

A CASE STUDY ON SENIOR MANAGERS' UNDERSTANDING OF ERGONOMICS IN FIVE MANUFACTURING COMPANIES

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The understanding of ergonomics among senior management in five manufacturing companies was explored in a case study. The objective was to capture how ergonomics is given meaning from a business perspective. The results showed that managers' sensemaking was either based on theory, practice or ethics, or on a combination of the three, and that ergonomics occurred in certain business contexts: corporate identity, regulations, management systems and manufacturing philosophy.

Sensemaking, meaning, business ergonomics, knowledge management

1 Introduction

Improvement of work tools, workplaces and overall system performance can be achieved by integrating ergonomic knowledge into product and production development. Often, however, ergonomics is introduced at a late stage in the development process when experts in human factors, often with a health and safety focus, are called in. Only in rare cases is ergonomics brought in early to improve the product or service strategically.

The reason may be a resistance among senior management against absorbing ergonomic knowledge and identifying its potential as a tool for reaching business objectives. Yet some companies seem to have realized the commercial dimension of ergonomics, i.e. as a tool for improving the effectiveness in man-machine systems. They work proactively with solutions where ergonomics is a differentiating factor (Dul 2003; Rislund 2006). Understanding this business-oriented approach to ergonomics may mean new opportunities for companies when they innovate beyond the traditional safety-and-health horizon.

The purpose of this case study was to investigate how managers understand ergonomics: What is the rationale behind their ergonomic solutions?

2 Method

A case study methodology was chosen for data construction (cf. Merriam 1994). The research is characterized by an iterative process with continuous moves between the parts and the whole, between pre-understanding and new understanding, between theory and research question. The process has been influenced by *systematic combining* (Dubois & Gadde 2002) which is also the origin of the terms *passive* and *active* data. Passive data represents data that is expected according to the researcher's pre-understanding. Active data represents unknown, unexpected data.

The attention was on organizations that showed involvement in ergonomic issues in words and action. The focus was on management's understanding and handling of ergonomic issues in materials-handling activities. Five companies (companies A – E) were involved in the study, two of which were users of ergonomically advanced forklifts. All companies were medium to large enterprises with long traditions and significant international market shares. Two were Swedish-owned, one belonged to a Dutch company group, one to a British company group and the last company was controlled by a venture capital owner. The number of participants from each of the companies varied, in total 17 managers participated in the study.

The study concentrated on material handling and logistics functions as a means to delimit the scope and also to keep the focus on *ergonomics in logistics*. This choice of functions limited the variation of work tools to be found, the type of work processes to be observed and also, to a certain extent, the culture to be exposed to. At the same time the choice of functions made the studied companies comparable even if they represented different types of industries.

The existence of observable artefacts was considered important. The artefact, e.g., an ergonomically advanced forklift, became the starting point for searching out managers for interviews, i.e., everyone throughout the organization who in some way was responsible for its existence. The artefact also worked as a tool, in combination with the search areas, to mediate a dialogue on why this solution had been chosen, which alternatives there had been etc. Data construction consisted of semi-structured interviews with senior managers, analyses of documents and workplace observations. Triangulation of data sources was employed to secure richness in data and to find possible contradictions. Interviews were concentrated to specific search areas in order to delimit data construction. The five search areas were:

1. Manifestations, representations or wordings containing elements of ergonomics;
2. Documented routines for follow-up of ergonomics-related activities;
3. Plans and activities for knowledge sharing related to ergonomics;
4. Written or spoken statements showing the role of ergonomics in the company;
5. Concrete decisions that mirrored the company's understanding of ergonomics.

The interviews were recorded and transcribed or documented with notes. Data was reduced and structured in a matrix to get an overview of the answers in each search area and for each company (cf. Kvale 1997). The material was thereafter analyzed according to two different frameworks: Firstly to describe learning styles, by using the model of praxis theory (Handal & Lauvås 2001). Secondly, to identify the sensemaking in relation to ergonomics, by using Weick's seven properties of sensemaking (Weick 2001).

The two frameworks for analysis were chosen to understand the reasoning behind the observed ergonomic solutions, to capture the process of problem setting that can be expected to precede a decision. Problem setting is according to Schön (2000) "a process in which, interactively, we *name* the things to which we will attend and *frame* the context in which we will attend to them." Since managers often have the role of setting the scene for others, their sensemaking process is important to assess or describe. Schön also claims that when there is a strong emphasis on problem solving, problem setting is ignored. This is in line with Sandberg and Targama (1998) who claim that much of our understanding is

unreflected. Thus, in order to change or challenge a mindset, the process must start with identifying and acknowledging the current mindset.

Reflexive methodology was used in the study to validate the interpretation of data (Alvesson & Sköldbberg 2000).

3 Results and findings

Search area one: Written policies were common among the studied companies, stating the importance of health and safety. One company that could not present a written policy showed in other ways that the attitude was there nonetheless. The basis for this attitude was explained by *i)* a tradition of close relationship over generations among people living in a geographic area with few alternative workplaces, *ii)* a need for efficient and reliable production capacity, and *iii)* a positive image among members of society.

Search area two: Systematic follow-up of issues related to ergonomics as a tool for learning was rare. Ways of assessing that policies were actually turned into action varied between the studied companies. Some had routines for follow ups tied to health and safety management systems, work environment in-house inspections, or illness absence. However, the impact of many ergonomic improvements was never followed up in a systematic manner from an ergonomic perspective.

Search area three: Access to ergonomic knowledge was limited. Only a few of the interviewees had personal knowledge on ergonomics or work environment issues. Internal processes for acquiring and sharing this type of knowledge only existed in one company. The others relied on contracts with occupational health services, i.e., external expertise, for access to ergonomic knowledge. Even so, since each consultation through this arrangement meant a cost for the company knowledge exchange was discouraged. The contracts with the occupational health services also seemed to comprise specific treatments, health screenings and courses on stress etc.

Search area four: Production concepts, increased environmental concerns and systems for managing quality and environment helped to put work environment and thus ergonomic issues on the agenda. Some companies had an environment controller function which also included a responsibility for work environment issues. However, the controllers usually had their knowledge base in environmental issues and legislation which was also where their focus lay.

Search area five: Concrete examples of decisions leading to improved ergonomics were found in all companies. However, when improvements eventually were made, assessment of the effects seemed rare and non-existing from an ergonomic perspective.

3.1 Findings from the first analysis

In the first analysis, using the model of praxis theory as a framework, the material was searched for clues to how the existing ergonomic solutions had happened in each of the companies. What were the stories behind? Reasons and arguments were categorized into ethics and values, own experiences or acquired knowledge, thereby indicating the learning style of each company (see Table 1).

	Company A	Company B	Company C	Company D	Company E
Ethics & values	Strong, many expressions	Strong, verbal expressions, activities	Strong, many expressions	Strong, mainly written expressions	Strong, many expressions
Acquired knowledge	Medium, local expressions	Weak	Strong	Weak, local expressions	Medium, local expressions
Practice & experiments	Medium, local expressions	Strong, local expressions	Medium, local expressions	Medium	Strong, local expressions

Table 1 Findings from an analysis of data using the model of praxis theory.

Examples illustrating ethics and values: The label ‘strong’ relates to e.g. values and norms set by the founder many years ago and still vivid. Values and norms are communicated in words and actions expressing a caring attitude and treatment of employees as a valuable asset. (Triangulating sources of data, mapping both words and actions, was used to make sure the expressions were not only empty words.)

Examples of acquired knowledge: The label ‘strong’ relates to e.g. a documented theoretical basis among at least key representatives within the organization, a system for continuous in-take and diffusion of up-dates, and a contract with occupational health services for support.

Examples of practice and experimenting: The label ‘strong’ relates to e.g. tradition of learning by doing, acceptance and support for challenging current mindset, and experiments with operators’ expertise and knowledge.

3.2 Findings from the second analysis

In the second analysis, using Weick’s properties of sensemaking as a framework, the material was searched for signs of the seven properties. Reasons and arguments were categorized into social context, personal identity, retrospect, salient cues, ongoing projects, plausibility and enactment (see Table 2). Examples illustrating the expressions behind the labels in the matrix are:

Identity: A policy stating the importance of health and safety issues motivated by how the company wants to be perceived by others.

Social context: Managers socialized into a culture of respecting and listening to employees. Employee well-being was a deep concern for managers.

Retrospect: A richness of stories which illustrate a leadership in line with health and safety concerns and general well-being at the workplace (e.g. how the founder of the company, at that time the owner, brought in flowers and plants in the metal shop).

Enact: Words supported by actions. Activities are what counts, what makes a difference (e.g. improved lightning, repaired floors, new modern equipment, pressure on producers to improve work tools).

Ongoing projects: Ergonomics-related issues integrated in production concepts or management systems to improve performance and product quality. Follow-up routines. Continuous improvements.

Salient cues: Management systems for health and safety issues in combination with educated managers open up for a new way of seeing, thus perceiving ergonomic related risks at an early stage that can be attended to and turned into improvements.

Plausibility: Well-established values and norms leading managers to act early on cues instead of waiting for facts in extensive reports.

	Company A	Company B	Company C	Company D	Company E
Identity	Few expressions	Few expressions	Many expressions	Many expressions	Many expressions
Social context	Many expressions	Many expressions	Many expressions	No expressions identified	Many expressions
Retrospect	Many expressions	Few expressions	Many expressions	No expressions identified	Many expressions
Enactment	Many expressions	Many expressions	Many expressions	Few expressions	Few expressions
Ongoing projects	Many expressions	Few expressions	Many expressions	No expressions identified	Few expressions
Salient cues	Few expressions	Few expressions	Many expressions	Few expressions	Many expressions
Plausibility	Many expressions	No expressions identified	Many expressions	No expressions identified	No expressions identified

Table 2 Findings from an analysis of data using Weick's properties of sensemaking.

4 Discussion

According to the International Ergonomics Association, IEA, ergonomics is the scientific discipline that deals with the design of products and processes with a view to improving human well being as well as overall system performance (IEA 2006). Thus ergonomics can be said to have a social goal and an economic goal. What is most often reported in the research field of ergonomics are issues concerned with the social goal. Ergonomics is associated with occupational health and safety and related legislation, and not with business performance (Dul & Neumann 2005). Focusing the social goal of ergonomics means a risk that ergonomics is perceived as a goal in itself and, hence, of minor interest for a company that puts turnover and market share first. However, if ergonomics is handled with its economic goal in mind, and consequently perceived as a tool for the company to improve turnover and increase market share, the meaning of ergonomics may change.

However, in order to reach this potential, current mindsets among actors in the ergonomics community as well as among business managers need to be challenged. They have to change their understanding from a health ergonomics paradigm to a business ergonomics paradigm (Dul & Neumann 2005). Subsequent to this change in mindsets a

change in language is likely to happen, illustrating the new understanding. The findings from the reported study give clues as to how ergonomics can be named and framed by new actors in a business context.

5 Conclusion

The objective of the study was to capture the reasons and arguments, on the part of management, behind observed expressions of ergonomic knowledge, in terms of artefacts, features, design or policies. Ergonomics seemed to have become meaningful when motivated by company objectives and supported by intrinsic forces, e.g. safe workplaces, efficient and reliable production, high demands on product quality or the desired profile of a responsible company. Hence, ergonomic knowledge may be socially used under certain conditions, e.g. pulled by internal factors such as culture, tradition, identity, management system or production concept, and/or pushed by external factors such as legislation, standards or contracts. The implication for ergonomists and human factors experts is that by widening the conventional safety-and-health horizon of ergonomics and including it in a wider business context, new opportunities for making use of ergonomic knowledge may open.

6 References

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