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OCCUPATIONAL SAFETY ISSUES RELATED TO WORKERS WITH DISABILITIES – A SYSTEMATIC REVIEW

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Abstract: *This paper presents the findings of an ongoing project of the National Institute for Occupational Safety (INCDPM) developed in collaborations with BAUM Engineering SRL that addresses the occupational safety issues related to workers with disabilities, with emphasis on specific risk identification and mitigation. The method used was The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA). Using the chart flow and the list of items of this method, a literature search was conducted in Science Direct Freedom Collection, Elsevier database, Web of Science - Core Collection, Springer Link Journals. Keywords such as occupational risks, worker with disabilities, health and safety for impaired people, were used to retrieve relevant studies which explicitly reported on occupational risks related to workers with disabilities. It was developed an extensive and comprehensive list of occupational risks related to workers with disabilities.*

Key words: *occupational risks, worker with disabilities, health and safety for impaired people, risk identification, risk mitigation,*

1. INTRODUCTION

Disability and health affect a relatively high percentage of the workforce. It is estimated that 23.5% of the working population in the European Union (EU) have a chronic illness and 19% have long-standing health issues [1, 2]. The employment rate of persons with disabilities (aged 20-64) stands at 50.6%, compared to 74.8% for people without disabilities (2017) [3]. For people with severe disabilities employment rates are lower and in most EU member states only a small proportion of working age individuals with severe disabilities are in employment. Moreover, women with disabilities, young disabled persons and persons with high support needs are more likely to be discriminated against and excluded from the labor market [3].

Increasing the employment rate of people with disabilities was one of the main objectives of the European disability strategy 2010-2020 [4]. The progress report (2017) [5-9] on this strategy concluded that although efforts have been made, the employment rate remains rather

low mainly due to the lack of equal opportunities in the labor market. The employment situation of women and men with disabilities needs to be further improved through quality jobs in open, inclusive and accessible work environments [5].

One of the reasons that many employers are reluctant to hire a person with a disability is finding the safety and health issues for such a worker a daunting prospect. Our project aims to facilitate the activity of decision makers (managerial staff in an economic unit), at different levels of management (from the supervision of technological processes to top management), to make better decisions (more effective) and documented. We also wanted to provide sufficient support to the decision-maker (related to occupational risks) to minimize certain risks that have been identified [10-14].

This article will consider the health and safety risks for workers with disabilities with the focus on where these may be different to the risks faced by workers without disabilities. For the purposes of this article the European Agency for Safety and Health's (EU-OSHA) definition of disability will be used as these covers both

physical and mental impairments and covers, as well, all employees whose work performance might be hampered by their disability [6]. This definition defines persons with disabilities as those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others [15-18].

2. METHODS USED

For this paper it was used The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA). The PRISMA has been designed primarily for systematic reviews of studies that evaluate the effects of health interventions, irrespective of the design of the included studies. However, the checklist items are applicable to reports of systematic reviews evaluating other non-health-related interventions (for example, social or educational interventions), and many items are applicable to systematic reviews with objectives other than evaluating interventions [8]. The PRISMA 2020 items are relevant for mixed-methods systematic reviews (which include quantitative and qualitative studies).

A literature search was conducted in Science Direct Freedom Collection, Elsevier database, Web of Science - Core Collection, Clarivate Analytics, Scopus, Springer Link Journals. Keywords such as *occupational risks for workers with disabilities, health and safety for impaired people, employing a person with disability* were used to retrieve relevant studies which explicitly reported on occupational risks related to workers with disabilities. The searches were limited to English and Romanian languages only.

The PRISMA checklist was used to validate the research process [9]. The titles and abstracts of the search results were screened independently by all authors with discrepancies discussed and resolved. Articles were eligible for full-text screening if the title and/or abstract mentioned occupational risks for workers with disabilities, health and safety for impaired people, employing a person with disability.

Full texts were screened for inclusion by all authors disagreements resolved by discussion. Articles were included in this systematic review if they reported on occupational risks for workers with disabilities.

Research studies that made use of previously collected or administrative data were also acceptable if they satisfied other criteria. Studies were excluded if they were published before 2000. In addition to the formal literature described above, a range of Internet sites of national and international organizations recognized as being involved in the discipline of occupational health and safety (OHS) or disability were explored.

3. RESULTS

The literature search yielded 1,166 references, of which 50 articles were selected for full-text screening as specified by the inclusion criteria, and ultimately 12 were included in this review (Fig. 1), this showing that there is very little research on OHS risks of people with disability.

The occupational risks factors for workers with disabilities were grouped into four categories (according to the four component of a work system): worker, means of production, work environment, workload.

Identifying the risk factors in the work system is an essential step for the quality of the analysis. Practically, it is established for each component of the evaluated work system (respectively job), based on a predetermined list, what dysfunctions it can present, in all the foreseeable and probable situations of operation.

To identify all possible risks, it is therefore necessary to simulate the operation of the system and deduce the respective deviations. This can be done either by a verbal analysis with the technologist, in the case of relatively low-risk jobs, in which accidental dysfunctions (or disease-generating) are quasi-obvious, or by applying the event tree method.

In addition, the simulation can be performed concretely, on an experimental model or by computer processing. Regardless of the solution adopted, the working methods are direct observation and logical deduction.

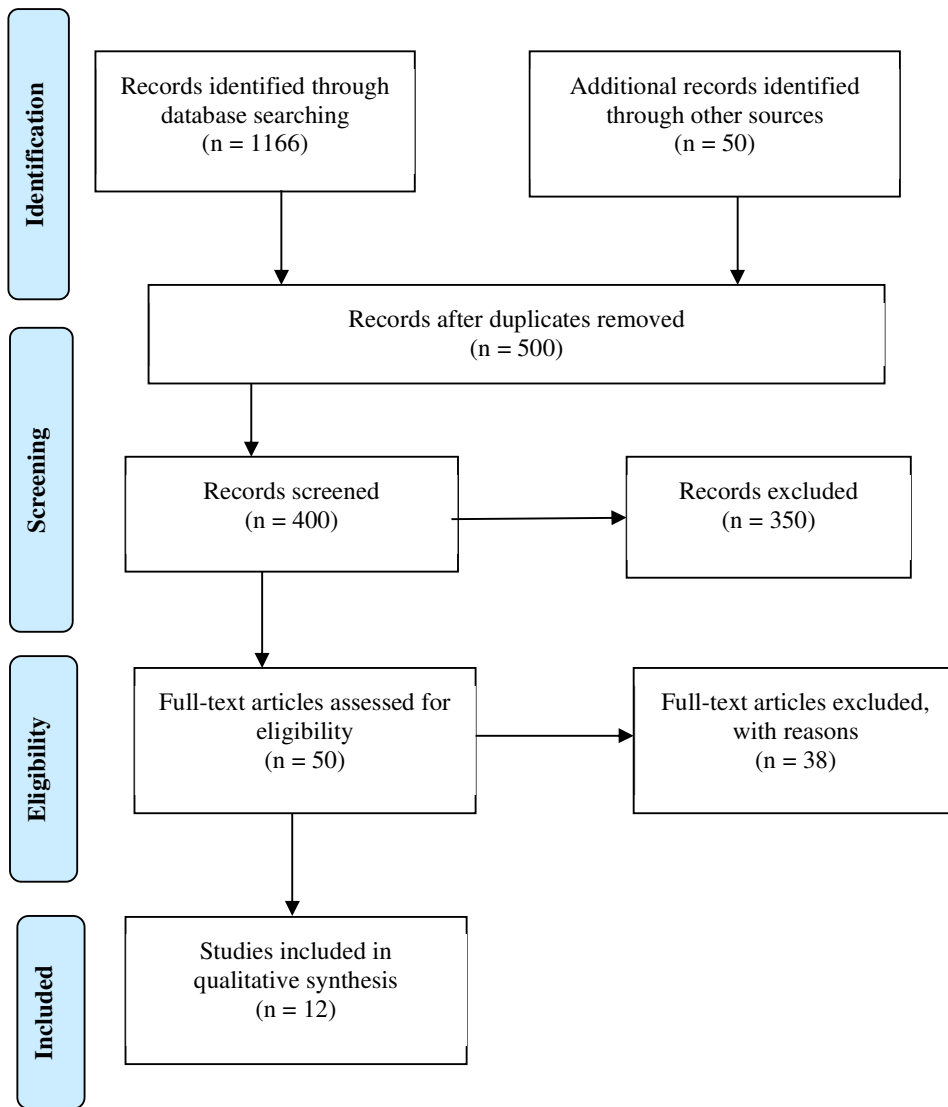


Fig. 1. PRISMA flow diagram.

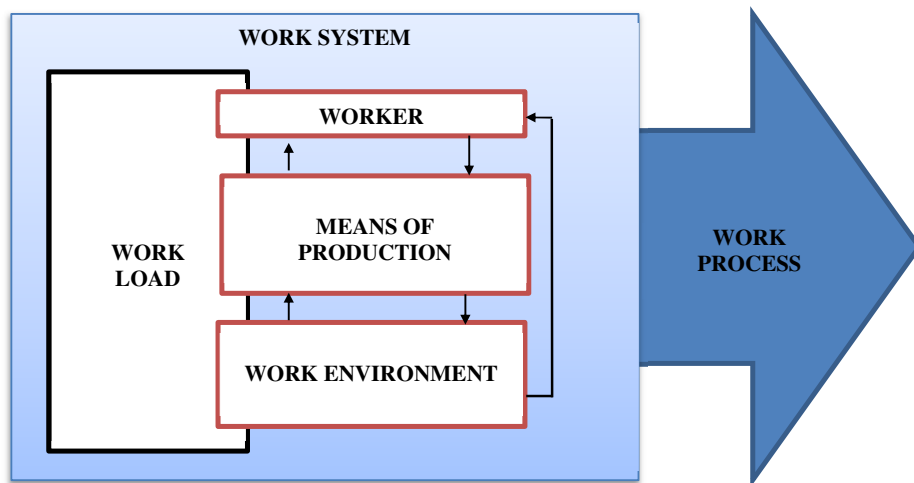


Fig. 2. The elements involved in carrying out the work process and the relationships between them.

In the case of objective risk factors (generated by the means of production or the work environment), their identification is relatively easy, knowing the parameters and functional characteristics of machines, equipment, installations, physic-chemical properties of materials and materials used, or bulletins analysis of environmental conditions.

Regarding the worker, the operation is much more difficult and involves a high degree of indeterminacy. As far as possible, all its foreseeable and probable errors in relation to the assigned workload, in the form of omissions and wrongdoing, and their impact on its own security and on other elements of the system shall be analyzed (similar with the debate of [21-27]).

The identification of risk factors of the workload is performed, on the one hand, by analyzing the conformity between its content and the work capacity of the executor to whom it is assigned, and on the other hand, by specifying possible operations, work rules, wrong work procedures.

For the work system' component "worker" the occupational risks factors founded were: faulty operation (orders, positioning, fasteners, assemblies, settings, misuse of means of protection), non-synchronization of operations (delays, overtaking), performing unforeseen operations due to the impairment or workload (starting the technical equipment, interruption of the operation of technical equipment, interruption of the power supply), travel or parking in dangerous areas, danger of falling from the same level (imbalance, slipping, tripping), danger of falling from a height (by stepping into a gap, by imbalance, by sliding), accidentogenous communications, omission of operations, failure to use protective equipment.

For the work system' component „work task” the occupational risks factors founded were: improper content of work load in relation to safety requirements (wrong operations, rules, procedures), absence of operations, improper working methods, wrong sequence of operations, under- / over-sized load in relation to worker capacity, physical load (static effort, forced or vicious work positions, dynamic effort), mental stress (high work pace, difficult decisions in a short time, repetitive operations of short or extremely complex cycle, monotony of

work), dynamic effort by moving with crutches, walking sticks, walking frames, stroller on long routes through the company yard, climbing stairs due to unreasonable accommodation, stress due to moral harassment, stress due to lack of proper information and training, stress due to lack of technical equipment and auxiliary devices (software, devices), specially adapted to the type of activity.

For the work system' component "means of production" the occupational risks factors founded were: mechanical risk factors, functional movements of technical equipment (moving machine parts, fluid leaks, means of transport), self-timing or self-locking contraindicated functional movements of technical equipment or fluids, slipping, rolling, overturning, free fall, free drain, spill, collapse, propulsion movements of bodies or particles, deviation from the normal trajectory, balance, recoil, excessive shocks, jet, hazardous surfaces or contours (stinging, sharp, slippery, abrasive, adhesives), excessive vibration of technical equipment, thermal risk factors (high temperature of objects or surfaces, low temperature of objects or surfaces, flames), electrical risk factors, (direct contact with electricity, indirect contact with electricity); chemical risk factors (toxic substances, caustic substances, flammable substances, explosive substances, carcinogenic substances); biological risk factors (bacteria, viruses) (similar with the debate of [21-27]).

For the work system' component „working environment” the occupational risks factors founded were: air temperature (high, low), air humidity (high, low), air pressure (high, low), air ionization, noise, ultrasound, vibration, lighting (low lighting level, shine, flicker), electromagnetic radiation (infrared, ultraviolet, microwave, high frequency, medium frequency, low frequency, laser, natural disasters (lightning, flood, wind, hail, blizzard, landslides, avalanches, earthquakes), chemical risk factors (toxic or caustic gases, vapors, aerosols, powders suspended in air, flammable or explosive gases or vapors), biological risk factors (microorganisms suspended in air).

Contrary to the common perception of increased OHS risk for people with disability, a national study of employers in Australia [20, 26,

27] found that workers with disability have a lower number of OHS incidents compared to an average employee. When examining studies on OHS risk of employees with disability, one of the best evidence available against this perception comes from a 2002 Australian nationally representative study (Graffam et al. 2002) [20-24].

This study surveyed 643 employers across Australia who had employed someone with disability. The researchers reported that the number of OHS incidents in an employee with disability was six times lower than that of an average employee.

The same trend was observed for the number of worker's compensation incidents, where the number of incidents for an employee with disability was four times lower than that of an average employee.

Large proportions of people with disability currently work in white collar employment where the risk of traumatic injury is low and this may also be a contributing factor to low injury rates (improvements should take into consideration the modern and actual approaches, methods and tools as shown in [21-28]).

When people with disability are working in "high risk" industries (e.g., people with hearing loss in the construction industry), it is likely that the disability is caused by the work that they undertook and they continued working in the same industry with continued exposures after the onset of their disability.

For example, two thirds of workers with hearing loss in the construction industry attributed their hearing disability to their work. Almost half of workers with incomplete use of fingers or arms who worked in the manufacturing industry also attributed their disability to their work.

Accommodating people with one disability does not appear to be an issue. However, a third to half of people with disability requiring accommodation are not receiving it.

This is even though anti-discrimination legislations require employers to provide "reasonable" accommodation for people with disability. Most accommodations reported in literature are related to access, not safety.

4. FURTHER RESEARCH

Development of a decision support system to facilitate the activity of decision makers (managerial staff in an economic unit), at different levels of management (from the supervision of technological processes to top management), to make better decisions (more effective) and documented. Such systems will provide sufficient support to the decision-maker (related to occupational risks) to minimize certain risks that have been identified.

5. CONCLUSION

The occupational risks to which workers with disabilities are exposed are the same as those of typical workers with emphasis on risks like dynamic effort by moving with crutches, walking sticks, walking frames, stroller on long routes through the company yard, climbing stairs due to unreasonable accommodation, stress due to moral harassment from co-workers, stress due to lack of proper information and training, stress due to lack of technical equipment and auxiliary devices (software, devices) specially adapted to the type of activity.

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Accommodating people with one disability does not appear to be an issue. However, a third to half of people with disability requiring accommodation are not receiving it. This is even though anti-discrimination legislations require employers to provide "reasonable" accommodation for people with disability. Most accommodations reported in literature are related to access, not safety.

One of the reasons that many employers are reluctant to hire a person with a disability is finding the safety and health issues for such a worker a daunting prospect. Through our project we aim to facilitate the activity of decision makers (managerial staff in an economic unit),

at different levels of management (from the supervision of technological processes to top management), to make better decisions (more effective) and documented.

We also wanted to provide sufficient support to the decision-maker (related to occupational risks) to minimize the occupational risks that have been identified.

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Aspecte legate de securitatea muncii lucrătorilor cu dizabilități – o revizuire sistematică

Aceast articol prezintă o parte din concluziile unui proiect INCDPM aflat în desfășurare, dezvoltat în colaborare cu BAUM Engineering SRL, care abordează problemele de securitate a muncii legate de lucrătorii cu dizabilități, cu accent pe identificarea și diminuarea riscurilor specifice. PRISMA a fost metoda utilizată în cercetare, fiind asociată unor elemente de raportare preferate pentru revizuirii sistematice și meta-analize. Diagrama de flux a fost aplicată unei liste de articole selectate pentru aplicarea acestei metode; a fost efectuată o căutare în literatură de specialitate din bazele de date Science Direct Freedom Collection, Elsevier, Web of Science - Core Collection, Springer Link Journals. Cuvinte cheie precum „riscuri profesionale”, „lucrător cu dizabilități”, „sănătate și securitate pentru persoanele cu dizabilități”, au fost folosite pentru a prelua studii relevante care au raportat în mod explicit riscurile profesionale legate de lucrătorii cu dizabilități. În final, a fost elaborată o listă extinsă și cuprinzătoare a riscurilor profesionale legate de lucrătorii cu dizabilități.

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