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An Investigation of Quality Climate and its Association with Implementation of Quality Management System

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Abstract
Quality management and continuous improvement are paramount for businesses to survive and thrive in today's competitive landscape (Goetsch & Davis, 2003; Abdullah et al., 2009). One effective approach to operationalize quality processes and continuous improvement goals is a formalized quality management system (Khanna et al., 2010; Mosher et al., 2013). Quality management systems are embodiments of the organization's policies, procedures, plans, resources, processes and delegation of responsibility and authority designed to achieve customer satisfaction within the boundaries of organizational objectives (Goetsch & Davis, 2003). While these systems are being used extensively across many industries, the ideas are relatively new to the bulk commodity handling and processing industries (Hurburgh & Lawrence, 2003). Although factors such as globalization and legislation have been external drivers for the adoption of quality management systems in these industries, internal benefits have also been noted as a result of these systems (Laux, 2007; Laux & Hurburgh, 2010).

Disciplines
Agriculture | Bioresource and Agricultural Engineering | Occupational Health and Industrial Hygiene

Management

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Introduction

Quality management and continuous improvement are paramount for businesses to survive and thrive in today's competitive landscape (Goetsch & Davis, 2003; Abdullah et al., 2009). One effective approach to operationalize quality processes and continuous improvement goals is a formalized quality management system (Khanna et al., 2010; Mosher et al., 2013). Quality management systems are embodiments of the organization's policies, procedures, plans, resources, processes and delegation of responsibility and authority designed to achieve customer satisfaction within the boundaries of organizational objectives (Goetsch & Davis, 2003). While these systems are being used extensively across many industries, the ideas are relatively new to the bulk commodity handling and processing industries (Hurburgh & Lawrence, 2003). Although factors such as globalization and legislation have been external drivers for the adoption of quality management systems in these industries, internal benefits have also been noted as a result of these systems (Laux, 2007; Laux & Hurburgh, 2010).

Implementation of quality management systems is driven by the organization's vision, goals and objectives and is tailored to each organization's specific culture, values, strengths and weaknesses (Goetsch & Davis, 2003). These implementations are resource-intensive and time- consuming. A complete implementation cycle of quality management systems requires at least twelve months and in some cases may require several additional months (Yousef & Aspinwall, 2000; Goetsch & Davis, 2003). For this reason, an evaluation strategy is required to determine the impact of implementation and to measure continuous improvement actions within the organization (Fitzpatrick et al., 2004; Laux & Hurburgh, 2010).

Operational measures of quality management were first proposed by Saraph et al. (1989). Follow-up studies identified several "soft" and "hard" indicators to measure the success of quality management systems (Lewis et al., 2006a). Hard factors of quality are well-defined and easily quantifiable measures such as product reliability, durability and serviceability Alternatively, soft factors deal with behavioral aspects and are more complex and difficult to measure (Black & Porter, 1996). One such soft factor is quality climate, a measure of employees' shared perceptions of the importance of quality policies and procedures relative to other business goals (Mosher et al., 2013). While some soft factors and their impact on organizational performance have been investigated (Gadenne & Sharma, 2009; Fotopoulos et al., 2009; Abdullah et al.,2009 ;Khanna et al., 2010), little research has

focused on the potential constructs of quality climate. The structure and antecedents of quality climate can be measured through a survey instrument, similar to the measurement of safety climate (Mosher et al., 2013; Guldenmund, 2007). Employee perceptions are an important component of workplace climate (Lunning & Marcelis, 2007), yet little previous research has examined antecedents to quality or to develop a valid and reliable survey instrument to measure quality climate. This is especially true in the bulk commodity industry, where changes in customer expectations and legislation have prompted new demands for quality performance (Thakur & Hurburgh, 2009).

Accordingly, the purpose of this study is to identify the various employee-related organizational characteristics and constructs that influence the effectiveness of quality management systems. The findings of this study will be used to develop and validate a survey instrument for measuring the quality climate in the bulk commodity handling and processing industry.

Quality Management Systems in Bulk Commodity Handling and Processing Industry

The use of quality management systems that encompasses statistical data, teamwork, continuous improvement, customer satisfaction, and employee involvement concepts, gained wide acceptance in the United States in the late 1980's and early 1990's (Goetsch & Davis, 2003). However, these ideas have been slow to reach the bulk commodity handling and processing industry, which is facing challenges facilitated by globalization, changes in customer demands and increased legislation (Hurburgh & Lawrence, 2003). Previous research conducted in a bulk commodity handling and processing facility showed positive impact of quality management systems on operational efficiency, demonstrating an enhanced ability to meet both customer specification and comply with legal requirements, while instituting only a minimum increase in transaction costs (Laux 2007; Laux & Hurburgh, 2010).

Quality management systems are also being used to create traceability systems that are increasingly the norm for bulk commodity industries dealing with food and feed in all developed countries (Dabbene & Gay, 2011; Laux & Hurburgh, 2010). Meeting these traceability requirements has been a major challenge for bulk commodity handlers due in part to the practice of blending loads from multiple sources before processing (Bailey et al., 2002). The main objective of a traceability system is to precisely log and locate a product along the supply chain (Dabbene & Gay, 2011). Implementing quality management systems has led to greater inventory and process control for bulk handling firms, thus allowing firms to successfully track and trace raw material through their supply chain (Hurburgh & Sullivan, 2004; Thakur & Hurburgh, 2009).

Implementing Quality Management Systems

The implementation of a quality management system is a multi-phase process usually consisting of preparation, planning and execution phases (Goetsch & Davis, 2003). Each phase has many steps implemented over several months (Hurburgh & Hansen, 2002). Successful implementations require commitment from top management, the creation of organization-wide steering committee, and the planning, promotion and establishment of infrastructure to support deployment and continual improvement (Goetsch & Davis, 2003).

A high level of both time and resources must be invested to develop and implement a quality management system, therefore, an assessment of the program's efficiency is necessary (Mosher et al., 2009). An effective evaluation plan is important to determine the effectiveness of the implementation and to facilitate continuous improvement within the organization (Fitzpatrick et al., 2004; Laux & Hurburgh, 2010).

"Hard" and "Soft" factors of Quality Management Systems

Defining and measuring quality is a complex task (Chen & Chen, 2009; Wankhade & Dabade, 2010). In addition, the criteria to quantify and measure quality management systems vary greatly in the research literature, based in part on the author. One of the first studies to systematically measure the components of quality management was conducted by Saraph et al. (1989). This preliminary study identified 78 operational criteria's for measuring the effectiveness of organizational quality management programs. Numerous follow-up studies have since evaluated quality management systems across several industries. For example, Joseph et al. (1999) identified 150 measures of quality management for a manufacturing- based business. Chen & Chen (2009) proposed measures for operational quality improvements in the bio-technology industry, while Brah et al. (2000) identified factors critical to quality management implementation in the service industry and Kafetzopoulos et al.'s. (2014) study measured quality-related attributes in the food processing industry.

The various criteria for measuring quality were categorized by Chen & Chen (2009) into five dimensions-: leaders, employees, customers, information technology and operating processes. For practical purposes these different criteria can be classified into "hard factors" and "soft factors" (Gadenne & Sharma, 2009).

Hard factors are indicators that are used to control production and work process flow (Wilkinson et al., 1998; Evans & Lindsay, 2002). Process controls, just-in-time measures, defect rates, and other process indicators are examples of hard factors (Lewis et al. 2006a). The key distinguishing feature of hard factors is that they are well defined and generally have a straightforward method of measurement (Lewis et al. 2006a; Gadenne & Sharma, 2009). Because of the consistency and ease of measurability, hard quality factors are both the preferred and more commonly used measure of quality systems implementation (Lewis et al. 2006b).

Soft factors focus on behavioral and human aspects of quality management systems. Leadership, teamwork, empowerment, human resource utilization, customer satisfaction, quality culture and social responsibility are a few commonly cited examples of soft factors (Saraph et al., 1989; Flynn et al., 1995; Ahire et al., 1996; Brah et al., 2000; Kaynak , 2003; Lewis et al., 2006a; Gadenne & Sharma, 2009). Unlike hard factors these soft factors may not be well defined and can also be intangible and difficult to measure (Gadenne & Sharma, 2009). Hence, studies on the measurement of soft quality factors have not been common, due in part to the challenges of quantifying such factors.

Measuring Effectiveness in Bulk Commodity Handling and Processing Industry

The effectiveness of quality management in the processing industry is a function of product quality and human behavior (Luning & Marcelis, 2007). Product quality is achieved by controlling production activities such as heating, storing, and transporting, while human behavior is influenced by managerial decision-making activities (Luning & Marcelis, 2009).

Little previous research has attempted to measure the effectiveness of quality management system in bulk commodity industry. Hurburgh (2002) proposed impartial third party audit and certification for validating quality management system. However, these audits occur infrequently and are expensive relative to the information gained on efficiency. Mosher et al (2009) suggested mock recall as a possible tool to internally evaluate a quality management system for a processing firm. Thakur et al (2011) suggest an indirect method to study and analyze the various processes with the help of data recorded from all grain lot activities. Both mock recall and electronic records require consistent data records, which are not always in place in the bulk processing environment.

However, none of these studies measured the effectiveness of quality management systems in a process-based system nor were the human factors measured as proposed by Luning and Marcelis (2007). For this reason, there is a need for an instrument that measures effectiveness of quality management based on human and behavioral aspects while taking into account the unique needs and challenges of process-based industries.

Quality Climate

Quality problems occurring due to employee behavior are difficult to detect unlike those associated with mechanical and production aspects (Luria, 2008). Facet specific climate such as safety climate are positively correlated with safety behaviors (Neal at al., 2000; Zohar, 2002; Cooper & Phillips, 2004; Keren et al.,2009). Hence quality climate that measures employees shared perception of importance of quality policies, procedures and policies relative to other business goals (Mosher et al , 2013), impacts employee quality behaviors (Luria, 2008).

While some facet specific climates have been investigated like safety (Zohar 1980; 2002; Zohar & Luria 2004, 2005), service (Schneider et al.,1998 ; Dietz et al., 2004) little research has explored the concept of quality

climate (Luria, 2008; Mosher et al., 2013). Moreover, no research has explored the constructs of quality climate and validated a survey instrument to measure quality climate especially in the bulk commodity handling and processing industry.

Methodology

The purpose of this study was to identify the employee related organizational characteristics that impact the effectiveness of quality management systems. To determine the various employee related dimensions, a review of quality literature was undertaken. The review focused on soft human factors that impacted quality management systems and continuous improvements. The perception of these organizational characteristics by employees forms the quality climate of that organization.

Studies that were selected discussed quality management and critical factors explicitly. All studies selected measured some employee-related characteristics and all used or developed a quantitative survey instrument to measure these critical factors. The pilot study suggested that most previous studies investigating critical success factors were conducted in manufacturing environments. Additionally, the number of critical success factors identified has increased over time (Hietschold et al., 2014). Human-based critical factors identified in quality literature as influential toward a positive climate of quality can be classified into the following broad dimensions.

Top management commitment and leadership

Top management commitment and leadership's impact on successful implementation of quality programs cannot be under-estimated and is a consistent theme in the quality literature (Saraph et al., 1989; Flynn et al., 1995; Ahire et al., 1996; Brah et al., 2000; Kaynak, 2003). Implementing quality systems requires an enterprise-wide management philosophy (Hietschold et al., 2014), hence leadership support and the involvement of senior executives is vital for success. Strong commitment and involvement of top management signifies greater emphasis on quality thus impacting working climate just as top management can positively or negatively influence organizational safety climate and safety behavior (Zohar 1980; 2002; Neal et al., 2000).

Employee involvement and empowerment

Employee involvement is defined as the ability of employees to have control of the tasks assigned to them (Lawler et al., 1992). Several researchers have emphasized the importance of employee involvement in implementing quality management systems. For example Reger et al. (1994) suggest that fundamental organizational change efforts such as quality management will be successful only when employees' cognitive resistance to beneficial changes is resolved. To realize the benefits of organizational change, employees must fully participate in all quality improvement activities, acquire new knowledge, and feel a sense of accomplishment (Zhang et al., 2000). Employee involvement will result in overcoming some of the cognitive hurdles, positively impacting the successful implementation of quality management systems (Das et al., 2008).

Education and training

The education and training of employees and the encouragement of skill improvement also can impact organizational climate (Chapman & Hyland, 1997). Ahire et al. (1996) suggested that knowledge of quality concepts, tools and techniques are essential for employees to understand and solve quality issues. Das et al. (2008) suggest that employees are valuable resource in implementing quality systems and hence their training and development should be viewed as a necessary investment. Training empowers employees and is thus a pre-condition for a higher degree of employee involvement (Hietschold et al., 2014). The consistent message in quality literature suggests training and development as a critical factor for success for quality management systems within a firm.

Rewards and recognition

Quality programs are generally perceived by employees as befitting the organization rather than themselves (Daily & Bishop, 2003). A good reward and recognition system is an important management tool to influence employee attitudes (Mohrman et al., 1996) and may in turn, increase their likelihood of involvement in quality programs. Employees need to feel that their personal quality goals are in sync with organizations quality goals (Zhang et al., 2000). Furthermore, employees tend to choose between maximizing organizational quality goals and their personal short term goals based on how they are rewarded (Sinclair & Zairi, 1995). For this reason, employee rewards and recognition is an important dimension for successful implementation of quality initiatives.

Communication

Effective communication of quality policy ensures a strong orientation of employees towards the quality goals and objectives of the organizations (Maletic et al., 2014). Regular interactions between management and employees on quality outcomes and continual improvements can also increase the opportunity for success of quality initiatives (Gatchalian, 1997). Another important component of communication is regular reporting of quality data. This activity is one of the most critical success factors and reflects a positive quality culture where employees, supervisors and management have a better understanding of quality issues and successes (Antony et al., 2002). Thus, the communication of quality principles is closely linked with positive quality outcomes.

Conclusions

The concepts of quality management are gaining popularity in the bulk commodity handling and processing industry. While critical success factors of quality management have been investigated, most of them have focused on hard factors and studies in a manufacturing industry environment (Hietschold et al., 2014). Very little work has explored the human factors in the bulk commodity handling and processing industry (Lunning & Marcelis, 2007; Mosher et al., 2013).

This study identified five critical dimensions of quality systems implementation based on a literature review. The findings of this study will be used to build, test, and validate a survey instrument for measuring quality climate in the bulk commodity handling and processing industry.

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