Technological design influence on production and ergonomic development in meat cutting

Johan Karltun\textsuperscript{a}, Kjerstin Vogel\textsuperscript{b}

\textsuperscript{a}Industrial Engineering and Management, School of Engineering, Jönköping University, Jönköping, SWEDEN
\textsuperscript{b}Unit of Ergonomics, STH, KTH Royal Institute of Technology, Huddinge, SWEDEN

1. Introduction

The ergonomic problems in the meat cutting and deboning operations are well-known and have for long time been subject to research and investigations in order to improve the situation (Hägg & Vogel, 2003; Vogel & Eklund, 2014). Both accident rates and musculoskeletal problems are common and significantly higher than most other industries (The Swedish Work Environment Authority, 2012). At the same time, the Swedish part of the industry is struggling with a high-cost environment where salaries and other influential factors are more costly if compared to some neighbouring countries. The authors of this paper have been working actively with improvements in this industry for eight years in collaborative research efforts to improve the situation (Karltun, Eklund, & Vogel, 2014). What has been noted is that a number of technical designs for production have been implemented, sometimes including large investments, and that these have not considered a sufficient systems perspective but instead seem to be mainly driven by demands of control and work flow. The consequences are often not entirely satisfactory from a human point of view. Even if these investments to some extent, for example reduce the workload in terms of less lifting, the results add other ergonomic problems instead, thereby decreasing the possible effects in terms of work improvements. Since musculoskeletal disorders are considered to be dependent on systems characteristics and not only on physical workload per see (Arvidsson et al., 2012) it is necessary to consider the entire system of production and not only lifting and cutting. The same reasoning can be made regarding accidents. The results of the technical investments observed are more or less well functioning solutions with shortcomings that influence both the economical outcome as well as the consequences for the workers (Vogel, Karltn, Yeow, & Eklund, submitted). The aim with this paper is thus to compare a number of changes and investments in production technology and evaluate these from a Human-Technology-Organization (HTO) systems perspective in order to outline improvement possibilities.

2. Method

The study approach provides a number of examples from studies reported earlier where the data collection techniques are provided in these studies. More examples from interviews, conversations and observations during visits to companies and documentation in the form of pictures and videos taken were added. The paper can thus be seen as a multiple case study design (Yin, 2003) where the ergonomic results regarding the meat cutting work is dependent on the technological changes applied.

Six different technical solutions for designing meat cutting and deboning (flowline, streamline, paceline, traditional line with two step cutting, quarter- and half carcass cutting and single table cutting) are presented and their technical characteristics are analyzed in terms of productivity, quality, flow and origin traceability, all according to some of the modern principles of lean management. The analysis is then extended to the opportunities for organizing the activities surrounding the technology chosen and the main obstacles of each exemplified system in order to achieve not only beneficial production characteristics but also beneficial working conditions in terms of decision latitude, cooperation, physical work load etc.

3. Results
4. Discussion

The cases are discussed in terms of improvement possibilities. The criteria for these are to better optimize the production both from a company perspective and from a meat cutter perspective where a sustainable work situation is considered. A number of recommendations to meat companies as well as to manufacturers of machinery are developed. The recommendations are based on the conditions for human-technology-organization interaction as well as theories regarding industrial production.

Keywords: production control, quality, origin traceability, productivity, work sustainability

References:

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Johan Karltun1, Kjerstin Vogel2
1School of Engineering, Jönköping University, P.O. Box 1026, SE-551 11 Jönköping, SWEDEN
johan.karltun@jth.hj.se
2KTH Royal Institute of Technology, STH, Unit of Ergonomics, Alfred Nobels allé 10, SE-141 52 Huddinge, SWEDEN