

NEED FOR ERGONOMICS RESEARCH IN ISLAMIC COUNTRIES

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Introduction

Improvement of living and working conditions of the people is one of the major concerns of any state. Ergonomics, defined as "the scientific study of the relationship between man and his working environment," (1) can offer invaluable help in this respect. Ergonomics can be regarded as a prerequisite for the protection of physiological, psychological and social well being of the worker and the society.

Technological change whether it is planned or unplanned, causes some interaction between man and his physical and social work environment in all the sectors of production. That is why ergonomics can find its fields of application in manufacturing, service and agricultural activities. The results of ergonomic research in these fields can contribute to, the design of optimum man-machine-environment systems (preventive ergonomics), testing of man-machine-environment systems (curative ergonomics), estimation of work load, performance and safety of the system (predictive ergonomics).

Ergonomics is an interdisciplinary activity and makes use of many scientific and professional disciplines like anatomy, physiology, psychology, sociology, engineering and management. Therefore, the ergonomic research is conducted by people, having various backgrounds but a common objective of meeting the physical, psychical and social needs of man (worker) at a satisfactory level. While achieving this objective ergonomist do not start from the materialistic question of how to increase production to its highest level profitably, but he starts from the point of the vital interests and needs of man which have to be satisfied and protected in the work place and outside of the work. But nevertheless ergonomic research causes improvements in productivity and long term profitability.

Why Islamic Countries

The above explanations indicate the importance of ergonomic research from design to consumption of any good and service.. Although this is a general requirement for any country, one may question the special emphasis given to the Islamic countries. Even a superficial study shows that Islamic

countries have many similarities, or common characteristics, not only because of the religion that they share but also because of their geographical, economic and technical standings. In other words the physical, psychological and socio-cultural characteristics of work environment in Islamic countries is significantly different than that of western European and American nations. And yet the amount of research conducted in Islamic Countries in such a vital field is very limited. For example in the last International Ergonomics Conference (2) only two of the 360 papers presented were from the Islamic countries (one from Malaysia another from Egypt). This does not only show the lack of ergonomic research in Islamic countries but also lack of communication of findings at an international level. At this point it is necessary to stress that science is universal, therefore findings of researchers in other countries can be transferred to the Islamic countries. But in order to be able to use them effectively they have to be reviewed within the context of environmental conditions particular to each country. Even this requires an extensive applied ergonomics research.

At this point it is necessary to specify the environmental factors which are specific to Islamic countries and cause problems that require ergonomic research.

Common Environmental Factors In Islamic Countries

Human beings are very adaptable creatures. They can adapt to difficult climatic, working or living conditions by forcing their anatomical, physiological and psychological well beings. If living and working under poor conditions extend over a long period, not only the efficiency of work drops down but it also jeopardize the safety and the health of men. That is why it is important to investigate the nature of environmental conditions and find the ways of eliminating their hazardous impacts on man at work.

Geographical and Climatic Conditions

A quick glance at a world map reveal that almost all of the Islamic countries are in the tropical and subtropical zones. This factor alone necessitates extensive ergonomic research because of excessive heat and humidity that every worker is continuously subjected to.

As majority of ergonomics research is conducted in Europe, Japan and North America the present literature on the influence of heat on the work performance during prolonged physical work is scarce, and mainly reflects the findings under laboratory conditions. These findings indicate on accelerating decrease of output with increasing effective temperature (3). If it is desired to have an accurate evaluation of heat stress on work output it is necessary to do some research under practical work conditions in the relevant countries.

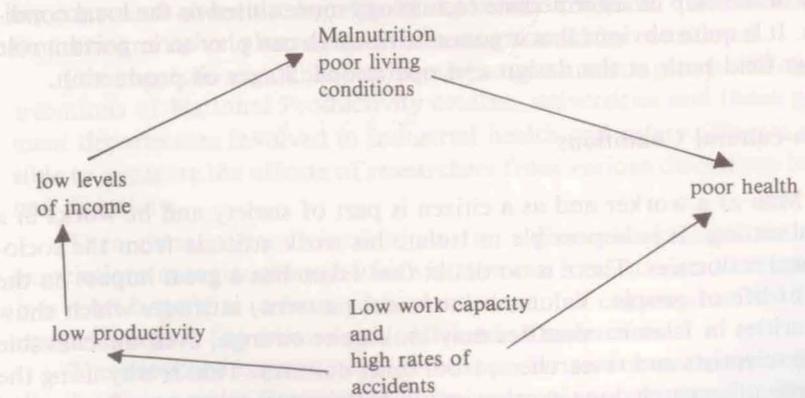
Another research requirement in these countries is in the field of anthropometry. Even a rough observation reveals the fact that body weights and body dimensions of people in many Islamic countries are quite different than those of the European or American populations (4). Yet these people use equipment and tools (both industrial and personal) designed to the western standards. This situations increases the risk of accidents, shortens the usage periods of tools and equipment and also decrease the work efficiency while using these tools.

A sample study conducted in Turkey indicated that the control units of farm tractors, manufactured according to an Italian design are placed beyond the optimal dimensions for Turkish population (5). This resulted in uncomfortable driving postures and an early wear of machine (especially the gear box). This simple example is enough to demonstrate the amount of national resources wasted because of unsuitable design of equipment.

Economic Conditions

Almost all of the Islamic countries can be classified as developing countries. Even if some of them have relatively high per capita income the distribution of national wealth is quite inbalanced and hence majority of the populations in Islamic countries suffer from low incomes which inevitably causes poor living conditions. As far as the ergonomic research is concerned nutrition and health becomes two important areas since they have direct effects on the working capacity of man. This situation can be demonstrated by a diagram (Fig. 1) indicating the vicious circle of low working capacity and poor income.

Fig. 1 Vicious circle of low productivity.



Ergonomic research can play an important role in breaking up this vicious circle, by providing healthier working environments under the existing conditions.

Another common character of Islamic countries can be seen in the composition of GNP. The major contributions to GNP is either from production of raw materials or from agricultural sector. Unfortunately both of these sectors can be characterized by "heavy physical work" which in most cases forces the physical abilities of workers and have high risks of accidents. Improvement of working conditions in these areas again is only possible by the help of ergonomic research.

Technological Conditions

As a natural consequence of economic conditions the level of technology in many Islamic countries is also rather low. This means most of the tasks which can be mechanized are still done manually in many industries. The existence of a few organizations having very sophisticated technologies does not change this general picture. Replacement of the primitive low quality hand tools with mechanized or sophisticated tools is not always a good solution to the technological problem as the later has a tendency for stimulating unemployment for certain groups of population. Instead, the improvement of the existing tools and technology through use of local resources should be emphasized. Primitive manual working methods use much labour, are difficult to control and becomes more expensive, even the wages are low. Therefore there is a tendency for replacing manual tasks with mechanized ones which in turn increases the unemployment and in most cases the maintenance of machinery is rather expensive since the parts have to be imported from developed countries. In the case of more sophisticated machinery, the operators have to be either brought from outside or only very few well qualified persons can use these machinery. All these problems, now forcing the Islamic countries to either improve the existing tools for higher productivity or develop an intermediate technology more suited to the local conditions. It is quite obvious that ergonomic research can play an important role in this field both at the design and operational stages of production.

Socio-cultural Conditions

Man as a worker and as a citizen is part of society and he works in a social setting. It is impossible to isolate his work attitude from the socio-cultural influences. There is no doubt that Islam has a great impact on the way of life of people. Values, behavioural patterns, attitudes which show similarities in Islamic countries may look quite strange, even unbelievable to the scientists and researchers, from other cultures. That is why using the findings of research done in other cultural environments may not be applied safely in the Islamic countries. Sometimes even using experts from other countries may become a wrong starting point due to the social biases. A striking statement which (6) reflects the opinions of some western researchers work-

ing in tropical countries is as follows:—

".....we are modern, they are traditional, we are rational, they are emotional, we are sensible, they are half devil and half child....."

Even if there may be some exaggeration in this statement it shows the biases that one faces in conducting ergonomics research in different environments.

What could be done

The present state of ergonomics research in Islamic countries is heterogeneous. In some Islamic countries ergonomics has been taught as a compulsory subject at university level and hence some related research is conducted, while in the others some government organizations (especially those related with industrial health and safety) involve themselves with some ergonomics research, while a third group of countries have no interest in the field. But in any case there is no formal organization which can plan and direct the ergonomic research.

If research is defined as systematic search for new knowledge and technologies, and education as the transmission of knowledge, they have to go parallel so that the results of the researches could find applicability. Having such organizations at national levels is a part of the solution. As stated in the previous section there are lots of similarities among the Islamic countries therefore an international body (for Islamic Nations) can coordinate the efforts of national organizations and hence can prevent the duplications of effort.

Then the major question is how to finance these institutions. At present since private industries know very little about ergonomics it is not very realistic to assume that they would contribute to such research financially, until they are convinced about the benefits of ergonomic research. Therefore for the time being another alternative for finance should be considered.

One suggestion could be the formation of a nucleus group with the contributions of National Productivity centres, universities and those government departments involved in industrial health and safety. Then it is possible to organize the efforts of researchers from various disciplines in planned directions.

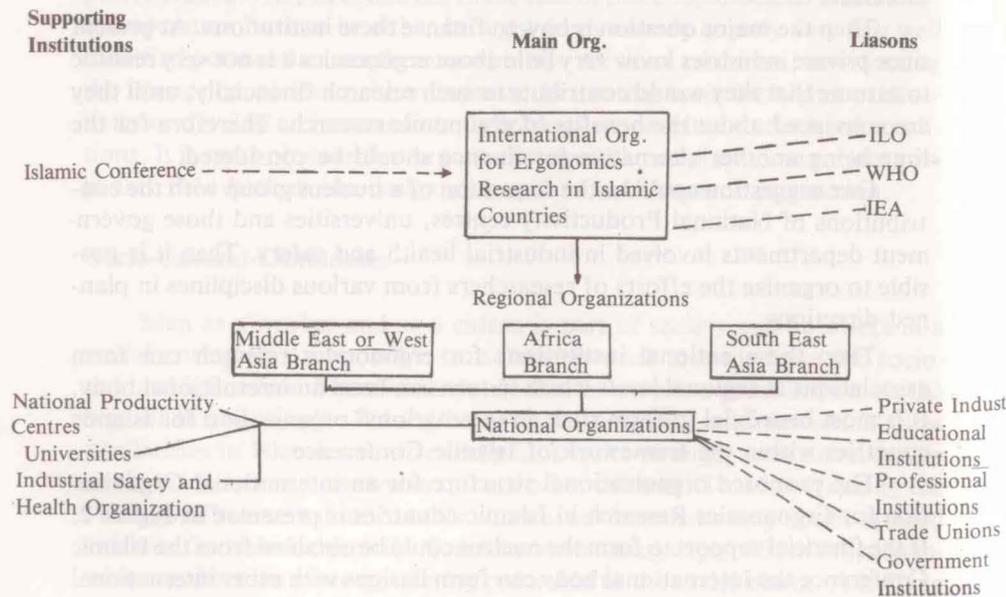
Then these national institutions for ergonomics research can form associations at regional levels which in turn can form an international body. It is most beneficial to form such an international organization for Islamic countries within the framework of Islamic Conference.

The proposed organizational structure for an international Organization for Ergonomics Research in Islamic countries is presented in Figure 2. If the financial support to form the nucleus could be obtained from the Islamic Conference the International body can form liaisons with other international organizations such as International Labour Office, World Health Organiza-

tion, International Ergonomics Association etc, in order to facilitate the training of its members, exchange ideas, organize joint programmes. It is possible to form regional branches under the above mentioned international organization. The regional units can facilitate the operations of the main body and concentrate on the regional problems. At present three regional branches are considered sufficient to cater the needs (these are; Middle East and West and concentrate on the regional problems. At present three regional branches should coordinate the research efforts in their regions and also aid those countries which has yet not got the sufficient man power and know-how to form their own research institutions. The national organizations can be supported (or formed) by the joint efforts of National Productivity Centres, universities and other bodies engaged in the Industrial Safety and Health. It is essential that the national organization should be in close contact with the industry and make recommendations to industrial establishments to guide their activities to improve the working conditions health and safety and hence achieve a higher degree of productivity. The expected activities of national organizations are presented in Figure 3.

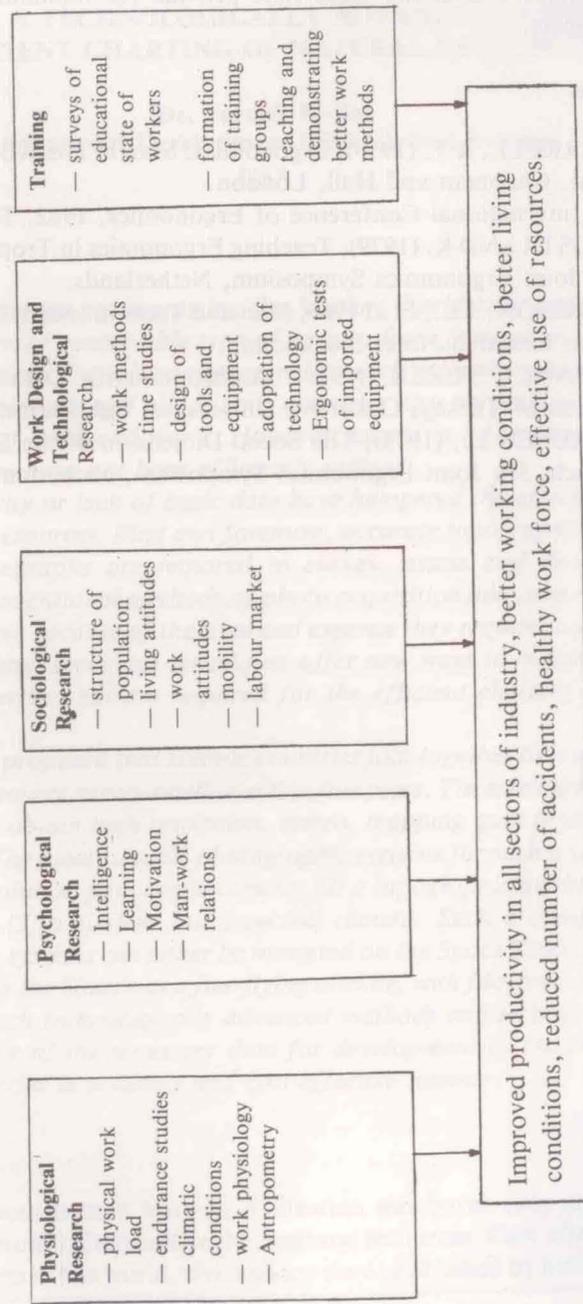
As a result it can be said that Islamic countries having similar socio-cultural, economic and technological structures should unite their resources and efforts to seek solutions for the problems related with work design.

Fig. 2. Proposed structure for the organization of Ergonomic Research in Islamic Countries



...the research and development programme...
...in order to improve the productivity of work...

Fig. 3. Activities expected from the Ergonomic Research Institute



Such research will facilitate the technological developments, productivity improvements and at the same time provide for humanization of work environments.

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