and safety**, of using both semi-computerized systems components and fully-computerized systems components. In this way it is being promoted the mix of factors within the organization assessment: anthropometric factors, biomechanical and psychological factors relating to the position (standing or sitting), factors related to manual materials handling (lifting, tracking, pushing, pulling weights), factors related to the design of tasks and jobs, factors related to information and control tasks and last but not least, the environmental factors. An increased accuracy coefficient of data derived from viability assessment and proposed optimization sizing of complex work systems can be provided by the involvement of human element in this process.

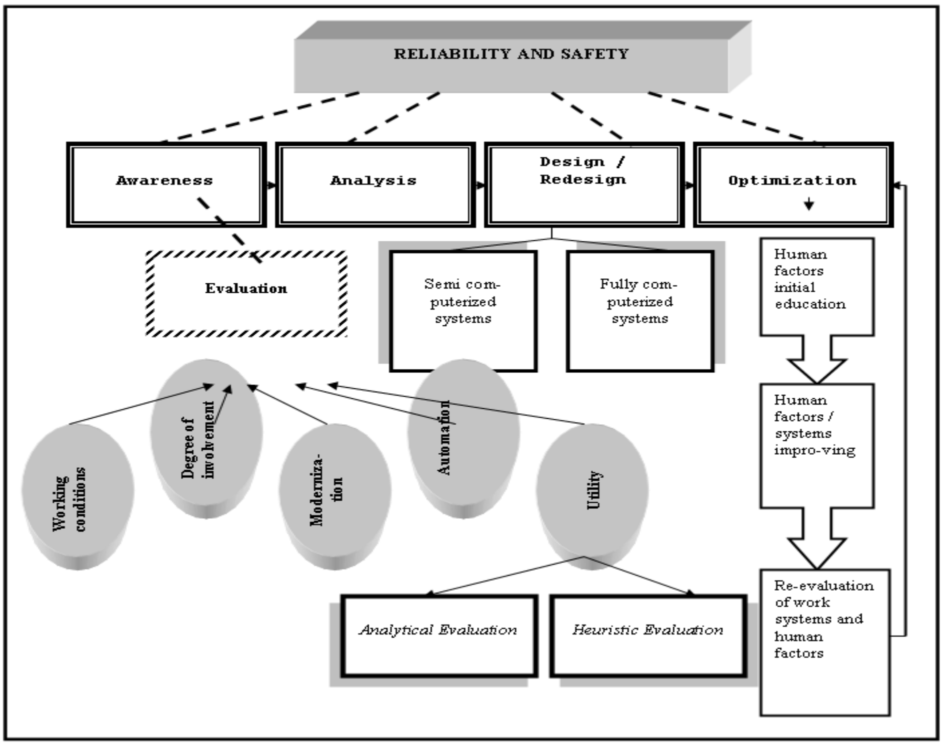

Figure 2 Human capital-technology interaction system in conditions of reliability and safety

In this regard, **consultation with users is almost a conventional wisdom among practitioners of human capital-technology interaction**. However, the validity and reliability of techniques used in consultation with users are questionable. Focus groups, for example, are sensitive to a confusing number of factors: how would the results of a group, which can depend on the assessment made by a person who is leader of the group be and how the questions or topics chosen for discussion would be. Because the researcher is also part of the group, its interests, lack of attention, sensitivity to build language and other forms of nonverbal communication can influence the outcome. Focus groups have the advantage that it **offers troubleshooting problems and difficulties in identifying the user**, which would be harder and more expensive to be investigated by observation. Multiple users at the same time can summarize experience in computing, over longer periods of time. Moreover, some problems may occur less frequently and can be easily omitted during a shorter period of observation. Progress can be seen in the deployment of stress and utility, valid and reliable measurement scales, which adopts a pragmatic approach to their work focusing on design rather than on cognitive theories.

Thus, in this context, we appreciate that the utility can be considered as a product that can be used by human factors in order to achieve specified goals with effectiveness, efficiency and satisfaction in a specific use, **effectiveness** referring to accuracy and completeness with which users achieve specified goals, **efficiency** referring to the extensive resources in relation to the accuracy and completeness with which users achieve goals and **satisfaction** referring to comfort and acceptability of the use and evaluation.

We can thus draw the conclusion that utility assessments are performed to identify the inherent problems and difficulties appearing within the complex semi-computerized and fully-computerized systems usage of human resources-technology interaction. It is imperative to mention that, in this view, the specialty doctrine underlines two main categories of utility methods: **analytical evaluation and heuristic evaluation** (or assessment based on use).

Therefore, analytical assessments, also called utility inspection methods, fit assessment by a professional analyst, such as an expert in utility, involving testing: testing the usefulness, user involvement in design, thinking aloud and: questionnaires and interviews. At the other evaluations end, heuristic evaluation fits a set of design rules or objectives that are used to assess a human capital-system computerized interface. They are made in most cases, at a high level, with abstract objectives and depend on the design in order to determine how each objective can be implemented by the interface design.

The human operator's performance, in terms of those stated above, tends to be a result of compatibility matching between individual human characteristics (capabilities and limitations), and technology and environment requirements. Quality of life and performance of work are affected by positive and negative results matching complex relationship compatibility between human operators, technology and environment. **Positive results** include such measures as **labor productivity, performance, product quality and desired results** subjective psychological, behavioral outcomes such as **job satisfaction, employee morale, human wellbeing, and commitment**. **Negative results** include **human error and system failure, loss of productivity, low quality, accidents, injury**, and claim subjective physiological and psychological behavior undesirable results, such as **dissatisfaction at work, occupational stress and discomfort**.

Whilst, it can highlight such as the harmonious blending of all elements of the workplace in a whole are reflected in the rational organization of the workplace. For this it is necessary to examine correlations between these factors and the influence that various factors exert on the organization of production of all, concerned to remove any deficiencies and improve the elements involved in the process of production.

For this purpose, **the objectives of increasing labor productivity must increase reliability concerns for sizing systems ergonomic human-technology interaction**, which is in the current context, one of the most important factors for **raising economic efficiency** and the largest pool of production that exists in latent phase. At the same time, the materialization of these objectives in business and organization management at the level of human operators is facilitated by the created company, in which the role of human factor increases, as people, in their double as producers and owners of the means of production, have a new attitude towards work, from which they become active participants in the process of production and continuous improvement of forms and methods of its organization, as well as in the design, implementation, evaluation and optimization of semi-computerized and fully-computerized working systems.

At the same time, failure to successfully applying the principles in the design of the workplace has consequences for both the system and the human resource. Working systems can become less effective over time, while individuals may suffer health problems such as physical and psychological stress. **The successful application of ergonomic principles** can improve efficiency and productivity as a primary way to reduce work-related health and safety possible risks. This is essentially achieved by reducing and eliminating the opportunities for working operators making uncorrected mistakes within the system, while maintaining the necessary degree of control system errors in the event of their occurrence.

Thus, when existing systems are upgraded, the requirements are already known by human operators and only the parameter value should be changed, the distribution of functions between operators and machines can help determine the level of automation made in the system. The purpose of the allocation function is **the design of complex systems** within which the operator performance are achievable and appropriate for the role of operator and the system development is technically and economically feasible.

Clearly well-designed computer systems can record a productivity and savings if used correct.

The objective and continuous growth of employment complexity in terms of modern production caused not only a new approach to issues of human capital but also a new vision of human-technology interaction factor itself. In this context optimize human resource action at work is largely conditioned by how it is understood the essence of its action, its technology context in which it is being experienced to analyze and to implement it.

In conclusion, for properly dimensioning the ergonomic reliability of human capital -technology interaction systems we need to reconsider how to look, think, understand and act within organized work forms.

The vision should not be anymore technical, economical or physiological, but a new vision, in which nor the equipment, human factor and neither the work is viewed as isolated entities, but as forming a **complex ergonomic work system in terms of reliability and safety**.

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