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ICT as a Tool in Industrial Networks for Assessing HSEQ Capabilities in a Collaborative Way

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INTRODUCTION

There may still be many companies and organizations that use information and communication technology (ICT) for employees' work conditions and systems, particularly only for collecting and presenting yearly figures of their absences from work due to sickness and accidental injuries. The employees, meanwhile, probably frequently use text messages or e-mails to inform their bosses that they are not well enough to come to work. In many companies, computer applications can use, produce, or present the results of job satisfaction surveys. This article presents other much wider potential applications of ICT. It describes in detail a system developed and used by a process industry network in Finland and provides a general review of contemporary needs and possibilities. The potential contributions of ICT to work organizations and personnel is much larger and more diverse than commonly realized.

Networking is a typical solution for companies of different sizes to combine and manage their contributions competitively in a contemporary business environment. It is typical for employees from several supplying companies or contractors to work simultaneously for the same production, such as in the process industry (e.g., purchasing organization, customer of suppliers). This method of production, using so-called shared workplaces, has become more common. This situation has set up new requirements for managing health, safety, environment, and quality (HSEQ), causing issues and achieving desired results within that framework. These requirements are partly regulation-based, but are also voluntary, business-driven, and promotional. Large-scale process industry companies in Finland have developed and have started to apply the HSEQ Assessment Procedure (HSEQ AP) for measuring and evaluating suppliers (Väyrynen, Koivupalo, & Latva-Ranta, 2012). The objective of HSEQ AP is to ensure that outside employees in shared workplaces have sufficient knowledge and skills for HSEQ to operate in the principal customer companies' premises.

Generally, HSEQ issues concern the key factors of a company's contemporary holistic control, assurance, and management measures. The integration of all "additional" aspects of quality (Q) is a practical, rational, feasible, and cost-effective model (see Hutchison, 1997; Dale, van der Wiele, & Iwaarden, 2007). This is in line with the UK definition of an accident covering "any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity" (Hugnes & Ferrett, 2003). Integrated management systems (IMS) (see Wilkinson & Dale, 2007) are used to assure customers that products and services satisfy requirements for "basic" Q. Responsible organizations also have to be concerned about the working environment and well-being of their employees (HS), the impact of operations on the local community, and the long-term effects of their products and activities (E). HSEQ management involves planning, organizing, controlling, monitoring, and reviewing the measures. Multi-employer HSEQ management can be effectively arranged through the proper participation of all employers, including contractors, and employees.

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Both managerial and labor commitment to an HSEQ-oriented culture should be a part of the business and all work activities. Internal and external auditing of HSEQ capabilities plays a key role in maintaining a high level of HSEQ. This can maximize the strengths and minimize the weaknesses. In Q maintenance and in continuous improvement, sharing good practices and applying benchmarking procedures are also important (see Hutchison, 1997).

This article will provide a detailed review of the literature on the ICT-enabled system, in our case the HSEQ Assessment System (HSEQ AS). It is followed by a section on the main features of the current system. It will discuss the system's essential phases and all tasks allocated to it within the industrial network in Finland. The next section analyzes the utilization of HSEQ AS by answering the five Ws and one H (i.e., who, what, where, when, why, and how) (see Hutchison, 1997).

BACKGROUND

In a work organization context, technology, tools, work environment, and people all contribute and affect each other within the work system (Roland & Moriarty, 1983; Carayon & Smith, 2000; International and European Standard, 2004; Baldrige, 2013). From material, energy, and knowhow inputs, this system provides both desired and non-desired outputs (see Väyrynen & Nevala, 2010). Desired outputs consist of products, well-being at work, and money. Non-desired outputs consist of human and material harms and losses, accidents, and undesired variations and deviations such as human and system errors (see Hugnes & Ferrett, 2003). In general, in intra-organizational work systems, and even more so in inter-organizational contexts, the channels and flow of information and communication (IC) are essential for business and people. This is enabled, aided, and supported by technology. ICT should be more explicitly mentioned in the context of work systems.

It is useful to analyze a single company or a network of companies as a constellation of single work systems interacting with each other (Carayon & Smith, 2000). ICT is "in the center of the work system" and will continue to be so in the future (see also Figure 1). It plays a special role in enabling character. Carayon and Smith (2000) stated that it is essential to aim for a "balanced" work system, systems, and company. They defined a "balanced" organization as one that takes into account business goals and human outcomes, examines the positive and negative aspects of work system design, and minimizes the negative outcomes. The general approach in this case essentially consists of "balanced" work system thinking enhanced with ICT. ICT fits very well with the descriptive, analytical, evaluative, and developmental needs within the thinking model of work system(s). Examples of work system improvements and innovations were given by Väyrynen and Nevala (2010). These could be evaluated by relevant stakeholders using a participatory approach, similar to what Rajala and Väyrynen (2011) did in the metal industry.

Bigger companies use ICT in HSE management, as described and modeled by Kjéllen (2000). Nowadays, they are linked with their insurance company for dealing with accident cases, such as providing compensation data. Typical online services of a big Nordic company include both "login" and "extranet" service lines designed to be used by all corporate clients (If, 2013). A login account is hosted at a secure Website, similar to online banking, which can be accessed by designated staff at the client organization from any computer. Through such an account, one can browse insurance information and perform a number of different tasks. The account enables the user, depending on access rights, to file a claim and/or view claim reports, among others. Meanwhile, the extranet enables the client's employees to access relevant and useful information, including details of employee coverage, without the help of the client's human resource department.

Kjéllen (2000) stated that accidents are infrequent events in modern industries; therefore, they are not part of the top agenda of management in all companies. However, they are only one form of unplanned events; more common unplanned events are production stoppages, substandard product quality, material damages, and personnel injuries. Thus, HSE data shows implicitly that there are more various unplanned events than one would expect. Kjéllen (2000) concluded that HSE information systems at their best provide decision makers with support in several areas such as prevention of occupational accidents and diseases, accidental emissions of environmental pollution, damage to material assets, waste handling, controlling working environment factors, and even follow-up of the psychosocial work environment. The roles of HSE ICT