

TOKYO

CONGRES A] E

Egonomica in ducalibus

Cerentia

ERGONOMICS IN DEVELOPING COUNTRIES

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University of the Philippines^{****}, Compagnie des mines de phosphates^{*****}
Paris France^{*}, Yaoundé Cameroun^{**}, Sao Paulo Brasil^{***}, Quezon City Philippines^{****}, Gafsa
Tunisie^{*****}.

Summary

Transfer of technology is now a powerful tool of industrialization of many countries who have not yet a full development of their economies. The success of this transfer is very unequal from one receiving country to another and from one plant to another. Ergonomic work analysis may explain lot of the deceptions and suggest solutions. In many cases the lack of success is rooted in the underestimation of the informal contribution of the workers of the exporting country to the satisfactory behaviour of the system. A better analysis of the geographical, biological and cultural differences between exporting and receiving countries induces different choices of technology and produces many recommendations about the conditions of a successful transfer. This body of knowledge strongly related to ergonomics could be called anthropotechnology.

A large movement --

Ergonomics in developing countries is now a vast area of research and action which is growing quickly in relation with Nord-South trade and soon with the South-South. Among the Societies taking part in IEA, there is now the Mexican Society, there will be soon probably, an Asean, a Bresilian, an Indian, a Maghrebin Society. Since 1976, a big effort has been realised by ILO to promote better working conditions in industrially developing countries through PIACT (Programme International pour l'Amélioration des Conditions de Travail - International program for better working conditions). An important step will be taken ~~in Mexico~~ ^{nearby} in ~~1983~~ ¹⁹⁸⁴ with an international meeting on ergonomics in developing countries.

-- mainly in semi-industrialized countries --

But if one carefully looks at the countries that are building an ergonomic activity connected with their economic development, it can easily be observed that they are ^{nearby} all members of the intermediate category recently isolated by the general director of World Bank as semi industrialized. They all have a considerable industry and a strong intellectual potential in universities and research centers. Most are themselves exporters of technology and taking part in the more and more active South-South trade.

-- and inside countries

It does not mean that other countries who are not yet in this semi privileged situation do not need ergonomics and that some important initiatives are not sometimes observed there. Neither does it mean that all parts of the semi industrialized countries have the same relation with economic development and ergonomics. Many of the industrially developing countries moving toward ergonomics are subcontinents (Brazil, India, Mexico, and are extremely diverse from one part to another. It seems that the transfer of technology inside one country is a very new and important subject in view of decentralization. *A very interesting study has been published a few years ago on this subject by B. MANUABA studying the transfer of technology between North and South parts of Italy*
A main theme : anthropometry --

Among the classical themes of ergonomics, anthropometry has been the first studied but the knowledge is not yet sufficient. A. MANUABA, R.N. SEN, B. THU have shown the rather

little height of South Asia workers but N. SAHBI has not found any significant difference between miners in South Tunisia and in France. Large studies are done in Brasil (L.L. FERREIRA).

in relation with migrations

A very important question even for anthropometry is the knowledge of the population that will in fact use the material. In Europe, for example ^{most} of the miners and automobile workers are coming from abroad (mainly North Africa and Western Asia). In Middle East, many industrial workers are coming also from Asia and Africa but professionals and middle managers are frequently coming from the Philippines or Tunisia. Many problems cannot be solved without attention to these huge population movements (C. RUBIO et al.).

Physical capacity and work and life situations

Another important field of ergonomics in developing countries is physical fitness. Muscular strength has complex relations with body height, nutritional status, parasitism and heat. Very interesting studies have been produced again by A. MANUABA, R.N. SEN and B.THU in this area. Some small workers are quite strong if they receive enough food. (R.N.SEN). Many workers don't eat enough to produce as much as they are expected to do because they share food with an enlarged family. Many tropical workers have to use their forces in two or three activities (agriculture, artisanal production, tourism, like in BALI- A. MANUABA). A vegetarian diet, frequent pregnancies among women, and parasitism (ankylostomiasis, bilharziosis) may provoke such a low level of iron, and thereby of hemoglobin that there is a linear relation between the level of hemoglobin and production (tea gathering in SRI LANKA, sugar cane cutting in GUATEMALA). Many remarkable studies have been done relating heat and health or even mortality among miners (CH. WYNDHAM), relating heat and nutritional status among hotel workers (MANUABA). Coming back to industry, R.N. SEN has recently produced a very comprehensive report on ergonomic principles in the design of factories in hot climates.

Human resources and anthropotechnology

It is clear from these examples that technology cannot be easily transferred with success without careful studies of the population of workers of the importing country, that the results of researches on human resources are an important part of ergonomics knowledge. It is clear again that the study of climatic, social and cultural conditions is equally necessary for a successful transfer. These different aspects of knowledge and the methodology of implementation in conception and/or transfer of technology could be called anthropotechnology.

Ergonomics in relation with national technology

If usually these considerations are used for technology elaborated in foreign countries, they are also necessary in cases where tentatives are done in industrially developing countries themselves by research center engineers. The International Rice Research Institute (IRRI) in LOS BANOS (Philippines) and the Central Rice Research Institute (CPRI) in Cuttack (India) have each produced a rice planting machine. These two machines allow a man to plant ten times as many rice shoots as he could by hand; however, this requires 2.5 times as much physical effort, which is unacceptable as P. NAG has shown.

Even toxicology has to be considered

In relation with these physiological considerations, one has also to think to the very severe toxicological problems that arise many times in relation with the specific conditions of work in industrially developing countries (for example the pesticides used in Brazilian sugar cane plantations M.R. CHUAIRA DA SILVA, U. MALUF). A very good book on this subject has been published recently in SINGAPORE. *By P: PHOON*

Work analysis

In many cases, the difficulties are even more hidden. The "soft" part of the technology : methods manuals, training are transferred not only without understanding the ways of work and life of receiving countries but even more without realizing how things are really working in the exporting country. There is a difference between real work and the work as it prescribed by the engineers and organizers. What workers really do, due to their intelligence and experience

is usually unknown and not transferred to the receiving country S. DONGMO in analysing the way tobacco factory workers are operating in France has seen that they are completely neglecting the automated signalisation that is in fact inadequate but that they are using very sophisticated pattern of observations transmitted from one worker to another. However what is transmitted to the receiving country is a very formal use of the automated signalisation. Sometimes there is a complex mixture of these cultural and psychological aspects with more material facts. In the phosphate mines in South Tunisia, the saline nature of the ore and the insufficient use of soluble oil produces the jamming of the hydraulic pillars in such a proportion that the maintenance unit is overloaded and the supporting system dangerous (N. SAHBI).

Recommandations

There are many industrially developing countries where excellent ergonomic teams exist but too frequently these teams are living with difficulty. They are limited by poor facilities, limited library and - as it can be observed at IEA congresses - little travel allocations. One of the reasons of these limitations is of course the volume of the Gross National Product of these countries but also the fact that many governments have not yet realized that ergonomics and anthropotechnology are not only necessary for humanitarian reasons but for the success of transfer of technology. Too many imported machines or factories have a low productivity for reasons that ergonomics can detect and to which reasonable solutions can be found. One may hope that the impact of the international action can help to stress this point.

It is the main reason for the ~~MEXICO~~ meeting organized by IEA, ILO and WHO. Industrially developed countries are also able to contribute and they do in receiving scholars from industrially developing countries. There is a great danger of brain drain if the researches are not connected with the real problems of the own country of the scholars but with the questions connected with research programs of the receiving country. This orientation is not at all easy in relation with the rules of students international exchanges. But as far the real finality of the training of students is considered, the results of these exchanges are beneficial as the coauthors of this text can testify. The past 10 years, 40 scholars coming from more than 15 industrially developing countries have stayed 1 to 3 years at the CNAM ergonomics laboratory in PARIS. Nearly all of these have come back to Africa, America or Asia and they contribute to ergonomics in their own countries.

They have been recognized in France as having either a master's degree in ergonomics, a title of ergonomist (level of engineer title) that is the master's degree plus a practical study and realisation described in a dissertation, or a Ph.D. in Ergonomics obtained 3 or 4 years after the master's degree. In France, these different titles are the consequence of the State recognition of ergonomics as an academic field and the industry, business and union recognition of ergonomics as able to contribute to solve problems in the society.

8TH CONGRESS OF THE INTERNATIONAL ERGONOMICS
ASSOCIATION

EA82

hosted by the JAPAN ERGONOMICS RESEARCH SOCIETY

23-27 August, 1982

Nihon Toshi Center, Hirakawa-cho, Chiyoda-ku, Tokyo, Japan.

Congress Chairman: Masamitsu Oshima

Advisory Board: Harry L. Davis, Etienne P. Grandjean, Brian Shackel,



April 30, 1982

Dear; Dr. Alain Wisner,

Re; Your contribution to the Scientific Program of the 8th
Congress of International Ergonomics Association.

As I informed you the other day, your contribution, "Language
and Computer Systems - Work Analysis and Cognitive Load"

has been accepted and included in the Program of the Congress.

Please type the full text of your contribution, on the designated
paper enclosed.

Important conditions:

We will inform you of your allotted time, your session and date
as soon as they are finalized.

Text of less than 2 pages (see separate instructions) to be
printed in the Proceedings shall reach the Secretariat before
June 20, 1982.

A copy of the speaker's version (full text of the paper as it
will be read by you), if any, reaches the Secretariat before
June 30, 1982. This will be useful for the prior-study of our
conference interpreters.

Please note that authors who want to use a 16mm film projector for
your presentation must inform the secretariat of the request in
writing.

Please contact the Secretariat should you require any further
information.

Sincerely yours,

Prof. Kageyu Noro

~~Chairman~~

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May 25, 1982

Dear Dr. A. Wisner;

We are planning to hold a Symposium entitled "past, present and future of ergonomics" on August 27, afternoon at the 8th Congress of the International Ergonomics Association.

We would like you to participate in this Symposium and deliver a speech on "Ergonomics in Developing Countries"

lasting for about 10-15 minutes and a 35mm slide projector will be available in the hall. We would like to have the text of your contribution to be published in the Proceedings of the Congress not later than June 20. Please refer to the instructions enclosed herewith.

We thank you for your co-operation and look forward to seeing you.

961 dem page

Sincerely yours,

42 c x 96 l = 2400 characters

M. Oshima

Masamitsu Oshima, M.D.
Chairman
Organizing Committee

56 lignes manuscrites

*40 lignes dans une page
d'une*

Akira Watanabe

Akira Watanabe, D. Eng.
Organizing Committee
(Program)

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The Late Ruffel Smith.



August 12, 1982

Dear Prof. Wisner:

Thank you for your agreement to speak at the Symposium on "Past, Present and Future of Ergonomics" at the 8th Congress of the International Ergonomics Association, on August 27. We are asked to serve as chairmen at the Symposium by the Organizing Committee.

In order to make the Symposium interesting and fruitful, we would like you to include something about the following points in your speech:

- Can ergonomics be an integrated entity as an academic area?
- Can ergonomics actually help to solve problems in the society?
- How should the education of ergonomics be given to students and engineers?
- What are needs and seeds for future ergonomics?

The time allotted to you will be 20 minutes.

We thank you for your cooperation and look forward to seeing you in Tokyo.

Sincerely yours,

Masamitsu Oshima, M.D.

Akira Watanabe, D.Eng.

21st June 1982

Doctor R.B. Sen
Department of physiology
University Colleges of Science
92 Acharyya Prafullachandra Road
CALCUTTA 700 009 (Indes)

Dear friend,

I have received a very late proposal from the Tokyo I.E.A. congress organizers to take part to the symposium on "Past, present and future ergonomics" in speaking about "Ergonomics in developing countries".

Considering the very short delay, I thought that the question of ergonomics in industrially countries would not have been treated if I had refused and that it would be a mistake considering the Mexico meeting. You may perhaps know that I.E.A., I.L.O. and W.H.O. are organizing in Mexico, at the end of 83 or the beginning of 84, a meeting devoted to ergonomics in developing countries, meeting for which I am working since 4 years.

Anyway, for this short text, I was a very conflictual situation : let people consider the importance of ergonomics existing now in industrially developing countries and specially of your works and, simultaneously, let the attenders of the Tokyo congress that I was not speaking as a french man but as member of an international team based in the CNAM laboratory. It why, I have choosen 4 ergonomists who have worked and/or are working at the lab as co-authors. All four are good scientists and are members of industrially developing countries from different point of the world.

I hope that you shall attend the Tokyo meeting to have the pleasure to see you add to benefit of your remarks about this small text and also a book that I have build from diverse papers written or translated in english and that you shall soon receive.

Truly yours,

A. Wisner

21st June 1982

Professor A. Manuaba
University of Udayana
Faculty of Medicine - Dep. Physiology
DENPASAR - BALI (Indonésie)

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Truly yours,

A. Wisner

21 Juin 1982

Monsieur Mitsuo Tanaka
Sohyo European Office
24 rue de Léningrad
75008 PARIS

Cher Monsieur,

Je vous remercie de votre accueil amical et des vues si intéressantes que vous m'avez communiquées. J'ai lu, pendant le week-end, vos documents qui m'ont également beaucoup instruit.

Je vais écrire dès maintenant à Monsieur Ogawa et vous fais parvenir, ci-joint, le pré-projet du congrès de l'Association Internationale d'Ergonomie ainsi que mon projet de voyage. Je vous joins également le texte des deux communications que je présenterai au congrès.

Veillez agréer, cher Monsieur, l'expression de mes sentiments très cordiaux.

A. Wisner

Copie : H. Blassel

THESE MOVEMENTS OF FILIPINO WORKERS HAVE CONSEQUENCES ON PHILIPPINE OCCUPATIONAL STRUCTURE AND EMPLOYMENT SITUATION, ADAPTATIONS INTO NEW WAYS OF LIVING eg. BEING FAR FROM THEIR FAMILIES, BEING ISOLATED FROM OTHER FILIPINO WORKERS, CLIMATIC DIFFERENCES; AND WORKING CONDITIONS eg. NEW TECHNIQUES, WORK PROCEDURES, RELATION WITH OTHER CO-WORKERS HAVE TO BE STUDIED. FINALLY, UPON TERMINATION OF THEIR WORK CONTRACTS, THEIR RE-INTEGRATION INTO PHILIPPINE SOCIETY HAS TO BE CONSIDERED.

C. RUBIO

ERGONOMICS IN DEVELOPING COUNTRIES

Alain WISNER^{*}, Simon DONGMO^{**}, Leda LEAL FERREIRA^{***}, Clarissa RUBIO^{****}, Nouredine SAHBI^{*****}
Conservatoire National des Arts et Métiers^{*}, Manufacture Nationale des Tabacs^{**}, Fundacentro^{***},
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But if one carefully looks at the countries that are building an ergonomic activity connected with their economic development, it can easily be observed that they are all members of the intermediate category recently isolated by the general director of World Bank as semi industrialized. They have all a considerable industry and a strong intellectual potential in universities and research centers. Most are themselves exporters of technology taking part to the more and more active South-South trade.

It does not mean that other countries who are not yet in this semi privileged situation do not need ergonomics and that some important initiatives are not sometimes observed there. It does not mean also that all parts of the semi industrialized countries have the some relation with economical development and ergonomics. Many of the industrially developing countries moving toward ergonomics are subcontinents (Brazil, India, Mexico) and are extremely diverse from one part to another. It seems that the transfer of technology inside one country is a very new

and important subject in view of decentralization.

Among the classical themes of ergonomics, anthropometry has been the first studied but the knowledge is not yet sufficient. A. MANUABA, R.N. SEN, THU have shown the rather little height of South Asia workers but N. SAHBI has not found any significant difference between miners in South Tunisia and in France Large studies are done in Brasil (L.L. FERREIRA).

A very important question even for anthropometry is the knowledge of the population that will in fact use the material. In Europe, for exemple most of the miners and automobile workers are coming from abroad (mainly North Africa and Western Asia). In Middle East, many industrial workers are coming also from Asia and Africa but professionals and middle managers are frequently coming for Philippines or Tunisia. Many problems cannot be solved without attention to these huge population movements (C.RUBIO)

The problem of influence of hot climate is very critical Many studies are convincing (A. MANUABA, R.N. SEN, CH. WYNDHAN).

In many cases, the difficulties are even more hidden The "soft" of the technology: methods manuals, training are transferred not only without understanding the way of working and living of receiving countries but even more without realizing how things are really working in the exporting country. There is a difference between real work and the work as it is prescribed by the engineers and organizers. What workers really do, due to their intelligence and experience is usually unknown and not transferred to the receiving country, S. DONGMO analysing the way tobacco workers are

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The works of researchers coming from industrially developing countries of different parts of the world and the discussion between them has been so beneficial since 10 years in C.N.A.M. PARIS that the development of such international ergonomics research center has to be recommended.



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Akira Watanabe, D.Eng.



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