

INTEGRATION OF MANAGEMENT SYSTEMS IN TERMS OF OPTIMIZATION OF WORKPLACE HUMAN PERFORMANCE

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Abstract. *In this paper the influence of technical and technological changes on workplace requirements, potential danger factors and workplace human performance is presented. Elements and procedure for workplace risk management as well as the general framework for occupational safety and health management system are described. The process approach for integration of Quality Management System (QMS), Risk Management System (RMS) and Occupational Safety and Health Management System (OSHMS) in terms of the optimization of workplace human performance is presented.*

Key words: *Workplace, occupational risk, risk management, integrated management systems.*

1. INTRODUCTION

Technological development is a result of a number of technological changes in goods production methods and service offering, the changes themselves being the result of the application of the newly-acquired knowledge. Technological changes can be classified into a number of technological revolutions on the basis of the criteria considered dominant in the technological development. Some authors regard the relationship between man and technology in the production process as the criterion; some other – the process of the complex revolution of production means still others – the use of knowledge. Taking into account the use-of-knowledge criterion, P.F.Druker distinguishes three phases of technical and technological (but also economic and social) changes:

- industrial revolution (or the first technological revolution) – application of knowledge to tools, processes, products;
- productivity revolution (or the second technological revolution) – the application of knowledge to work;
- management revolution (or the third technological revolution) – the application of knowledge to knowledge itself

Technological changes are reflected on the workplace system as well: on one hand, working means and objects, technology, man's working activity structure change; on the other hand, the structure, goals and the firm organization and the society as a whole change (Savić, 2001). This leads to new requirements as far as workplace human performance is concerned. These requirements include (Genaidy, 2000):

- the shift in workforce needs from lower (e.g. adequate and fair pay system and work benefits) to higher (e.g. participation in decision-making, recognition) needs;
- the emphasis on cognitive, organizational, social and technical demands of work as opposed to the traditional physical task demands and physical environment conditions;
- the need for macro-tools in addition to the traditional emphasis on micro tools to assess organizational health (e.g. work productivity, health and safety, output quality);
- the study of interrelationships among quality of work life, work productivity, and output quality to optimize organizational health;
- the inclusion of workplace human performance within the context of work processes and systems;
- the shift in work design principles from job level to job, process, and work system levels.

The paper presents a general frameworks for workplace risk management and occupational safety and health management in terms of optimization of workplace human performance.

2. WORKPLACE HUMAN PERFORMANCE

The first technological revolution changed the general craftsmanship approach to a specialized one, Fig. 1, (Genaidy, 2000). Technological advances, education, government regulations, Hawthorne studies and theory of hierarchy of needs resulted in a new approach characterized by separate and specialized movements.

Each movement dealt with only one facet of workplace human performance (e.g. work satisfaction). The separate improvement efforts did not consider the interrelationships among the quality of work life, work productivity, and output quality. In recent years, many of the separate movements started to realize the disappointing results associated with their own efforts when measured in terms of their contribution to organizational performance because:

- the human performance measures are influenced by a common set of work factors;
- an interrelationship exists among quality of work life, work productivity and output quality;
- the economy poses new challenges which require integration of different resources in the work system.

The Ergonomic Compatibility and the Work System Compatibility Theories serve as general frameworks to advance this progress in human performance optimization.

Ergonomic Compatibility is defined as degradation of ergonomic system in terms of the system's inefficiency and associated human losses (Karwowski, 1991). Altering interactions among human, machines, environmental subsystems could reduce it.

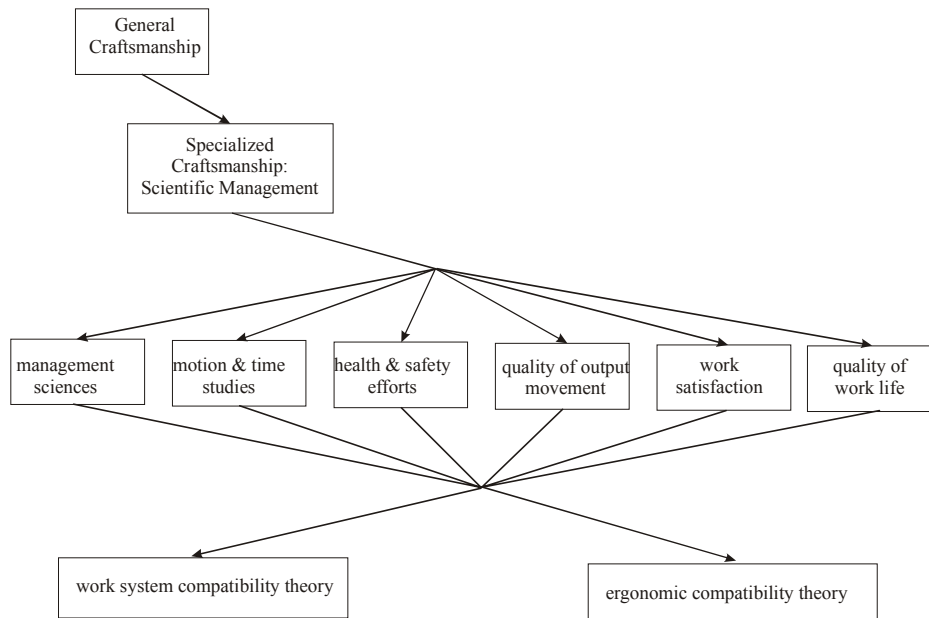


Fig. 1. Past, present and future efforts in optimizing workplace human performance

The Work System Compatibility is defined as the degree of balance achieved in the work system resulting in the matching of energy expenditure and replacement forces (Genaidy et al, 2000).

The Work System Compatibility Theory integrates many of the previous efforts in the different fields of human performance and adds new principles:

- work factors are "forces" acting upon the worker to transform an input to an output;
- work factors influence the human performance into three levels job, process and organization.

3. MANAGEMENT SYSTEMS OF WORKPLACE HUMAN PERFORMANS

Management of workplace human perfomans should provide the required performance quality. However, as each workplace involves reisk, it is necessary that the management system of workplace human performance quality should be supported by workplace risk management system and occupational safety and health management system.

3.1. Workplace Risk Management System

Risk management is an aspect of quality management wich has a supporting role in the required quality achievement. The crucial aim of quality management is such implementation of strategic management plan wich ensures the required system quality, whereas the aim of risk management is the retention of the system quality in case of possible risk ocurence (Vauglan, 1997).

The elements of risk management process: risk assessment, risk control and performance monitoring are shown in Figure 2 (Draft, 1996; Savić, 2001). Illustration of workplace risk management which involves potential factors of occupational risk is shown in Figure 3 (Dahlke and Grzybowski, 2000).

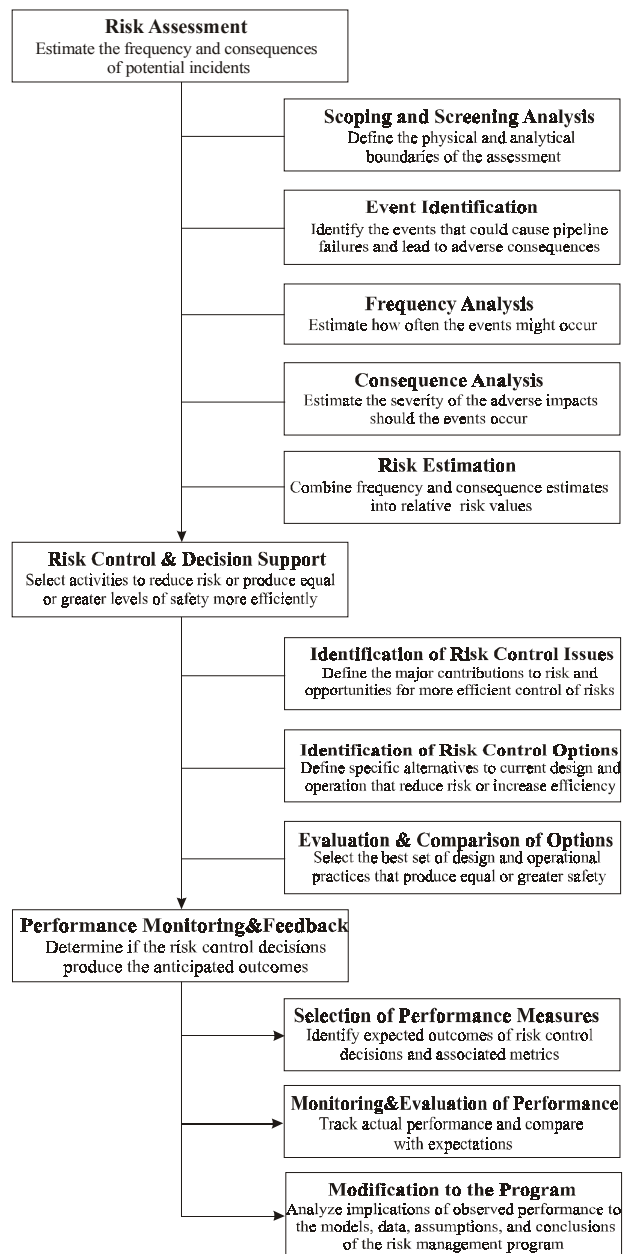


Fig. 2. The risk management process elements

Taking into account the fact that:

- no workplace is risk free (every workplace involves risk),
- workplace risk depends on a large number of factors,
- workplace risk should be regarded in terms of the working process and firm organization,

workplace risk management has to be based on systems analysis and systems approach.

Such an approach operates on the assumptions that (Dahlke and Grzybowski, 2000):

- it is better to anticipate and prevent health and safety problems than deal with consequences of maintaining workplaces at which conditions do not reflect employee competencies, needs and aspirations;
- most accidents and occupational diseases can be prevented by eliminating workplace risks;
- improvements in working conditions reduce accident costs for employers and for the society at large;
- occupational safety is vital for every employee
- their awareness must be raised by developing an appropriate safety culture.

The essential tasks of risk management are (Internet Edition, 1998):

- to determine what hazards present more danger than society is willing to accept;
- to consider what control options are available;
- to decide an appropriate actions to reduce or eliminate unacceptable risks.

At the broadest level, risk management includes a range of management and policy-making activities: agenda setting, risk reduction, decision making, program implementation, and outcome evaluation. The nation's laws and policy framework through which decisions about risk management are made.

3.2. Occupational Safety and Health Management System

Occupational safety and health management system (OSHMS) is a set of interrelated or interacting elements to establish occupational safety and health policy and objectives, and to achieve those objectives (ILO, 2001).

The positive impact of introducing OSHMS at the organization level, both on the reduction of hazards and on productivity, is now recognized by governments, employers and workers.

These guidelines on OSHMS have been developed by the International Labour Organization (ILO) according to internationally agreed principles defined by the ILO's tripartite constituents. This tripartite approach provides the strength, flexibility and appropriate basis for the development of a sustainable safety culture in the organization.

The ILO has designed these guidelines as a practical tool for assisting organizations and competent institutions as a means of achieving continual improvement in OSH performance.

These guidelines should contribute to the protection of workers from hazards and to the elimination of work – related injuries, ill health, diseases, incidents and deaths.

At national level, national and tailored guidelines are defined.

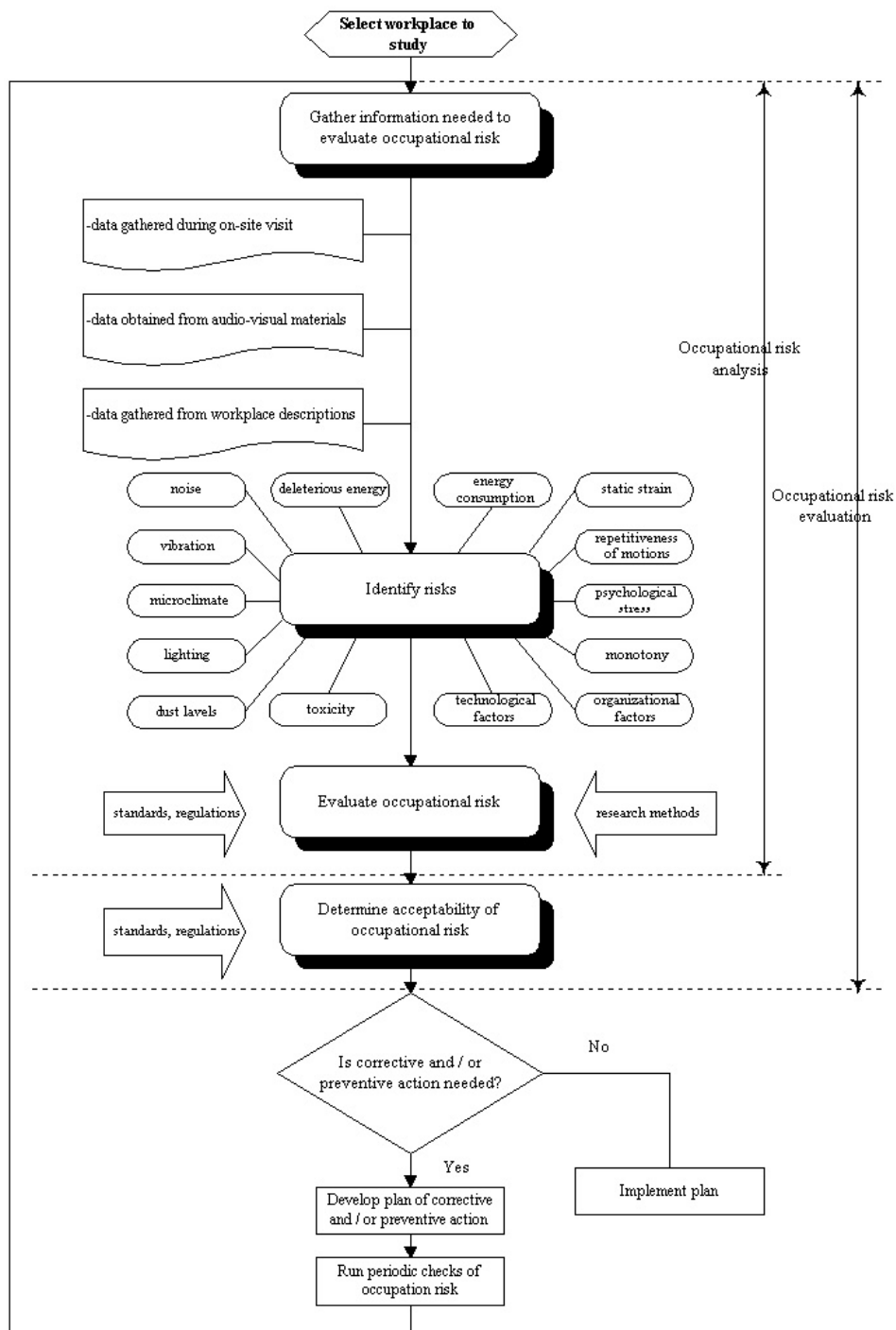


Fig. 3. Illustration of workplace risk management

National guidelines on the voluntary application and systematic implementation of OSHMS should be elaborated on the basis of model, which comprise national conditions and practice.

Tailored guidelines, reflecting the overall objectives of the ILO guidelines, should contain the generic elements of the national guidelines and should be designed to reflect the specific conditions and needs of organizations or groups of organizations, taking into consideration particularly:

- the size (large, medium and small) and infrastructure; and
- the types of hazards and degree of risks.

There should be consistency between the ILO guidelines, the national guidelines and the tailored guidelines, with sufficient flexibility to permit direct application or tailored application at the organization level

The OSHMS should contain the main elements as shown:

Policy

- occupational safety and health policy
- worker participation

Organizing

- responsibility and accountability
- competence and training
- occupational safety and health management system documentation
- communication

Planning and implementation

- initial review
- system planning, development and implementation
- occupational safety and health objectives
- hazard / risk prevention

Evaluation

- performance monitoring and measurement
- investigation of work – related injuries, ill health, diseases and incidents, and their impact on safety and health performance
- audit
- management review

Action for improvement

- preventive and corrective action
- continual improvement

The above – mentioned elements are wholly or partly present in organizations, which depends on the hierarchic level of the OSHMS applied. Hierarchy of OSH management levels possible in enterprises (organizations) is presented in Table 1 (Podgorski, 2000).

Table1. Hierarchy of OSH management levels possible in organizations

Level	Motivation	Description	Assesment method	Learning method	Safety goals	Safety results
I	Fear	Inactive	External inspection only	Only basic training required	No fines or penalties	Less than full compliance worse than average record
II	External punishment	Reactive	Paperwork audit, inspection	Classroom instruction, testing	No non-compliances, citations	Rote compliance, no improvement, average record
III	External reward	Active: understanding and belief	Work observation	In-depth instruction coaching	All jobs done correctly	Appropriate behavior, better than average record
IV	Self and internal	Proactive: passion and commintment	Peer and subordinate inerviews, work results	By example, selflearning	No accidents, best methods	Continuous improvement and leadership, excellent record

4. INTEGRATED MANAGEMENT SYSTEMS

Quality management involves the realization of quality goals, i.e. risk reduction. The aspects of system quality can be: product quality, health and safety quality, environment safety quality. These system quality aspects have been partially answered by quality management system (ISO 9000 : 2000), environment management system (ISO 14000), health and safety management system (ISO 18000). Risk management system (ISO 17000) has also been promoted. Certain relations among these systems can be established and the systems can thus be integrated taking into account the peculiarities of each system.

System integration comprises three phases:

- decomposition of all systems to be integrated
- singling out of the common elements of integration
- integration of the decomposed systems

The common elements of the mentioned systems are (Arsovski, 2001):

- the same interest groups (employees, management, business partners, people, state, stockholders)
- the same organization and environment processes
- the same methods and techniques, management theories and practice
- similar concepts of process management
- similar concepts of resource management
- the same measurement, anlysis and improvement concepts
- the same management responsibility
- the same organization vision, mission and business concepts.

On the basis of the above – mentioned reasons, the integration of other management systems is also possible, as shown in Figure 4 (Arsovski 2001).

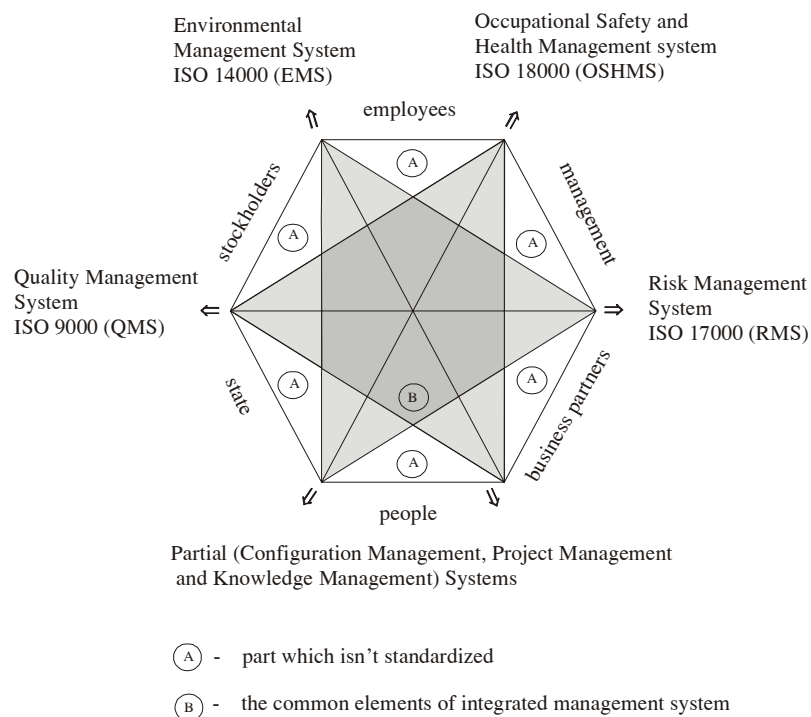


Fig. 4. Illustration of management system integration

The analysis of standards applied to the certification of management systems leads to the conclusion that they rest upon Deming's circle plan – do – check – act. Apart from the mentioned management circle, the tendency to reduce risk is common to all management systems.

The above common features determine the possible ways of integration.

One of ISO 9000 requirements is for production processes to take place in a controlled work environment which includes a proper workplace compliant with applicable standards (ISO 9001 and ISO 9002). Under another standard, the ISO 9004, evaluations of the impact on social and work environments (Jasiak and Zavada. 1998).

Improved working conditions and better psychological and social environments (workplace restructuring) are best achieved when based on comprehensive changes in company strategies. The case is best evidenced by implementations of quality management systems, and TQM systems in particular.

From the point of view of certification it is desirable to integrate quality and environment management systems first and then add occupational safety and health management system.

The fact that systems are basically concerned with risk reduction lead to the development of new approach to management:

- Integrity Management
- Integrated Asset Management

Integrated Asset Management comprises all systems, including finance as it deals with the management of all resources.

The approach to management system integration based on Deming's circle and process approach is shown in Figure 5 (Ivanovic, 2000).

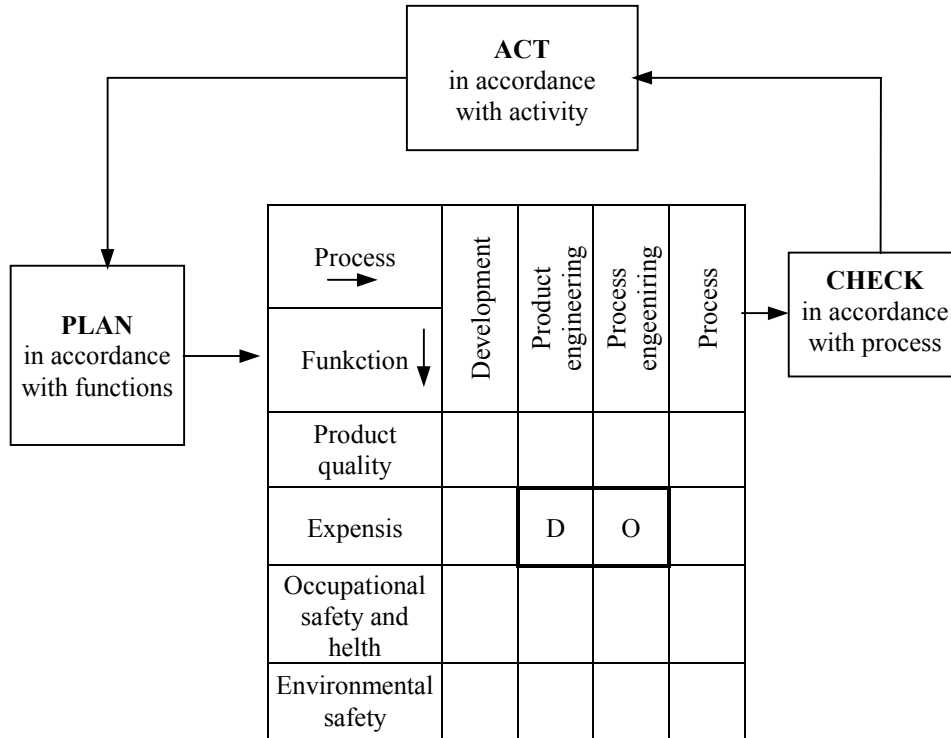


Fig. 5. Illustration of process management based on Deming's circle

The planning of activities is carried out jointly on the level of functions, (product quality, expenses, occupational safety and health, environment safety), then the plans are realized and the checking of the plan quality is carried out on the level of activity – i.e. is carried out on the process itself. The advantage of this model is that it represents the basis for a real integration of management activities.

5. CONCLUSION

The maintenance of organization on the market at the time of continual change depends exclusively on its ability to follow development trends. The tool for attaining this goal is an integrated management system which includes all the aspects of management and puts under control potential failure risks.

In practice, all the above mentioned systems (QMS, EMS, OSHMS, RMS), exist to some extent, as mutually coordinated systems functioning almost independently. It is necessary to produce a synergetic effect of all the systems through the integration on the level of goals and planning.

Integrated management system represents a higher level of system organization and a new quality in relation to separate systems that have contributed to its making. The framework of their integration and interaction is quality as a pragmatic systems discipline (Kostic, 1999) as well as risk as a factor inevitably accompanying all antropogenic systems.

Management systems integrated in this way should enable optimum workplace performance, the health and safety of the workers on one hand and high quality products and environmental safety on the other hand.

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INTEGRISANJE SISTEMA UPRAVLJANJA U CILJU OPTIMIZACIJE HUMANIH PERFORMANSI RADNOG MESTA

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U radu su analizirani uticaji tehničko-tehnoloških promena na zahteve radnog mesta, potencijalni faktori opasnosti i humane performanse radnog mesta. Prikazani su elementi i procedure za upravljanje rizikom radnog mesta, generalni okvir za sistem upravljanja bezbednošću i zaštitom zdravlja kao i procesni pristup integrisanju sistema upravljanja kvalitetom (QMS), sistema upravljanja rizikom (RMS) i sistema upravljanja bezbednošću i zaštitom zdravlja (OSHMS) u cilju optimizacije humanih performansi radnog mesta.

Ključne reči: *radno mesto, rizik okruženja, upravljanje rizikom, integrisani sistemi upravljanja*