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Safety Management System in TQM environments

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ABSTRACT

Safety Management Systems continue to be a prevalent research topic nowadays, which has gone from being an incipient construct to an essential factor in new currents of business management. Organizations have perceived the importance of organizing their techniques and resources under a Safety Management System with models similar to other certification systems such as the ISO 9000 family of standards. This research is aimed at knowing the conditions that accelerate the adoption of a Safety Management System, either under the principles, beliefs and values of Total Quality Management or as a consequence of the implementation and application of essential safety management techniques, namely, risk assessment processes, assumption of safety responsibilities and safety training. It has been proven that companies operating in Total Quality Management environments are more likely to adopt a Safety Management System than those which apply key safety management practices in isolation. Results show the potential of Total Quality Management to promote a Safety Management System by itself, even in the absence of proven core practices. The results are robust and suggest maintaining principles of the quality paradigm when pursuing more ambitious models based on total management such as Total Safety Management.

1. Introduction

Unsafe working conditions directly affect workers' health. In addition to labor accidents and diseases, the occurrence of occupational risks lowers satisfaction, worker motivation and firm performance, which may alter its market position (Bottani et al., 2009; Fernández-Muñiz et al., 2009). Competitive firms must combat occupational risks and organize resources for their prevention.

A Safety Management System (SMS) is a management model that groups functions, responsibilities, practices, procedures and processes for risk prevention. Real and effective application of an SMS allows compliance with an extensive legal framework including guarantees of effective protection for workers and continuous improvement of health and safety conditions (Granerud and Rocha, 2011). In addition, an SMS is a means to optimize performance and economic indicators of a company (Fernández-Muñiz et al., 2009). The utility of SMSs have increased as a management tool in companies (Bottani et al., 2009; Mohammadfam et al., 2016b) and promoted great academic interest in investigating their fundamental characteristics (Fernández-Muñiz et al., 2007; Bonafede et al., 2016; Gallagher et al., 2003; Mohammadfam et al., 2016b) and their interaction with other management systems (İnan et al., 2017; Jørgensen et al., 2006; Kafel and Casadesus, 2016; Moumen and El Aoufir, 2017; Vinodkumar and Bhasi, 2011). However, the literature does not specify beliefs, values or practices that promote the adoption of an SMS.

The implementation and maintenance of an SMS is a process conditioned by legal requirements, expectations and interests of the parties, and requirements of other management systems of the company that compete with the SMS to obtain resources. In addition, an SMS is characterized by the socio-technical dimension of its objectives (Grote and Künzler, 2000; Rasmussen, 1997). On the one hand, it has a social character (workers' rights, staff satisfaction, quality of labor relations) and, on the other, a technical one (modification of processes to integrate safety, investments in adequate equipment and acquisition of safe technologies) (Lowe, 2008). A socio-technical vision implies that an SMS must be developed in a work environment that values social relationships and that perceives risk prevention measures as an opportunity for improvement in order to accelerate its real and effective application.

An organizational culture capable of operating in the social domain of labor relations and integrating technical security to improve processes would favor the implementation and maintenance of an SMS. In this sense, the principles of Total Quality Management (TQM) seem to be in line with the bases that an SMS needs for effective implementation. Employee satisfaction and continuous improvement are an integral part of the cultural change promoted by TQM (Hackman and

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Wageman, 1995; Sitkin et al., 1994). Continuous process improvement, employee satisfaction and motivation are intrinsic features of TQM that make this philosophy an appropriate platform to promote the adoption of an SMS.

Frequently, SMS studies are oriented towards techniques, plans, procedures and key processes of an SMS but they do not strengthen the beliefs, values and commitments that drive their adoption. "It may be equally necessary for organizations to nurture the cognitive and emotional commitment of workers" (Wachter and Yorio, 2014, p. 129). The objective of our research is to determine the capacity of a TQM environment to promote the adoption of an SMS and analyze convergence of the TQM philosophy with essential SMS practices in order to favor its implementation.

This study focuses on 5147 Spanish companies, consulted in 2009 as part of the Spanish National Survey of Safety and Health Enterprises Management (ENGE for its acronym in Spanish), by the Spanish National Institute of Occupational Safety and Hygiene (INSHT for its acronym in Spanish, 2009). The study focuses on Spain because of the importance of SMS in Spanish workplace risk prevention policy (Fernández-Muñiz et al., 2014; Morillas et al., 2013; Mullen et al., 2017; Sesé et al., 2002).

The analysis of the relationships between TQM and SMS in Spain is especially important for two reasons. The first is that tensions between social and technical aspects have been visible during the period of crisis in the Spanish economy. "In Spain, the worker representatives perceived the economic crisis to have had two main effects: companies prioritised their concerns about production and costs over dealing with demands from representatives for occupational safety and health improvements; and companies were generally less willing to accede to such demands" (EU-OSHA, 2016, p. 12).

The second is that TQM was the most-used management tool during the period of study in companies of all sizes considered and in all sectors of activity of the ENGE survey. However, it is the industrial sector in which the highest percentage of companies apply TQM (74.3% of companies) and, within this sector, chemistry and metal (INSHT, 2009). Specifically, organizational innovations based on quality management were consolidated as indicative of Spanish companies during the economic crisis (Álvarez Santos et al., forthcoming).

It should be noted that this research represents a significant advance in SMS research as it analyzes interactions between TQM and key safety management practices such as risk assessment processes, assumption of responsibilities and safety training. These interactions are a novelty in SMS research and allow robust comparisons with TQM and its ability to promote the implementation of an SMS.

The article is structured as follows: Section 2 contains the theoretical framework on SMS and TQM, which justifies the formulation of hypotheses. Section 3 describes the data and methodology used to obtain the results reflected in Section 4. Finally, Section 5 provides the most important conclusions of the research, as well as implications for managers, limitations, and future lines of research.

2. Safety Management Systems

Research on Safety Management Systems (SMSs) has revealed the multidimensional nature of the construct (Fernández-Muñiz et al., 2007; Vinodkumar and Bhasi, 2010). Safety Management System has been defined as "a combination of the planning and review, the management organizational arrangements, the consultative arrangement and the specific program elements that work together in an integrated way to improve health and safety performance" (Gallagher et al., 2003, p. 69).

The adoption of an SMS is a form of management that reveals the risk prevention policy of a company. The adoption of an SMS is not an end in itself, but a means to guarantee the right to effective protection of workers by improving working conditions. Currently, new SMS trends are of a proactive nature, integrated into business activities and committed to the management system policy for continuous improvement of the process system (Kontogiannis et al., 2016; Ramli et al., 2011). Nowadays, continuous improvement, the core philosophy of Total Quality Management (Sitkin et al., 1994), is an inherent objective of the current evolution of SMSs (Fernández-Muñiz et al., 2007, 2009; Granerud and Rocha, 2011; Kontogiannis et al., 2016). Similarities between SMS and TQM (Vinodkumar and Bhasi, 2011) have created constructs such as Total Safety Management (García Herrero et al., 2002) which continue to gain relevance within new SMS research trends (Kontogiannis et al., 2016).

TQM enables optimizing performance and provides a propitious environment for problem-solving in terms of effectiveness, improvement, and satisfaction of stakeholders. These qualities are especially useful for implementing an SMS while guaranteeing efficiency and continuity. The literature recognizes the existence of similarities between the structure of TQM and SMS (García Herrero et al., 2002; Vinodkumar and Bhasi, 2011). We believe it is necessary to broaden knowledge of the convergence between TQM and safety management to know if there are elements that facilitate the adoption of an SMS in environments committed to quality. Consequently, our research question is: Do companies operating in TQM environments tend to set up an SMS? To answer this question, it is necessary to consider the practices that the literature recognizes as key in the development of SMS and which can therefore influence the effect of TQM on an SMS.

A vital part of SMS concerns the risk assessment process, the involvement of members of the organization who assume roles and responsibilities and the training of workers (Fernández-Muñiz et al., 2009; Kontogiannis et al., 2016).

Risk assessment process is an SMS information system based on a sequence of activities that transforms the identification of dangerous situations into levels of risks defined by the probability and consequences of their occurrence (Bottani et al., 2009). Its usefulness lies in its ability to estimate and assess the risks of all jobs and to decide on the need to adopt preventive measures according to an objective criterion of priority (Aven, 2016). The risk assessment process outputs are preventive measures to improve working conditions and, therefore, a central practice of SMS information and feedback (Fernández-Muñiz et al., 2009; Nassiri et al., 2016; Papadopoulos et al., 2010).

In addition, the integration of safety in processes requires the assumption of responsibilities by functional units and safety training of personnel in order to perform their activity in accordance with the guidelines received (Segarra Cañamares et al., 2017). The design and implementation of safe working procedures and processes, periodic monitoring of working conditions to reach improvement and intervention on the causes of incidents or damage arising from work should be carried out by means of cross-functional co-operation, which is an indicator of preventive integration. For this reason, SMSs require management commitment for an effective assumption of responsibilities of the organizational structure after it has undergone safety training programs (García-Herrero et al., 2002).

Because of the diversity of practices representative of SMS it is advisable to verify its relationship with TQM and its contribution to the adoption of an SMS; i.e., how do key SMS practices combined with TQM contribute to the adoption of an SMS? The design of the sample and the measurements made allow verifying the relationship and interactions of TQM with the three essential aspects of SMS mentioned above: risk assessment processes, assumption of responsibilities, and safety training.

2.1. Total Quality Management background: Convergent environment with SMS

Total Quality Management (TQM) "often is defined as the continuous improvement of processes by all employees in the organization to better meet the needs of internal and external customers" (Sitkin et al., 1994, p. 541). The TQM philosophy is a form of multidimensional