Building Taxonomy Knowledge 'Systemic Ergonomics Intervention Work' - a Product Joining up practice with theory in an Industrially Developing Country and its 'Meta-Reflection'

Faramarz Helali

Department of Business Administration, Technology and Social Sciences, Luleå University of Technology (LTU) Sweden – Norrbotten, Luleå, Sweden

Abstract: Based on evidence accumulated during the author's 19 years of ergonomics intervention experiences and investigations with the different challenges and roles, the ergonomics 'know-how' transfer explores and describes the models to success implementation of Ergonomics and Human Factors Management in an Industrially Developing Country. A systematic ergonomics 'know-how' transfer management at Micro and Macroergonomics-based levels for training and learning could be managed and led in an industrially developing country. This paper describes a model of systemic intervention work based on the finding "Building taxonomy knowledge 'systemic ergonomics intervention work' as a product joining up practice with theory when 'Reflection learning' (Learning of the reflection) is pitted against 'action learning' (Learning of the action).

Practitioner Summary: Even though it is a popular activity-oriented approach for systemic ergonomics intervention work in Industrially Developing Countries (IDCs), little is known about the result of 'Tips' (i.e., to hit slowly) from an action pathway, the challenges the systemic ergonomics intervention work faces in taking action in an Industrially Developing Country while vision driven Ergonomics and Human Factors Management performance on the different understanding main purposes: "Know-Why" – "Know-How" – "Know-What" are significant for creative trust and then, the purpose Know-for-use that 'How will we go further here?' (i.e., leading through appreciative).
The current study demonstrates that in the building systematic ergonomics intervention influences as a product joining up practice with theory. Aimed at industrial managers, staff responsible for workforce, improvement of health, safety, and ergonomics, productivity and organizational development those following Ergonomics and Human Factors knowledge transfer management as a professional.

Keywords: Macroergonomics, Systematic Ergonomics Intervention Work, Meta-Reflection, Taxonomy Knowledge, Industrially Developing Countries

1. Introduction

Daniellou and Rabardel (2005) discuss recently in ergonomics that 'Activity-oriented approaches' (i.e. reference to activity is at the heart of the professional approach of ergonomists) are a vast field of developing theoretical and empirical research. In an action pathway journey and its challenges as the ergonomics intervention programme faces in taking action in "organization", viz., at individual, group, and organizational levels, the author has had different roles since 1993 for implementing the ergonomics 'know-how' transfer to industries and universities in an industrially developing country (IDC). See Helali' s study (2008, p. 103-107). Ghaye and Lillyman (2000) have described, 'joining up practice with theory". They noted that there are three elements in Schön' s (1983) idea of practical knowledge; i.e. 'knowing-in-action', 'reflection-in-action' and 'reflection-on-practice', in addition, they have added 'meta-reflection', i.e. 'this is thinking again about our reflection-on-practice. It is stepping back and checking out what we thought and said earlier. It is further removed from the action than 'reflection-on-practice' (Ghaye and Lillyman, 2000, p. 48).

This paper describes a model of systemic intervention based on building taxonomy knowledge 'systemic ergonomics intervention work' as a product joining up practice with theory when different ergonomics intervention techniques could be managed and led as an action pathway of the ergonomics intervention work journey (i.e., own experiences of the different 'reflecting, planning, acting, and observing') in an industrially developing country.

2. A Methodology for 'Systemic Ergonomics Intervention Work' while there is one way of distinguishing between Action Research-types Intervention

To give an initial definition of intervention, it simply means purposeful action by a human agent to create change. It should not be considered a general definition (Midgley, 2000). For this reason that 'If intervention is purposeful action by an agent to create change, then systemic intervention is purposeful action by an agent to create change in relation to reflection on boundaries' (Midgley 2000, p. 129). He suggested that an adequate methodology for systemic intervention should be explicit about three things. The first is the need for agents to reflect critically upon, and make choices between, boundaries. The second aspect that should be made explicit is the need for agents to make choices between theories and methods to guide action, which requires a focus on theoretical and methodological pluralism. Finally, an adequate methodology for systemic intervention should be explicit about taking action for improvement.

Midgley (2000) mentioned that this ensures a proper consideration of a minimum set of three 'angles' on possible paths for intervention. Making all of them a specific focus of a methodology for systemic intervention guides the reflections of the agent, ensuring that boundaries, theories, methods, and action for improvement all receive explicit consideration. The three activities are diagrammed in relation to one another in Figure 1. Critique specifically means boundary critique (reflection on, and choice between, boundaries); judgment means judgment about which theories and methods might be most appropriate; and action means the implementation of methods to create improvement.

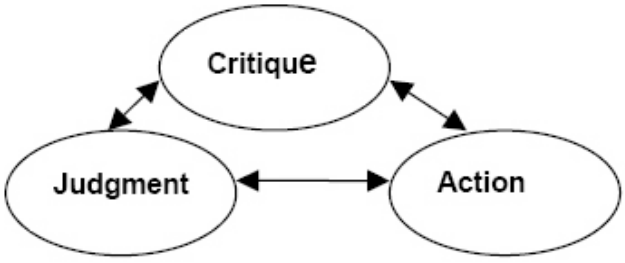


Figure 1: Three aspects of a methodology for systemic intervention (Source, Midgley, 2000, p. 75)

Put simply the conception of action research that the author used in his study (2008) was one of learning by doing; individually and collectively. One popular action research model is "reflecting, planning, acting and observing". There are many kinds of action research including: Action Research (AR), Participatory Action Research (PAR), and Participatory and Appreciative Action Research (PAAR) (Ghaye, 2008). This has mentioned, which one way of distinguishing between AR, PAR and PAAR is by the nature of the key questions that guide the research (Ghaye, 2008). They have noted example of key questions as follows:

In Action Research (AR): How can I improve my practice here? Or what is the practical problem I need to address in my work?

In Participatory Action Research (PAR): What can we do together to make a positive difference here?

In Participatory and Appreciative Action Research (PAAR): What is it we want more of here and how can we amplify this? Or „What are our successes and how can we amplify them to build and sustain a better future from valued aspects of the positive present?

The main different between action research and a case study (Yin, 2003) is that action research is an approach to research which aims at both taking action and creating knowledge or theory about that action. The outcomes are both an action and a research outcome, unlike traditional research approaches, which aim at creating knowledge only.

On the other hand, induction and deduction are not the only alternatives (Alvesson and Sköldberg, 2000; Kovacs and Spens, 2005). There are others, such as Abduction, which in simple terms means the ability to see patterns, to reveal deep structures (See, Alvesson and Sköldberg, 2000; p 50). Thus, the way the author has tried to avoid the disadvantages of deduction and induction is by using his research approach (See, Helali, 2008) and its meta-reflections based on a kind of logical argument called Abduction.

According to, Alvesson and Sköldberg (2000), Abduction begins with rising from empirical regularities to meet theory. Abduction can be distinguished from induction and deduction through the idea that it goes further than just condensing facts based on theory-charged empirical material (Alvesson and Sköldberg, 2000). Thus, if the theory were established, it would be tested in an empirical frame and if the empirical frame were established, it would create or build new theory.

2.1. "How do the reflective practices work in an interactive understanding of the author's research way as a 'Meta-Reflection'?

Figure 2 is drawn by the author that "How do the reflective practices work in an interactive understanding of his research way?"

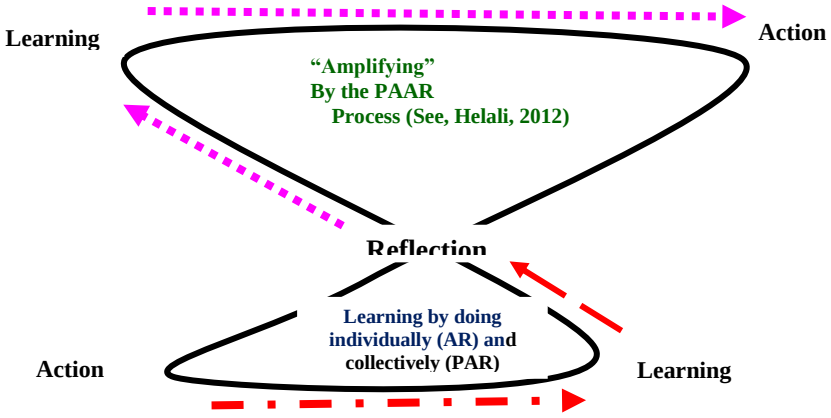


Fig. 2: How do the reflective practices work in an interactive understanding of the Helali' s research way?

For this reason that there are also different alternatives to you till selecting and understanding and its conversation the research to propose "Amplifying" by using the Participatory and Appreciative Action

Research (PAAR) process (Ghaye, 2007, p. 15) and also see Ghaye 2008; Or "What might be an 'Appreciative Intervention Work'?" (See also, Helali, 2012, p. 2733). Because of, 'Reflection learning' (Learning of each reflection) is pitted against 'action learning' (Learning of each action).

In action learning; learning by doing individually (as Action research approach) and learning by doing collectively (as Participatory action research approach) could be formulated and it is introduced based on the Helali' s study (Helali, 2008) as the action research types-intervention.

2.1.1. Ergonomics know-how transfer-based 'training'; a learning-performance workshop

At the beginning, the author's research was conducted according to an 'ergonomics awareness building', i.e., one form of intervention research is mentioned in the literature by Shahnavaz (1991), that it includes an intervention by workshop to purpose implementing an ergonomics intervention programme. The objective of an ergonomics intervention programme was to design jobs that were possible for people to do, worth doing, and give the worker job satisfaction and a sense of identity within the company. For this reason, the author defined the ergonomics intervention programme in 2003 as follows:

'A well -planned, structured process for thinking and action at three levels, viz, individual, group and organizational, in an organization for instigating change, which is suitable for the work systems in question. It is important that the ergonomists receives a professional evaluation and improvement of the work system through the participation of the workers (end-user) in action" (See also, Helali, 2008, p. 1)

Therefore, the firstly, a study has concerned itself with 'Research Question a' (i.e. 'What are the main causes of these constraints?'). This research question could be discussed with the results in relation to theory in Section 7.3 in the Helali' s study (2008) based on the evidences in Table 1.

Table 1: The ergonomics training workshops and training courses conducted by Professor Houshang Shahnavaz and his Ph.D. Student (the author) as the pre-intervention phase of his research working

Ergonomics Training Workshops & Training Courses	Date	Numbers of participants	Numbers of Workshops & Training Courses	Time (hours)	Total man hours
Industries	July 1993 to Nov 2002	293	24	681	16838
Universities	Dec 1996 to Nov 2002	94	7	453	3375
Total	During 10 years	387	31	1134	20213

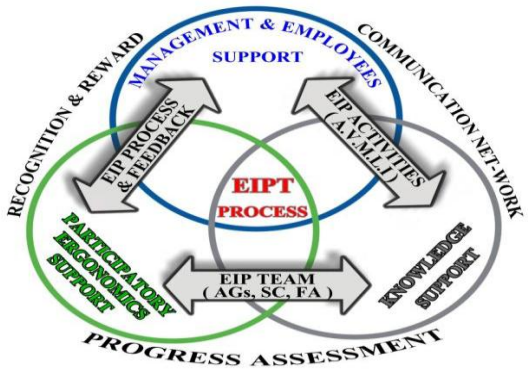
The method of conducting the training as a learning-performance workshop was an action learning approach, which means delegates were required to participate actively in the workshop. Individually and in small groups" participants could contribute with their experiences and apply the acquired information to encounter selected common problems in their own company. The proposed duration of the workshop was one to three days and the number of participants in a team varied from 8 to 57, see also the successes of ergonomics awareness building and its failures at the three levels (individual, group, and organizational levels) between 1993 till 2002, (Helali, 2008, p. 7). When a study has concerned itself with 'Research Question b' (i.e. 'Is it that the Ergonomics Intervention Programme (EIP) is difficult to implement?'). This research question could be discussed with the results in relation to theory in Section 7.4 in the Helali' s study (2008).

2.1.2. Ergonomics know-how transfer-based 'learning'; learning by doing individually for the purpose of competence of people/participants at the workplaces

"Knowing-in-action", i.e. the context was the ergonomics intervention programme that it linked to theories-of-action. In the first pre-intervention process phase, the root cause of 'Problem' was found. The "reflection-in-action" was 1) in a particular workplace (the workplace was in the IDC-case Iran, 2) thinking on our feet (the ergonomics was by the ergonomics training workshops), and its improvisation, thus the "reflection-on-practice", i.e. 1) before or after the event - The ergonomics intervention programme was by the ergonomics training workshops events at three levels, after that a sequence was the ergonomics intervention programme technique that it was significant for the ergonomics "know-how" transfer-based 'learning' by doing individually as follows: Based on different case studies, the ergonomics intervention programme technique was formulated as follows: a) Ergonomics Awareness Building = Ergonomics Training + Ergonomics Application + Evaluation; b) Ergonomics Intervention Programme Technique (EIPT) = Ergonomics Awareness Building + Research Activities + Network Building. In addition, Participatory Ergonomics (PE) will improve the intervention success. However, the role of ergonomics expert or an ergonomics facilitator was also high as a trainer. For detail its materials and associated methods of the EIPT model can see Helali, 2008.

2.1.3. Ergonomics know-how transfer-based "learning"; learning by doing collectively for the purpose of the improving work system

Results of the projects in three subsidiary companies between 2004 to 2006 (Helali et al., 2008 and Helali, 2009) as well as experiences from Glucosan factories between 1995 to 1998 indicated that using a participatory ergonomics approach discovered new capabilities and created new checkpoints at the work system and the workplace by the EIPTs" tool. The experiences and the study have indicated that the requirements were: 1) organization support (i.e. management and employees support), 2) knowledge support (i.e. Micro and Macroergonomics), and 3) participatory ergonomics process (i.e. to engage all three levels by the EIPT"s tool support). The results of the EIPT in practice have indicated a model of the EIPT process (Fig 3).



EIPT: Ergonomics Intervention Programmed Technique
EIP: Ergonomics Intervention Programme
A: Awakened need of change
V: Vision driven
M: Method
L: Continuous Learning
I: Integrating
AGs: Action Groups
SC: Steering Committee
FA: Facilitator (s)

Fig. 3. Proposed model for Ergonomics Intervention Programme Technique (EIPT) Process (Source: Helali, 2008)

The main Ergonomics Intervention Programme Technique Process activities include: 'Awakened need of change', 'Vision driven', 'Method', 'Continuous Learning', and Integrating". These factors have contributed to

the success of the participatory ergonomic intervention or participatory action research-type intervention at the organizational level with the different ergonomics intervention processes and built its team. Furthermore, when a study has concerned itself with Research 'Question c' (i.e. 'How can EIPTs be successfully implemented and internalised by such organizations?') and 'Research Question d' (i.e., 'what practical activities are required for the EIPTs' implementation?' These research questions could be discussed with the results in relation to theory in Section 7.5 and Section 7.6 in the Helali' s study (2008).

In the author' s opinion for the Macroergonomics intervention, the strength of this new model (Fig. 3) is that the ergonomics intervention programme technique process starts with 'Middle-out' (i.e. focus on processes), 'Top-down' (i.e. strategic approach to analysis), and 'Bottom-up' (i.e. participatory ergonomics) together for improving and changing of the work system. The exercise suggests that the ergonomics intervention programme technique process as a model can be used as a first basis to support the participatory ergonomics process for improving work systems in organizations. In the this model, the key question was "What can we do together to make a positive difference here?"

Furthermore, two-research studies focus was on the model when it was in practice since 2008. Example, the process performed for the PDSA Cycles of learning (see, Helali and Abdollapour, 2014; for the purpose of an awakened need of change to the improving work system) and also (See, Helali and Dastranj, 2014; a continuous learning for the competence (both technical and social skills) of people/participants at the workplaces.) The purposes were also for the M.Sc. Students when it could be to a necessity 'pedagogy idea'; i.e., a way of leaning with three different main interactions between "Teacher and Student" as follows: 1) Joint Learning Process (Teacher as Learner and Student as Learner; 2) Interactive Research Process (Teacher as Research and Student as Research; 3) System-oriented (Teacher as System and Student as System).

Therefore, the factors of the EIPT Process model will be contributed to the success of 'Wisdom' (i.e., what to do, act or carry out or the quality of having experience, and a better judgment for further research of here) based on re-framing the EIPT process that it is also in practice in an 'appreciative way' (i.e., research can be with company and the participation of people, not only on people or techniques and tools), (See also, Helali, 2012; Helali and Abdollapour, 2014; Helali and Dastranj, 2014) in the IDC' s industries. In the appreciative way, in fact, it 'starts out from what is actually happening – not from what appears to be happening, or what our initially limited understanding leads us to believe is happening' (Ghaye et al, 2008, p. 371).

3. 'Taxonomy knowledge' on the systemic ergonomics intervention work as a Meta-Reflection of a Product Joining up practice with theory

The ergonomics intervention models based on the long research journeys since 1996 could be focused on Ergonomics 'Know-How' (i.e. learning by doing could be characterized as practical knowledge), 'Know-What' (i.e. learning by using could be characterized as strategic understanding), 'Know-Why' (i.e. learning by studying could be characterized as theoretical understanding), 'Know-Who' (i.e., learning by engaging participants to purpose participation and collaboration). A kind of Ergonomics and Human Factors knowledge

Transfer management could be implemented and introduced to co-workers (Helali, 2008; 2012). Furthermore, the participants/students could be engaged in the recognition of processes and applying for Ergonomics Intervention Programme (EIP) – based on levels 'Training' (i.e. training as a learning-performance workshop), 'Learning' (i.e. learning by doing individually and collectively as the EIPT and EIPT Process) when there are many approaches to managing and understanding change to choose from theories of change (See, Helali, 2008), none of which appears to tell the whole story, most of which are convincing up to a point. Therefore, 'taxonomy knowledge' on the ergonomics intervention work as a product can be outlined as follows in Table 2. These purpose the activities training and learning are based on using different technologies on the knowledge within organization/workplace.

For this reason that, knowledge can be purposeful coordination of action. Achieving intended purpose is the sole proof or demonstration of knowledge (Zeleny, 2010). He noted that its quality could be judged from the quality of the outcome (product) or even from the quality of the coordination (process). Helali (2012) has indicated that, ergonomics '*know-what'* refers to the knowledge of objects, facts, components and goals from different strategic understanding as 'learning by using' because, Zeleny (2010) has noted "what is knowledge?" and also Sanchez (1996) has stated "what are three different kinds of knowledge within an organization. Because of, Zeleny (2010) emphasized that pragmatic philosophical roots firmly established the knowledge when it was Albert Einstein who cautioned our world "Information is not knowledge". For this reason that Einstein also asserted "Knowledge is experience. Everything else is information" (Zeleny, 2010).

Table 2. 'Taxonomy knowledge' on the systemic ergonomics intervention work as a Meta-Reflection of a Product Joining up practice with theory

	Technology	Analogy Building 'ergonomics intervention work'	Effect	Purpose
Data	Ergonomics Intervention Programme (EIP)	Elements are 'Actors'; Coach, Participants/ Students/, and also Ergonomics tools	Muddling through	Know-nothing
Information	Ergonomics Intervention Programme Technique (EIPT)	**Ergonomics Awareness Building =** Ergonomics Training + Ergonomics Application **+** Evaluation **Ergonomics Intervention Programme Technique (EIPT) =** Ergonomics Awareness Building **+** Research Activities **+** Network Building In addition, Participatory Ergonomics (PE) will improve the intervention success.	Efficiency	Know-how; Leaning by doing
Knowledge	EIPT Process	Coordination the ergonomics intervention technique processes with different useful factors toward the result product	Effectiveness	Know-what; Learning by using
Wisdom	Ergonomics intervention work (EIW)	Why systemic ergonomics interventions work? Why in this way? How can it reframe?	Explicability	Know-why; Leaning by studying
Enlightenment	'Appreciative EIW?'	Systemic Ergonomics intervention work, clearly	Truth	Know-for-use

How do we do this further of here as an Enlightenment, the 'developing insight though action' (i.e., working ethically with people at the workplaces) might be a main point of the starting for an appreciative intervention work project with focus on the following sub-research questions that it could be formulated: "What are your workplace "stories", " journeys", "culture" and "ballets (i.e. dances)" about the applying ergonomics and human factors since and how you want amplify it? (See also, Helali, 2012)

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