

Ergonomics: Past, Present and Future

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ABSTRACT

The document marks the most important progress acquired, as well as the numerous pressing challenges in the area of Ergonomics and the ergonomist profession on the road to its development and consolidation. In this context, the manuscript also highlights our own experience, including the approaches or actions taken, which have ultimately achieved the Project's main objectives with regard to the "ergonomist" profession. To understand the present and future of ergonomics, we need to understand its past, to know the premises of Ergonomics in Romania, the world evolution of Ergonomics, the current stage of Ergonomics in our country, the future of ergonomics and the current contribution to Ergonomics by completing the Project objectives concerning the profession of ergonomist.

Keywords: Ergonomics; Ergonomist; Paradigm; Training

INTRODUCTION

Emergence and development of ergonomics

In order to understand the present and future of Ergonomics, we need to understand its past, first and foremost. In the opinion of emeritus professor Erik Hollnagel, internationally recognized Danish.

Expert, Ergonomics, like any other science, needs to evaluate its past as objectively as possible, in order to obtain an analysis as pertinent as possible of the present, for the identification of the future directions of development of Ergonomics [1].

Current stage of ergonomics

When we approach the current stage of Ergonomics and explore the literature we find, however, that, at present, there is no completely drafted history of Ergonomics and the questions that are raised exceed by far the offered answers.

At the same time, in the case of Ergonomics, like in many other new disciplines, we can identify a larger or smaller number of precursors or fore-bearers who readied the emergence, development, and subsequent recognition of Ergonomics [2]. For example, the first observations of man's skills and movements or body segments were made by Leonardo da Vinci, who is considered the first ergonomist, in light of his scientific multidisciplinary and of his permanent concerns regarding the

exercise, development, facilitation or simplification of human activities. Da Vinci tried to describe the proportions of the "perfect" human being, which should match an anthropometric vision: the human being as center of the Universe.

Furthermore, in a communication presented at the French Academy and called Report on the strength of man, physicist Charles A. Coulomb (1785) proposes a method for the assessment of the amount of work required in different professions. From this point of view, Charles A. Coulomb introduces the notion of duration of effort, he studies work rhythms and tries to identify the optimal load considering the work conditions.

From a practical point of view, it is also believed that the interests in the field of Ergonomics have been and are obvious, owing to the fact that, over time, various civilizations have used and are using ergonomic methods in their projects [3].

Therefore, Ergonomics has always been an interest ever since the beginning of mankind: the interest in Ergonomics, in the simplification and facilitation of work may be observed throughout history, and the emergence and development of Ergonomics are tightly linked with the evolution of the needs of the society.

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Received: March 02, 2021; **Accepted:** March 16, 2021; **Published:** March 23, 2021

Citation: Geangalău S (2021) Ergonomics: Past, Present and Future. J Ergonomics.11:275.

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LITERATURE REVIEW

Evolution of ergonomics around the world

Ergonomics appeared in the middle of the 20th century and, in the beginning, in the first 10-12 years (1949-1961), it has a slower evolution, given the conservative views of the sciences participating to its establishment, which had created their own field of research and would not abandon easily the positions they had earned.

A decisive part for a solution to this dispute was played by the cosmic flight that led to the association of a number of scientific fields: (biology, medicine, psychology, anthropology, etc.) for the research of new, interdisciplinary issues raised, as well as for the definition of the possibilities by which humankind could support cosmic flight.

This historic moment in the evolution of modern technology meant a strong stimulation of ergonomic research, which then extended to industry and stirred a general interest, shown through the Congresses of the International Ergonomics Association-IEA), which had been established in Oxford, in April 1959, as well as the annual congresses of the French Ergonomics Society (Société d'Ergonomie de Langue Française-SELF), created in 1963, which counted approximately 350 members in 1986. In general, SELF organizes specialized colloquia [4].

Shortly thereafter, similar societies were organized in a number of other countries, such as the USA, France, Russia, Germany, Belgium, the Netherlands, Sweden, etc. In these conditions, in 1961, in Stockholm, the International Ergonomics Association (IEA) manages to organize the first International Congress of Ergonomics where an agreement was reached with respect to the term Ergonomics and some lines of action of Ergonomics were drawn up, for example, the ergonomic analysis of the place of work and of the work environment.

In the following decades, significant effort is engaged in the dissemination of this new interdisciplinary scientific field, as well as its integrative, holistic approach. Therefore, Ergonomics is becoming more and more global as the effect of several causes and the cause of new guidelines in older sciences.

Thus, the International Association of Ergonomics held Congresses every three years, whose topic marks the chronological evolution of the progress achieved on Ergonomics. This is also illustrated by the increasing worldwide concerns of Ergonomics [5].

Future of ergonomics

As regards the future of Ergonomics, the issues were a subject of debates also in the works of the 19th Triennial Congress of the International Ergonomics Association (2015, Melbourne, Australia, given that the specialists in the field (Robert and Bringer, 2015), when talking about the perspectives of Ergonomics, stated: "In perspective, the major objective of Ergonomics is the active participation to the definition and organization of future, for its improvement or change."

Concerns regarding the future of Ergonomics are also present in many works or relevant surveys, as well as in the most frequent opinions expressed by many authors who suggested a series of 14 challenges that Ergonomics will face in the future, for example:

The future of Ergonomics depends on the consolidation of what already happened or what was already obtained in this field (IEA, 1976; Christiansen, 1976);

Ergonomics must do professionally what it has already more than done with success (Small, 1978); due to these concerns and at Arnold Small's call, there was set up in 1978, the Committee On the Future of Human Factors.

The future necessities of Ergonomics need to consider the requirement of adaptation to the changes in technology and in the work methods (IEA, 1976; Corlett, 1997);

Ergonomics needs to offer a competitive advantage in all the cases of its use (Broadbent, 1961);

The future consolidation of Ergonomics as science and profession also required the increase of the approaches and accentuation of the professionals' interest in the scientific bases of the human condition, in general, and of our work, in particular [6].

Premises of ergonomics in Romania

The premises of Ergonomics in Romania are marked by plenty of research in traditionally established fields, such as: labor medicine, labor physiology and psychology, sociology, labor hygiene and protection, occupational safety and health, organization of production and labor, which led to practical solutions and applications of an ergonomic nature many years before the appearance of the term of ergonomics, but which maintained the tendency of data accumulation and separate adding and formulation of the results, without any congruence between them.

The first psycho-technical laboratories were organized, between 1924 and 1925, in the proximity of the Universities of Cluj and Bucharest, by professors F.I. Ștefănescu-Goangă and C. Rădulescu-Motru. One of the first psycho-technical laboratories was also the one established in 1925 by the Bucharest Tramway Company (STB) [7].

In 1927, at the initiative of the General Union of Industrialists in Romania (UGIR), the Romanian Institute for the Scientific Organization of Labor (IROM) is founded. The first issue of the IROM bulletin, which was published in the same year, opened the possibility of debates on the problems relating to the scientific organization of labor and was also a method of information about the outcomes obtained in Romania and abroad [1].

In 1935, the Psycho-technical Service of the Central Fund of Social Security for the Prevention of Labor Accidents was established. After the 1950s, new problems occurred, relating to the introduction of modern technology and gradual transition to automated production, in many factories, which led to the initiation of Ergonomic and engineering psychology studies and research.

In 1970, the Laboratory Human Factors and Ergonomics were founded in the Research Institute of the MTTc. The first courses of Ergonomics having a dedicated name and content were taught, widely, in our country, with support from the International Bureau of Labor, in 1967, at the Center for the improvement in the training of economy and administration management staff (CEPECA). In the same period, the students of the Faculty of Industrial Economics in the Bucharest. Academy of Economic Studies received the first notions of Ergonomics.

Nationally, in February 1968, the first symposium of Ergonomics was organized in Bucharest, while in 1969; IDT published the first documentary syntheses in the field of Ergonomics. Moreover, in 1971, the first courses of specialization in Ergonomics were organized for physicians, psychologists, economists, production organizers, ending with projects with ergonomic contents [2].

In September 1971, the necessity of joining the efforts of all those who were interested in the field of Ergonomics led to the organization of the first National Conference of Ergonomics, which gave a great push to the research and concern for the field of Ergonomics.

An important contribution to a large exchange of information, opinions, and experiences in the field of Ergonomics was also offered by the first International Conference of Ergonomics, in Bucharest, in September 1974, organized by the Ministry of Labor, in cooperation with the International Bureau of Labor. Then, main scientific events of an ergonomic nature were pursued.

DISCUSSION

Pilot project regarding the profession of ergonomist

The option for such a Project is the result of the following aspects:

Recent evolutions in the fields of micro, meso and macro-ergonomics.

Systematic concerns in the world, regarding the potential and value of Ergonomics for the competitive and sustainable success of modern organizations [6].

Recognition, by an increasingly higher number of companies or businesses, of the need to train the employees on Ergonomics.

Proven interest from numerous academics, researchers, contractors, professional associations, practitioners, as well as business environment representatives, in relation to the issues of Ergonomics.

At the basis of these initiatives of to completing the Romanian Classification of Occupations lies the paper *Ergonomie organizațională* ("Organizational Ergonomics"), coordinated by the Emeritus Prof. univ. PhD Aurel Manolescu, work dedicated to a unitary, but particularly complex disciplinary scientific field. The contents of the paper try to satisfy the need of information in the field of organizational Ergonomics, to cover a near-void or to contribute to the filling of a gap strongly felt in the specialized

literature of our country and, thus, to materialize our own interests in this scientific field that is well-shaped, but which poses issues that are less known and sometimes interpreted erroneously or approached insufficiently.

The efforts used for "Ergonomie organizațională" ("Organizational Ergonomics") were largely encouraged by the special support from the Faculty of Management and the Department of Management that agreed with the introduction of the subject matter "Organizational Ergonomics" in the MA study programs; this means an official recognition of the new requirements and demands in the field of knowledge and education quality, which should be as harmonized as possible with contemporary scientific thought [3].

At the same time, at national level, the Association ECOFOREST Neamț-NGO, has had support, ever since 1985 and even now, via the President of the Association, Ms. PhD economist Susana Geangalău, Permanent Member of the Academy of Romanian Scientists; every year, she defended scientific papers in various fields, mainly in Ergonomics, in the Scientific Sessions organized by the Management of the Academy of Romanian Scientists and by its Branch in Piatra Neamț.

Therefore, following the Cooperation Protocol made on 23.01.2017, between the Association ECOFOREST Neamț (AEN) represented by Ms. PhD ec. Susana Geangalău as President and Project Coordinator and Initiator, and the Bucharest Academy of Economic Studies (ASE) represented by Prof. univ. PhD Nicolae Istudor as Rector and by the Emeritus Prof. univ. PhD Aurel Manolescu as Project Coordinator, as well as following the approaches undertaken in the recent years, the following objectives of the "Project regarding the profession of ergonomist" were reached:

Introduction of the profession/occupation of "ergonomist" in the Romanian Classification of Occupations. The code of the profession of "ergonomist" is 226309 [8].

Joint Order of the Minister of Labor and Social Justice and of the President of the National Institute of Statistics

Drawing up the "Occupational Standard-OS" for the profession of „ergonomist"

Validation of the standard – Romanian National Association of Sector Committees – ANCSR

Approval of the standard – National Authority for Qualifications – ANC (Decision no. 1385 of 18.12.2017)

CONCLUSION

At national level, we worked closely with and received effective support from 11 major national institutions or professional association, who argued for or substantiated, in our actions or approaches, the necessity of promoting and developing ergonomics on strictly objective scientific grounds.

ACKNOWLEDGEMENT

At the same time, at national level, the Association ECOFOREST Neamț-NGO has had the support of its

President, Ms. PhD ec. Susana Geangalău, ever since 1985, i.e., from when the Piatra Neamț Branch of the Academy of Romanian Scientists - AOȘR was founded.

REFERENCES

1. Hollnagel E. Human factors/ergonomics as a systems discipline? "The human use of human beings" revisited. *Applied Ergonomics*. 2014; 45(1):40-44.
2. Stanton NA, Stammers RB. Bartlett and the future of ergonomics. *Ergonomics*. 2008; 51(1):1-13.
3. Chung AZQ, Williamson ST. Theory versus practice in the human factors and ergonomics discipline: Trends in journal publications from 1960 to 2010. *Applied Ergonomics*. 2018; 66:41-51.
4. Álvarez FJL. *Ergonomía y psicología aplicada. Manual para la formación Del especialista*. Tirant Editorial. 2008.
5. Salvendy G. *Handbook of human factors and ergonomics*, Third Edition. Wiley Lib. 2006.
6. Manolescu A. *Ergonomie organizational (in Romanian)*. Editura Economică. 2015.
7. Geangalău S. *Ergonomia poate fi și știință și religie? (in Romanian)*. Editura Academiei. 2011; 53: 23-24.
8. Geangalău S. *Ergonomie aplicativă în sistemul (in Romanian)*. Editura Tehnopress. 2012.