

Job Analysis/Work Design

Human Factors and Quality Improvement:

*An overview of interventions for the Human
Performance Practitioner*

Newman S. Lanier

Summer I 2008 UNCW

Dr. Florence Martin

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Quality Improvement

The output of a system or organization is judged on quality. The organization itself and the consumer make that judgment. The output or aim of the system is often times confused with the bottom-line or profits. In a perfect or theoretical world, the aim of the system is to satisfy consumers while maintaining a balance with safety and profits. However, in a modern capitalist organization, profits can outweigh quality in the short-term. In an effort to focus the entire organization on Quality, thinkers like Deming, Juran, and Crosby have written about Quality Improvement as a form of performance technology intervention and a way to combat this straggle hold of profits on commercial organizations.

"A system must be managed. It will not manage itself. Left to themselves in the Western world, components become selfish, competitive. We cannot afford the destructive effect of competition."

Deming 1993

Three ways in which the human performance technologist (HPT'ers) can manage a system is through 'Quality improvement' interventions. Total Quality Management (TQM), Continuous Improvement, and Value Analysis / Engineering are outlined below.

"TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society." ISO 8402:1994

The basic tenets of TQM are ingrained value of quality at all levels of the organization, pride in workmanship, esprit de corps, and 'constancy of purpose'. In order to implement TQM correctly, the organization must undergo a paradigm shift in culture. Every member of the organization must understand the purpose of the organization and work with pride toward that purpose. This sense of

pride and morale can fill an organization with enough energy to overcome obstacles and exceed standards.

Another basic principal of TQM is 'Continuous Improvement' which is sometimes referred to as "Kaizen", which is Japanese for improvement. It is a practice that emphasizes an ongoing effort to improve both the productivity and the quality within an organization. Like TQM in general, continuous improvement strategies requires a paradigm shift in how people think about their jobs. Moving from 'understanding of the content of one's job description' to 'understanding how the job contributes to the business process' is one example of the necessary shift in perception. Due to the holistic and often difficult task of implementing this type of change, teams, called 'Change Agents' or '6 sigma teams', are sometimes formed to manage and promote the change. The process these teams use is DMAIC (Define, Measure, Analyze, Improve, and Control). The process of evaluation and change can be seen as continuous improvement and the result may be the recommendation of another type of intervention (ergonomic or motivation or work design related)

"Value analysis is a systematic effort to improve upon cost and/or performance of products (services), either purchased or produced. It examines the materials, processes, information systems, and the flow of materials involved." (<http://thequalityportal.com/articles/value.htm>)

Value analysis and engineering studies and changes the system to focus on where the value to the system's products is added. The goal is determining where value is added to products and processes in the system and optimizing for that value.

Implementing a Quality Improvement intervention

There are many tools in the HPT'ers toolkit that relate to TQM. Charts, check sheets, and diagrams can help illustrate and communicate the intervention to others. But, the actual intervention is

the change in mindset to focus on quality, accept evaluation and change, and commit to the goals of the organization. TQM is a cultural intervention and should only be implemented when there is a complete understanding and commitment from the management. "...an overemphasis on tools, in the mistaken belief that the tools are TQM, can lead the organization in the opposite direction away from organizational commitment to quality" (Sashkin and Kiser 1983) A TQM intervention requires a considerable amount of time and effort from all parts of a system, not the least of which is understanding the ideas of TQM and disseminating that understanding to every participant in the system. Perhaps this is why Six Sigma teams are often used to implement the TQM intervention and change the organization.

TQM is a complete paradigm shift for the organization. This is a long term intervention which may take years to complete and there are no guarantees of success. A TQM transformation can be drastic, but the rewards can be equally drastic. As evidence, the Japanese system of TQM (seeded by W. Edwards Deming in the late 40s) has become the model not only for Asia but worldwide.

Human Factors

Most groups, organizations, teams, firms, and systems involve humans. People are the lowest common denominator in business organizations. As we industrialized, people in organizations and systems were dehumanized and treated like factory machinery. The industrial revolution is rife with examples of the poorest working conditions and horrible tragedies called 'industrial accidents'. The barons of industry justified this as essential for profit, but in the modern era we know that workers are more productive and organizations more profitable if conditions are safe and healthful. Human Factors is a term used to define the interface, both physical and mental, between humans and machines in the work environment. The task of the HPT is to fit the task or equipment to the human. By implementing these interventions that foster a safe, healthy, and productive workplace, the organization helps itself in the following ways; employee and public relations, reduced liability, marketing, and productivity. Three types of Human Factors interventions used by the HPT are Ergonomics, Safety engineering, and Preventive maintenance.

"Ergonomics involves the study and design of workstations, work places, workflow, equipment, and tools to accommodate the physical and psychological capabilities and limitations of employees."

(Van Tiem 2001) Examples of physical ergonomic interventions are; split keyboards and properly propositioned workstations, floor mats for workers standing in one position all day, or rubber grips on tools. Psychological ergonomic interventions are; well designed user-interface on a computer screen, and easy listening music or Muzak played in the workplace. The HPT studies how the worker and the work environment interface or interact and designs changes that increase performance and / or safety.

“Safety Engineering is a planned process to reduce the symptoms and costs of poor safety and health and make the work environment safer and healthier for employees.” (Van Tiem 2001)

Examples of Safety Engineering interventions are installing exhaust fans to reduce exposure to toxins or irritants, training about the effects of stress, or implementing a policy on proper (steel toe) footwear. Whereas Ergonomics seeks to increase productivity, Safety engineering seeks to reduce accidents and injuries. There are quite a few workplace hazards such as; loss of life or limb, cardiovascular diseases, and arthritis. In addition to these physiological conditions, the safety engineer must also account for sociopsychological conditions as well, like; apathy, irritability, and procrastination.

Preventive Maintenance is a proactive, systematic approach to equipment and tool maintenance at all levels of an organization. This involves routine checks on functioning equipment to avoid malfunction and promote optimal performance. For instance, tire pressure check done every time a driver picks up a delivery vehicle will do two things. One, it will avoid malfunction by alerting the driver of a dangerous tire condition before an accident takes place. And, two, it will promote optimal performance by ensuring correct tire pressure which can translate into monetary savings. Other than routine checks of vehicles and equipment, preventive maintenance can extend to other human factors as well. Examples of the borderline interventions are daily warm-up and stretching, or eye and hearing tests. The idea is to catch problems before they become accidents. The philosophy that supports preventive maintenance also supports other human factors and TQM.

Implementing a Human Factors Intervention

The major benefits of good 'Human Factors' interventions are a focus on the person as a key to top performance. Happy, healthy, and well workers are often an assumed resource. But if those individual's work environment is not tailored and maintained for safe performance, then top performance is not sustainable. Another benefit is that ergonomic, safety and PM interventions can be easily implemented without too much disruption to the system. Swapping out a tool for one that is better designed (i.e. a workstation or a screwdriver with an oversized, rubber grip) does not require many resources or systemic change.

However, there are limitations to human factor interventions. They may not change the organization as a whole or bring on an attitude shift towards safe use of equipment, for example. You can still slouch in an ergonomic chair. You can meet safety regulations and still get into accidents, and you can still fill out a PM checklist and have a vehicle breakdown. Human factor interventions can support a positive, 'quality minded' attitude, but it can't instill it alone. These interventions work best when coupled with others.

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