OFFICE ergonomics

Analyzing the Problem & Creating Solutions

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Traditionally, employers have approached ergonomics issues related to the office environment by focusing on individual workstation components such as the keyboard, monitor, work surface or chair. Although such features are important, tackling ergonomics issues related to office environment design requires a systems viewpoint.

A systems approach entails analysis of other physical environmental aspects (e.g., layout, storage, adjustability); job characteristics (e.g., job demands, pacing); organizational context (e.g., career path, shiftwork, job security); technology characteristics (e.g., computer interface design, screen design); and psychosocial variables (e.g., job control, decision-making latitude, participation). These factors impact individual, group and organizational performance (Smith and Carayon-Sainfort 67; Robertson and Rahimi 55; O'Neill 1; Sauter and Swanson 3). Understanding their interrelationships and their potential influences on health, stress, work and organizational goals helps the safety practitioner develop potentially more-effective solutions for office-environment-related problems.

One successful systems analysis approach is the seven-step, systems analysis tool (SAT) developed by Mosard (81). The tool produces a series of diagrams, flowcharts, criteria tables and resource models, as well as a cost/benefit table, schedule and evaluation metrics. To illustrate one approach to systems analysis, this article presents a modified SAT, based on the work of Mosard (81) and Hall (156). The modified tool guides development of alternative solutions by evaluating the cost-benefit of each; selecting and implementing solutions; and providing feedback and measurement of improved worker performance.

APPLYING AN SAT: UNDERSTANDING OFFICE WORK SYSTEMS

The SAT should be applied at the strategic business unit or departmental level, where specific objectives and issues are identified. (Individual and group needs may also be identified at this point.) The seven SAT steps are:

1) Define the problem: The Problem Factor Tree.

2) Set objectives, develop an evaluation criteria table and devise alternatives: The Objectives/Activities Tree.

3) Model alternatives: The Input-Output Flow Diagram.

4) Evaluate alternatives: The Criteria Scorecard and Cost/Benefit Analysis.

5) Select an alternative: The Decision Table of Future Conditions.

6) Plan for implementation: Scheduling and Management Project Flow.

7) Evaluation, feedback and modification process.

Step 1: Define the Problem

The problem factor tree (PFT) attempts to describe the problem, sub-problems and likely causal factors, as well as their interrelationships, in a logical hierarchical structure. To develop the PFT (Figure 1), the analyst assumes that the major office work system problem is a composite of typical office work performance issues such as an increase in turnover, lost workdays and workers' compensation (WC) claims and a decrease in performance and effectiveness related to technology and work systems design (Hedge, et al 419; Hendrick 713; Kuorinka and Forcier 1; Amick, et al 97). Psychological and physiological stressors are present as well (Smith and Carayon-Sainfort 67; Moon and Sauter 1; Westgaard 75). Arrows in the diagram indicate the direction in which causal factors contribute to the major problem.

Psychological stressors can be subdivided into psychosocial disturbances and perceived lack of environmental control (Karasek and Theorell 1; O'Neill 1; Moon and Sauter 1; Robertson and O'Neill 517). Further investigation of possible causal factors (depicted at the base of the tree) reveals more-specific contributors related to lack of job content, and poor job and workstation design (Moon and Sauter 1; Amick, et al 97; O'Neill 1).

Job content and design are the main elements of the social sub-system, and several related individual- and group-level factors (shown in the middle of the tree) are further identified. Suspect job design components may include teamwork or collaboration problems at the departmental level (such as cross-functional teams) or at the individual level (such as work pace).

Visual and musculoskeletal discomforts are among the many sub-problems that can arise with regard to physiological stress (Grieco, et al 1). Screen design, work-