

Staffing models in ergonomics/human factors

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THE WORK IN CONTEXT

The level of staffing in an organisation is an important determinant of both the organisation's effectiveness and of the workforce wellbeing. To predict staffing we need to know the work content of the enterprise. This was comparatively simple when the main work content was repetitive tasks, with total output measured in numbers of identical items produced per unit time. This is not the situation with most modern work, where more complex tasks performed by teams are more common, for example nursing or maintenance. Unfortunately staffing is not well-represented in the ergonomics/human factors (subsequently referred to as human factors) literature, for example in an Ergonomics Abstracts search. More literature is in trade journals, and in the industrial/organisational psychology literature. Specific staffing models have been developed for specific situations, and later applied to analogous enterprises. There are two types of model, depending on how the data are collected and analysed. Models of existing staffing levels use staffing data from a number of enterprises to predict the staffing needs of other enterprises with analogous tasks. For example, in nursing there is much data on existing staffing levels across sites in a health service, such as the UK's National Health Service. We can examine the staffing levels and concomitant input and process variables to determine how input variables correlate with overall nursing staff levels. The alternative method is summation of task times: if we know the time for each task, then we can sum across all of the tasks in a job to find the total workload and hence the number of staff to meet that workload. The estimates of time per task can come from historical data such as timesheets and work order records, from estimates by subject matter experts or from one of the various time study techniques. Staffing models are needed in human factors, so we need to access literature outside the immediate profession.

KEYWORDS

Staffing, workload, management

A brief outline of the work carried out

As part of a series of studies to determine appropriate staffing models for various government enterprises, human factors representatives with other disciplines examined modelling and models applicable to, for example, Air Traffic Control (National Research Council, 2010), airways facilities maintenance (National Research Council, 2013) and maintenance of hospital facilities (National Academies of Sciences, Engineering, and Medicine, 2019). The types of model available were listed and criteria for choice of model in each particular context were developed. This resulted in characteristics of an 'ideal' model for that enterprise. Many types of model were evaluated, mainly under the two headings given above: models of existing staffing levels, and summation of task times. This paper examines the fit of model types to different situations, and more importantly from a human factors viewpoint, the interaction of staffing levels with the International Ergonomics Association's objectives of performance and wellbeing.

Findings/solutions (the outcome)

The specific human factors issues centred on workload and performance. Staffing models work at various levels of aggregation, for example the individual department, the individual work site or the whole enterprise. At each higher level, the detail available at the lower levels may not be appreciated by the higher level decision makers. These are often the ones charged by the oversight authority (for example the board or the government) with maintaining service and with keeping costs bounded. Human factors is the discipline most closely associated with examining and recommending rational workloads for staff considering cost, error rate and the consequences of workload on the individual staff member.

Impact

As practitioners we should be aware that staffing models, of various degrees of adequacy, do exist and are likely to be instigated and used by management, often without management awareness of their assumptions or implications. When presented to management under such titles as ‘benchmarks’, these models carry considerable weight. Benchmarking is a standard activity in management, using data from hopefully analogous organisations as the basis for comparison with the current status in the industry. It is rather easy to find published sources for benchmarks without fully understanding their differences from our situation. We as human factors practitioners need to understand the various alternative modelling techniques to help management select one, or several, that meet their needs.

We also have an obligation to make clear the consequences of over and under staffing, particularly when there is continued pressure to reduce workforce headcount, with little acknowledgement of its effect on system performance and workforce health and safety. The issues of excessive workload, and the use of lower cost part-time labour are well documented and relevant here.

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