

# Chapter 23

## Knowledge Management and Ergonomics Implementation in Manufacturing Systems: Development and Validation of a Questionnaire for Critical Success Factors

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### ABSTRACT

*This chapter presents a knowledge management and Ergonomics implementation in manufacturing systems, through the development and validation of a critical success factors questionnaire. The instrument developed measures the frequency of inclusion of critical success factors for the implementation of Ergonomics and its benefits, validated in the manufacturing industry. The frequency is based on a five-point Likert scale. So far, no instrument able to measure such factors has been found in the literature. The questionnaire comprises 73 questions presented in four main stages: planning, process startup stage, work improvement cycle and long-term development. In addition, it contains a section of benefits regarding health and safety, operational and quality of life at work. The instrument was validated through a pilot test involving 140 participants from seven companies in the manufacturing sector of Ciudad Juárez, Chihuahua, México, through the use of an intentional selective method.*

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## **INTRODUCTION**

The word Ergonomics comes from the Greek word “*ergon*,” meaning work, and “*nomos*,” meaning law. Thus, Ergonomics means “the law of work” (Bridger, 2003). Today, Ergonomics is an accepted term worldwide. This science focuses on improving the interaction between people and the things and environments around them (Wilson, 2001). Ergonomics includes a large amount of knowledge and techniques and involves the work of professionals such as physicians, engineers, psychologists, sociologists, industrial designers, and others (Karwowski, 2012). The relevance of Ergonomics’ lies in that it is focused on the design of products, systems and environments that will cater for human beings’ capacities and limitations, thus guaranteeing an effective man-environment integration (Álvarez-Zárate, 2013).

Ergonomics is a science that seeks to achieve balance among work environment, tools, tasks and human beings. It is supported by other disciplines such as engineering as well as other physical, biological, social, and human behavioral sciences (Fernandez et al., 2010). In the industrial sector, Laos et al. (2007) describes Ergonomics as the science responsible for adapting the work to the worker. Its goal is to adequate space, products and systems to people’s capacities and needs (Harne & Deshmukh, 2016). Today, corporations are leaning on ergonomics to design *programs* that will decrease or eliminate the risk of musculoskeletal disorders in workers. Such programs will yield benefits such as lowering the costs generated by workers’ absences due to sick leaves (Fernandez et al., 2010; Haines & Wilson, 1998). On the other hand, when employees feel uncomfortable or unsafe, conditions such as dissatisfaction, lack of motivation, staff rotation, low productivity, and accidents are likely to occur (Portillo, Gomez, Palacios & Gutierrez, 2009). For all these reasons, implementation of Ergonomics is of utmost relevance within corporations.

## **PROBLEM STATEMENT**

In the twenty-first century, knowledge management is a key topic for companies as it allows them to grow and increase their profit margins (Harrington & Voehl, 2007). Thus, companies have increasingly recognized the value of knowledge management (Yew Wong, 2005). Furthermore, they have placed knowledge management as an essential element to improve and maintain competitiveness in the market (Yew Wong, 2005). Today, success factors are considered part of knowledge management (Alazmi & Zairi, 2003). According to Bullen & Rockart (1981), Critical Success Factors (CSFs) are defined as those key activities in a process, which are necessary for objectives to be reached. Likewise, Gauthier & Lagacé (2015) emphasize that critical success factors are the key elements that make the difference between success and failure in projects.

Currently, it is a common view that companies pursuing competitive advantage need to improve their performance by providing more human-compatible working systems, which results in a decrease in health and safety problems (Fernandez, Marley, Noriega, & Ibarra, 2010). Ergonomics is a good way to provide compatibility between human and working systems. Regarding the CSF concept, several authors have identified factors that lead to a successful implementation of Ergonomics. For example, the management’s commitment, rewards to workers, communication and feedback on tasks delivered, and training are all CSFs that contribute to a safe work environment (Vredenburg, 2002). In addition, investigations have found some benefits of Ergonomics such as a more comfortable work environment,

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