Chapter 68
Mental Workload Assessment and Its Effects on Middle and Senior Managers in Manufacturing Companies

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ABSTRACT

This chapter aims to know the mental workload level and its effects on middle and senior managers in manufacturing companies. The chapter aims to know the mental workload level related to gender, age range, civil status, number of children, years of experience, and worked hours per week. As method, the NASA-TLX method was implemented. This method measures mental workload based on six dimensions: mental demand, physical demand, temporal demand, effort, performance, and frustration level. Data was collected by applying an online questionnaire. Results indicated that some dimensions contributed to mental workload in the following decreasing order: mental demand, temporal demand, effort, performance, frustration level, and physical demand. Similarly, results from mental workload level varied from 55.73 to 64.10. Nevertheless, there was no clear relationship between the gender, age range, civil status, number of children, years of experience, worked hours per week, and mental workload level. Finally, employees manifested mental workload mainly due to stress, mental fatigue, and headache.

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INTRODUCTION

Nowadays, the scientific and technological advances that have been developed in the last hundred years have facilitated the daily life in several aspects, decreased the physical effort in the tasks, as well as work-related activities that require greater technical and intellectual skills for their implementation. In fact, this affects the way in which occupational diseases have evolved as well as the Ergonomics approach by applying theoretical principles, data, and methods to design which are used to optimize the human well-being and overall work system performance (Dul et al., 2012; International Ergonomics Association (IEA), 2018).

Specifically, Ergonomics is both a scientific discipline and a profession. From a scientific discipline perspective, and according to several authors, Ergonomics involves the understanding of interactions among human beings and other elements of a system. On the other hand, from a professional perspective, Ergonomics applies theoretical principles, data, and methods to design in order to optimize the well-being and overall performance (Dul et al., 2012). In addition, to achieve its objectives, Ergonomics applies knowledge from different sciences, such as Medicine, Physiology, Physics, Psychology, among others.

Therefore, Ergonomics is a multidisciplinary science (International Ergonomics Association (IEA), 2018). According to the object of study, Ergonomics is divided into Physical Ergonomics and Cognitive Ergonomics. Physical Ergonomics focuses on physical aspects of work and human capabilities, such as force, repetitive movements, and body postures (Choppin, Roth-McDuffie, Drake, & Davis, 2018), the design of working environments to fit human physical abilities, i.e., Physical Ergonomics deals with physical variables that can affect human beings: repetitive movements, body postures, physical load, and environmental conditions (Goonetilleke & Karwowski, 2018). In order to achieve its main goal of optimizing the human well-being and the work systems performance, Ergonomics applies different assessment methods. For instance, methods of Physical Ergonomics include Rapid Upper Limb Assessment (RULA), the Rapid Entire Body Assessment (REBA), the National Institute for Occupational Safety and Health (NIOSH) lifting equation, Occupational Repetitive Action tool, and the Job Strain Index (JSI) (Otto & Battaïa, 2017).

However, the cognitive Ergonomics domain comprises mental and psychological variables, such as perception, information processing, decision-making, action-taking, memory, reasoning, and mental workload (Belkic, 2003), as they affect interactions among human beings and other elements of a system (Wung & Schatz, 2018). This last variable, mental workload, focuses in activities that are mental or cognitive in nature and may comprise physical coordination, but excludes physical activities (Jin, Zheng, Pei, & Li, 2017). Currently, it is presented in most of employees from different labor sectors (agriculture, aviation, manufacturing, services, education, among others) (Claxton Bomme & Fendley, 2018; Jin et al., 2017; Li, Cao, Lin, Braithwaite, & Greaves, 2017; McLean, Abry, Taylor, Jimenez, & Granger, 2017). As a result, it is urgent to promote research on the causes, effects, and methods of evaluation, as well as the generation of new knowledge concerning the mental workload in different labor sectors. Also, cognitive Ergonomics includes methods, such as NASA Task Load Index (NASA-TLX), Systematic Human Error Reduction and Prediction Approach (SHERPA), Subjective Workload Assessment Technique (SWAT), Cognitive Work Analysis (CWA), and Task Analysis for Error Identification (TAFEI) (Stanton, Salmon, Walker, Baber, & Jenkins, 2018). All these methods help reduce or eliminate occupational risk factors, provide well-being to workers, and improve the organizational performance in companies (Khani Jazani, Salehi Sahlabadi, & Mousavi, 2018).