

## **PARTICIPATORY ERGONOMICS (PE), ITS BENEFITS AND IMPLICATIONS: A SYSTEMATIC REVIEW**

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### **ABSTRACT**

Now a day's participatory word is gaining popularity among the researches that deals with the human being. It is also being used in the field of ergonomics because of its various benefits and implication. As, it involves people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals. It helps to develop feeling of ownership among the front line workers that will help to improve the working conditions of the workplace. Thus it helps in reducing the various physiological and psychophysical hazards like MSD problems by providing an opportunity to workers to analyze their own working condition.

**KEYWORDS:** Planning, Controlling MSD Quality Circle

### **INTRODUCTION**

Participatory Ergonomics (PE) is a sub-area of macro ergonomics in which workers are involved in workplace, job, and work organization design (or redesign) efforts that will directly affect their jobs (**Hendrick and Kleiner, 2002**) and the socio technical principles are fundamental in designing work systems with the goal of ensuring a fully harmonized work system across several subsystems i.e. personnel and technological system, external and internal environment and the design of the organization (**Kleiner, 2008**). According to **Vink (2005)** it is a discipline that studies how different parties should be involved in a design process and it is the adaptation of the environment to the human together with the proper persons in question (participants) or it can be very simply described as a concept involving the use of participative techniques and various forms of participation in the workplace. It has been used to create more human centered work (**Imada, 2000**), to improve work organizational climate, reduce mental workload and rehabilitate workers with back pain (**Loisel et al., 2001**). It has also been used to prevent musculoskeletal disorders in workplaces (**NRC, 2001**) and associated with manual tasks across a range of industries including electrical and car manufacturing, meat processing, print media (**Rosecrance and Cook 2000**), office computer work, construction (**de Jong and Vink, 2000**) and health. Now it is the internationally recommended approach to reducing MSD associated with manual tasks (**Carrivick et al., 2001; Stubbs, 2002**).

Participatory ergonomics (PE) is a noted implementation strategy to develop ergonomic measures from the bottom up (**Haines, et al., 2002; Jensen and Friche, 2008 and van et al., 2005**) and it is principally the most often used methodology in the optimization of organization and work system design (**Brown, 2002**). The tools used in PE depend on the social, organizational and industrial context and must allow for a progression from practical to abstract and conceptual issues. This may mean that a combination of quantitative and qualitative data are required and can be collected using a

variety of methods (**Hignett, 2004**). **Rosecrance and Cook (2000)** implemented a participatory ergonomics process through the use of action research methodology. Furthermore; few studies on the factors for implementation of ergonomic interventions have used qualitative research methods (**Hignett et al., 2005**). The use of qualitative research techniques can result in a better understanding of the meaning of the factors for implementation and to adopt PE, it is essential that the top management is committed and supportive. The PE ergonomic measures are developed by working groups that consisting of workers, management, and other important stakeholders (**Haines et al., 2002; van et al. 2005; Vink et al., 2006, 2008**). By using this bottom up approach, the acceptance to use the ergonomic measures may become more widespread among end-users (i.e., workers). To inform, educate, and instruct workers on the PE process, other supportive implementation strategies, such as distribution of brochures and flyers, providing training, and capitalizing an opinion leaders are used. The actual implementation of ergonomic measures is considered as a (possible) consequence of the PE process and can be enhanced by the use of additional implementation strategies (e.g., use of opinion leaders) reported by **Grol and Wensing (2004)**.

According to **Bongers et al. (2002)**, the PE approach ideally encourages workers to be involved in controlling their own work activities, which consequently decreases work organization. Similarly **Eklöf et al. (2004)** defined that ideal PE approach as an approach where the employees are empowered to design and change their work station. The primary reason for engaging workers in a PE intervention was to reduce injuries or risk factors for injuries. The use of PE for these purposes has previously been shown to be reasonably effective (**Cole et al., 2004**).

A characteristic feature of most PE interventions is the formation of some type of “team” or committee, typically made up of employees or their representatives, managers, ergonomists, health and safety personnel, and possibly research experts. Once formed, teams usually receive training from an expert, most often an ergonomist, to become familiar with ergonomic principles (**Wells et al., 2004**) because team members work together to improve workplace conditions through participation, communication and group problem-solving in PE interventions, they can have a positive impact on workers’ health (**de and Vink, 2000; Hainse et al., 2002**). Similarly **Rivilis et al. (2008)** stated that a common PE approach is the ergonomics team model places the ergonomist in the role of expert facilitator guiding development of a ergonomics team, or ergo-team made up of representatives from employee, management and Occupational Health and Safety levels of the company. The team selects issues to deal with, conducts analysis and interviews with their peers, synthesizes information and propose solutions ‘Ergo-Team’ resources that outline the steps required to train individuals, set up organizational support structures, and develop learning culture (**Haines et al., 2002**).

Typically participatory programs involve experts and workers collaborating in program design, implementation and follow-up and it also include strong management support, active employee involvement, and providing training for employees, supervisors, managers, engineering and maintenance personnel. Some cases were reported where labor unions have actively promoted PE program (**Bryson, 2004; Canadian Auto Workers, 2004**). Whereas participatory approaches include design decision groups, quality circles, and worker management committees. Common characteristics of these approaches applied to ergonomics are worker involvement in developing and implementing ergonomic solutions; dissemination and exchange of ergonomics health and safety information; spread of ergonomic expertise to all levels of organizational structure; and cooperation between experts and non-experts (e.g., workers). These programs create a level of consideration and respect for workers’ opinion. This approach can lead to novel and effective ergonomic solutions (**Hendrick and Kleiner, 2000**).

As PE is a team approach therefore **Zalk et al. (2000)** conducted a study by making a multidisciplinary team based on participatory approach which prepared a training programme includes intervention methods, ergonomic tools used, damage acquired, and effects of waste container handling techniques on lower back, shoulder, and wrists and methods to help proactively reduce injuries associated with this profession. Similarly **Allard et al. (2000)** have designed and established ergonomics groups for identifying and controlling musculoskeletal problems and suggest interventions in high-risk situations and implemented corrective measures. By using action research methodology **Rosecrance and Cook (2000)** made an ergonomics committee, which included representatives of different departments to prevent WMSDs in the newspaper industry and the results showed that PE could contribute to the development and implementation of ergonomics solutions.

### **BENEFITS AND IMPLICATIONS OF PARTICIPATORY ERGONOMICS (PE)**

Within the health and community care sector, physical and psychosocial hazards are recognized as prominent ergonomic risk factors (**Sherehiy et al., 2004**). Recent evidence suggests that when compared to a trained expert, such as an ergonomist, front-line workers are able to provide more detailed information concerning social, organizational and physical hazards. Also, the use of a participatory approach can help to move the culture of an organization to one that values participation, team work and collaboration among all workplace parties, therefore reinforcing a sense of community in the workplace (**Zalk, 2001**).

The EPIC (Ergonomic Program Implementation Continuum) program follows the OSACH traditional five steps to program development. It also incorporates factors identified by the Institute for Work and Health (**IWH, 2008**) as increasing the likelihood of a successful PE intervention, specifically: Ensure management support and resources, involve the right people, define participant responsibilities, provide the necessary training, identify an individual to champion the PE process, use group consultation to make decisions.

According to (**Zalk, 2001**) participatory methods are increasingly utilized in improving ergonomic aspects of work and workplaces. The merits of these methods are widely recognized as a means of promoting initiative of local people and achieving workable solutions (**Khai et al., 2005**). A notable merit is that they contribute to improving various forms of workplaces in their diverse conditions (**Kawakami and Kogi, 2001; De Jong and Vink, 2002; Koningsveld et al., 2005; Eklund, 2000; Hagg, 2003**). It is of particular interest that participatory methods are extensively used in workplace improvement including risk management processes in both industrially developed and developing countries (**Shahnavaz, 2000; Kogi, 2002; Hignett et al., 2005**). However it is important to know how these methods can be effectively applied for improving working conditions in small enterprises despite many constraints (**Engstrom, 2000; Kawakami and Kogi, 2001**).

Recent experiences in using PE methods for ergonomic workplace improvement was reviewed to know that how, these methods can be effective in different settings. Further, the review confirms that the participatory methods are always modified according to each local situation. This is done by developing a group-work toolkit comprising action checklists and illustrated manuals and by building a support network of trained trainers. It is suggested that participatory methods taking a good-practice approach by multi-area low-cost improvements through the group use of locally adjusted toolkits are effective for improving small-scale workplaces including those in developing countries (**Kogi, 2006**).

According to **Hignett *et al.* (2005)**, there are differences in the understanding and applications of PE projects between different nations of the world such as Japan. In the USA, PE tends to be used at macro-ergonomics level, for the development and implementation of technology, whereas in Europe PE approaches have been applied at all levels of ergonomics interventions, with the key factor being the involvement of all stakeholders in the process.

Based on a literature review, PE was found to be applied in diverse work environments including health care settings (**Carrivick *et al.*, 2005; 2002,**); red meat packing industry, construction (**de Jong and Vink, 2002**); automotive industry (**Laing, *et al.*, 2005**) and several other manufacturing and warehouse settings. Further, PE was utilized as tools for rehabilitation, return-to-work, and back pain management interventions (**Loisel *et al.*, 2001**). Additionally, more relevant to this line of research, PE was utilized in office environments, for VDT users and was also applied among university students (**Robertson *et al.*, 2002**). Finding ergonomic solutions to workplace musculoskeletal disorders (MSDs) can range from micro issues, which require individual design for a single user workstation, to macro issues looking at systems for both strategic direction and operational processes. Participatory ergonomics (PE) has much to offer as a descriptor of a number of different approaches used to tackle problems at both these levels. Historically, MSDs have been tackled with expert input at a micro level, with mixed results.

A recent review of the literature on PE (**Morris *et al.*, 2004**) reported a shift towards reports and reviews of methods and approaches, which suggests that PE is a maturing approach, moving beyond the initial conceptual development and single applications into implementation and evaluation. It was noted that although a participatory approach was generally considered to be beneficial there were rarely reports from projects that had limited or no benefit from participatory interventions and that there was 'often a lack of quality evaluation'. A possible reason for the relative lack of publications might be that practitioners are reluctant to publish apparent failures. The lack of quality evaluations may be due to two factors. Firstly, a company is less interested in evaluating the project if the outcome has not been favorable. Secondly, a company does not see the need for evaluation if the project has been a success. In this case, there may also have been significant reorganization within the company that can limit a pre/post-evaluation protocol. The latter is a common problem with studies where the variables impacting on the outcome measures may be difficult to control. These concerns can be addressed if a more systematic approach is taken to case study research. As case study is defined by **Yin (2003)** as 'a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence'.

Besides all these fact there has been considerable effort in the last few years to develop a framework for PE projects with initiatives supported by the Health and Safety Executive and the European Trade Unions Technical Bureau for Health and Safety working in co-operation with The National Institute for Working Life and the Swedish Trade Unions SALTSA (**Morris *et al.*, 2003, 2004**).

## CONCLUSIONS

Hence it is concluded on the basis of above discussions that the PE can be the best method to reduce ergonomic problems arising because of various workplace risk factors. It increases the motivation of employees towards the development of the solutions. It also develops the feeling of ownership among them. PE approaches can apply at all levels of ergonomics interventions, with the key factor being the involvement of all stakeholders in the process.

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