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**Research Article**

# The Contribution Of Ergonomics To Professional Compatibility Within Algerian Economic Institutions Of A Productive Nature

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**ABSTRACT**

Economic and productive institutions, particularly in Algeria, are witnessing rapid and profound developments at various levels, which has enabled some of them to lead in production and quality at the regional level. They have managed to apply multiple strategies, with technology playing a significant role in addressing global challenges. One of the key elements contributing to this success is the availability of ergonomics tools and capabilities, both at the knowledge and technical levels, which have been integrated alongside ongoing technical advancements. Ergonomics can provide a suitable environment, professionally, socially, and even psychologically, for workers, aiming to create harmony between employees, their workplaces, and the tools that drive the production process. Therefore, it has become essential today to focus on ergonomics and take advantage of the possibilities it offers.

**Keywords:** Ergonomics - Occupational Compatibility – Work.

## Introduction:

Work has long been recognized as an effort undertaken by humans, specifically by workers, making it one of the most significant activities in human life as it responds to various needs. Consequently, work varies across sectors and institutions. When considering the Algerian institution within this context, we note the profound transformations it has undergone, similar to those in other countries, due to rapid technological advancements and globalization, which has permeated every aspect of life. Additionally, other factors, closely linked to the resources specific to each country, play a role.

However, Algeria's experience has demonstrated that development and productivity improvement necessitate both organizational and technical measures, with a particular focus on human resources. Furthermore, attention must be paid to ensuring productivity and quality. The role of human resources in the development and stability of institutions is crucial, especially when these resources are efficiently distributed and their available competencies are well-managed. The economic institution serves as the backbone and cornerstone of both economic and social development.

Since independence, Algerian institutions have undergone structural reforms, yet human resources remain a vital part of the production process. Therefore, ergonomics becomes essential to ensuring the institution's continuity in its activities.

## Problem Statement:

Working conditions constitute a crucial element in any institution and within the production process. Historical experiences from the Industrial Revolution in Europe have shown that the harsh working conditions faced by factory workers led to uprisings and demands for better and improved conditions. This revolution marked a significant turning point in the historical, economic, social, and even political development of European societies.

Excessive working hours and poor health conditions in workplaces placed a tremendous burden on workers, prompting scholars and social science experts, especially those in psychology and sociology, to explore ways to adapt the work environment to benefit workers. This factor is considered one of the fundamental pillars of the production process in any economic institution, particularly in the manufacturing sector.

It is here that ergonomics, or "human factors engineering," comes into play as a field of study focused on addressing the psychological, social, physical, and health-related conditions within the work environment that impact worker performance.

The First World War marked the beginning of the development of ergonomics, which accompanies workers within the institution. While European countries and other developed nations have made significant strides in this field, the situation has not been the same for third-world countries, where historical factors have largely contributed to institutional stagnation since independence. This is particularly true for economic institutions in Algeria, where workers have continued to struggle under harsh conditions, especially in industries dealing with chemical products that pose serious health and safety risks.

Thus, ergonomics focuses on human factors and places the worker at the center of attention, aiming to achieve worker comfort.

How, then, can ergonomics contribute to the design and adaptation of workplaces to suit the needs of workers? In other words, how can work conditions be tailored to the physiological capacities of workers to achieve professional harmony within the economic institution?

## II. Definition of Concepts

To address this topic, it is essential to clarify several concepts related to the subject matter, such as ergonomics, work, professional compatibility, and the economic institution.

## III. Definition of Ergonomics (Human Factors Engineering)

Before defining this concept, it is important to highlight the circumstances that led to the emergence of this field. During the First World War, at a conference held in Glasgow, UK, Robert Owen highlighted the suffering faced by industrial workers, noting that there had been no prior focus on improving working conditions. As a result of this awareness, the Industrial Fatigue Research Board was established. During the Second World War, the field of human factors engineering (ergonomics) was officially founded (Al-Samak, 2019, p. 16). Ergonomics, as first understood in the development of the term, is a relatively modern field, emerging alongside the Industrial Revolution and the changes it brought about. Ergonomics is concerned with organizing work and is an applied science that studies the relationship between humans and machines—i.e., tools, methods, and work environments. The primary goal of studying work is to eliminate all forms of waste, whether in terms of time or effort (Roy, R. N., 2005). According to Ahmed Badawi, ergonomics involves studies aimed at ensuring that machines, working conditions, and production methods align with human physical and psychological capabilities to increase productivity and improve workers' conditions (Badawi, 1982, p. 137). Al-Samman and Al-Samak define ergonomics as the design of machines, equipment, and various devices to suit the worker's body and working environment, with the aim of reducing effort, fatigue, and work-related illnesses (Al-Samman, 2012).

Thus, based on these definitions, ergonomics is a scientific discipline that, through its designs and contributions, serves as a fundamental tool for creating harmony between humans and machines within institutions.

### 1. Definition of Work:

The term "work" carries several meanings, both in general language and among specialists.

For the general public, it refers to an action or voluntary or involuntary movement, and it is often used to describe certain human behaviors (Al-Saeed, 1978, pp. 10-14). The general understanding of the term presents an image of human action and movement, which require both mental and physical effort. In an economic context, work takes on a different meaning, focusing on the physical and mental exertion aimed at earning a living (Al-Saeed, 1983, p. 9). From this perspective, work involves effort directed towards achieving a specific goal, whether that effort is physical or mental, depending on the nature of the activity or sector in which the person operates. Work has evolved over time according to human needs and the technology introduced into work environments.

Later, scholars offered various definitions of work. Coulson, for instance, defined work as the function that produces wealth and services (George Friedman).

This definition emphasizes goals, benefits, value, and productivity. Thus, work is one of the most important human activities, continuously engaging the social individual across different fields. It affects a person's professional life and social standing. In this sense, work is a function performed by the working individual, whether to produce wealth or provide services that meet the needs of both the individual and society.

### 2. Definition of Professional Compatibility:

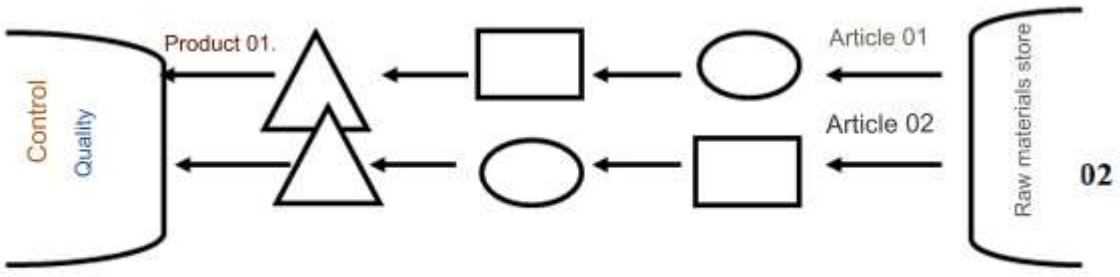
Before defining the concept, it is worth noting that, linguistically, "compatibility" refers to alignment or suitability, and it is derived from the verb "to agree" (Ibn Manzoor, p. 144).

In technical terms, the concept of professional compatibility emerged alongside the field of psychology and in response to the changes brought about by the Industrial Revolution in the professional environment and in the lives of working individuals, whether in terms of working conditions or living standards.
One definition of professional compatibility refers to an individual's ability to adapt effectively, to align with their physical, social, and professional environment, and to find harmony with themselves and others (Mahmoud, 2001, p. 15). This definition includes various aspects of adaptation and alignment that are essential in life, such as the physical, social, and, more importantly, professional environment, as well as relationships with others. This indicates that professional compatibility is highly significant in the life of a worker.
Another definition describes professional compatibility as the alignment of an individual with their work environment, encompassing the individual's adaptation to different environmental factors, their relationships with their employer and supervisors, as well as their ability to meet the demands of the job (Bouaattit, 2008).
These definitions highlight the essence of professional compatibility and work style, leading us to conclude that professional compatibility is a continuous and dynamic process that fosters harmony between the individual and the professional environment. It represents a state of alignment and coherence between a person and their environment, reflecting the ability to satisfy most of their needs (Rajeh, 1976, p. 18).
Others have defined it as a state of coherence with the environment, where the individual can fulfill most of their needs while also meeting the physical and social demands of the work (Zaitouni, 2005, p. 125). Considering these definitions, it can be concluded that professional compatibility is an essential and highly important process for both working life and social and psychological well-being.

## IV. Human Engineering and Occupational Compatibility:

There is no doubt that the professional environment is influenced by both physical and psychological stimuli, which affect an individual's occupational compatibility within the workplace. This often leads to a state of tension for workers, impacting their job performance in various sectors, whether industrial, service, or commercial. It is important to note that pressures have accompanied humanity since its existence, leading individuals to confront and overcome numerous challenges by continuously modifying their surroundings to create an environment capable of absorbing difficulties. These difficulties frequently have a negative impact on performance, occupational compatibility, psychological well-being, and physical health.
In today's era of technological advancement, ergonomics has become an essential part of various fields. Specialists in ergonomics are increasingly involved in ensuring the safety and well-being of individuals within organizations. The pressures associated with work environments can result in physical, psychological, and even mental disorders, depending on the nature of the work, and these can extend to broader health problems. Consequently, it is crucial to continuously modify and improve tools, machines, and production elements to enhance working conditions (Aboud, 2012, p. 25). The "workplace" forms the most critical link in the production unit, and organizing it in accordance with human engineering requirements is a key stage in achieving productivity, reducing effort, and improving working conditions. From a human engineering perspective, organizing the workplace fosters harmony between the worker and the machines or tools used, whatever they may be. This focus on equipment, tools, and even furniture ensures that they are adapted to the worker, reducing the burden and negative effects of work.
To understand the issue addressed in this research, we will rely on specific types of workplaces that have been the subject of study by human engineering experts. These studies have been conducted within industrial and production-oriented institutions, which define both the nature of the activities performed and the position of workers in the workplace. Additionally, these studies explain how human engineering contributes to achieving occupational compatibility within an organization.

**Figure 01:** Represents the sequence of workplaces according to the sequence of production operations.




**Source:** Najm Aboud Najm, Study of Work and Human Engineering, p. 246.

## Analysis of the Workplace Layout:

The analysis of this figure, which represents a workplace characterized by a sequence of production processes, highlights that workers are present at every stage of production. The tasks are completed in alignment with the worker's capabilities, and the equipment used must be suitable for both the task and the worker's abilities. Thus, the intervention of ergonomics becomes a necessity and is required based on specific considerations. These considerations can be grouped into task execution, equipment usage, and information utilization. Additionally, the physical environment, which includes factors such as temperature, humidity, lighting, and vibrations, must also be accounted for. On top of this, the social environment plays a role, particularly team dynamics that are aligned with the workstations, production processes, and administrative tasks.

There are also other considerations related to the workers themselves, including body size and shape, strength, and movement (thermal aspects). Moreover, physiological factors, such as mental capacity, individual knowledge, and experience, are taken into account. These elements are integral to human engineering as it aims to organize the workplace by arranging equipment and assigning workers based on the conditions each fulfills.

The "human-machine relationship" emerges here, a binary relationship that involves receiving and responding, which is key in any workplace. This relationship ensures safety, efficiency, and supervision of machines during production. Other workplace layouts are also subject to human engineering interventions during production, aiming to harmonize the interaction between workers, machines, and both the quality and quantity of production. As a result, the work evolves from professional tasks to communicative work (Friedman, 1985, p. 132).

This approach focuses on organizing equipment in a way that is more compatible with the worker's physiology to reduce errors and speed up execution. It is worth mentioning that human engineering has benefited from technological advancements, transforming the "human-machine" relationship into a new symbolic dialogue in the workplace, tied to the communication system within the organization. The industrial device's significance is underscored in the organized system of individuals and machines (Friedman, 1985, p. 132).

From a human engineering perspective, this can be seen as cognitive work, which is also of interest to psycho-sociology. Communication symbols play a significant role in this type of work, and language forms one of the tools specific to the human communication environment.

Additionally, in workplace analysis, an essential element emerges: "work materials." These materials comprise various elements that can interact to achieve the principle of harmony, thereby meeting the organization's goals. These goals are seen as both necessary and the ultimate aim of the institution.

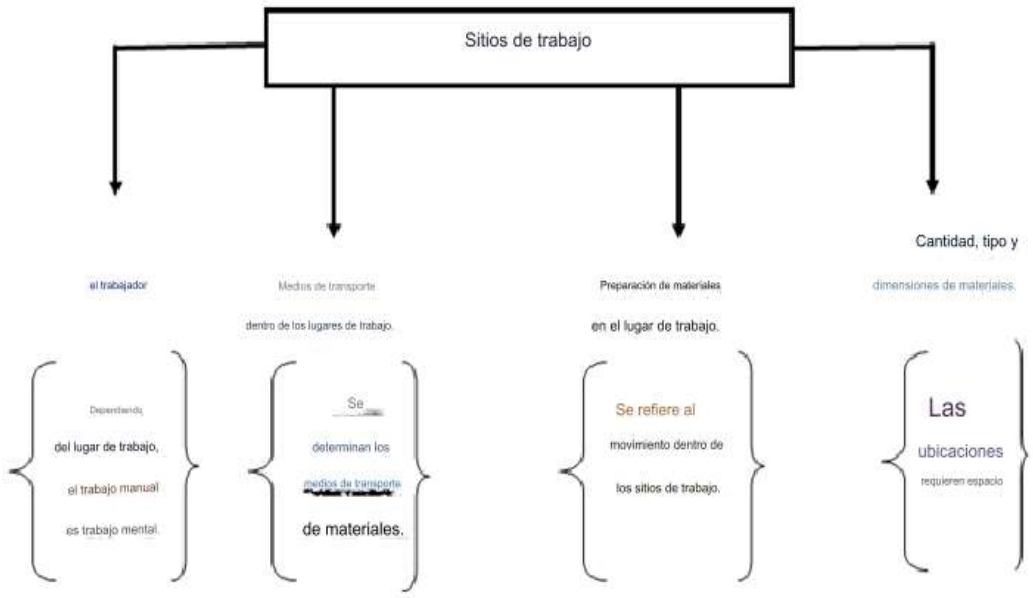



**Figure 02:** Represents the impact of human engineering on workplaces.
**Source:** Designed by the researcher.

### Work Materials and Their Role in the Workplace:

The work materials in this context are essential and fundamental to workplace operations. Additionally, the availability of transportation means within the workplace must align with technological advancements. Importantly, we must not overlook the "worker" and their position, as they actively engage with these machines, contributing to the process through their activity, performance, and function. This highlights the clear role of ergonomics, or "human engineering," in the distribution and use of both space and tools in a manner that fosters a harmonious relationship between the machine and the worker, while also achieving the goals of the production organization. The worker remains the central focus of all operations in the workplace, serving as the primary driver of all related elements, representing the "workforce" in the workplace (Najm, 2012, p. 252).

The worker is a biological, psychological, and social entity. The biological aspect pertains to physical capabilities, the psychological aspect relates to tendencies and abilities, while the social aspect encompasses the worker's experiences in society and the workplace, manifested in the relationships among workers. In this framework, ergonomics seeks to minimize human fatigue by effectively distributing tools and guiding workers, thereby enhancing productivity and conserving human energy (Awajat, 2019, p. 26). This approach contributes to ensuring the safety and security of workers. Consequently, the importance of ergonomics in workplaces is evident, as it aims to create acceptable working conditions that foster feelings of safety and loyalty among employees. Thus, ergonomics studies several dimensions of the work environment, including human, organizational, and physical dimensions, the latter referring to the professional environment.

Each dimension targets a specific aspect of the production process at various stages. The organizational and physical dimensions focus on management and the preparation of workspaces, while the human dimension addresses the body's responses to physical and physiological stress (Al-Mudhar, Al-Wasi, 2019, p. 1797). Throughout this process, the worker remains one of the foundational pillars of the production process, with ergonomics addressing the need for adaptation between the worker and tools through thoughtful workplace design.

### Human Engineering and Occupational Compatibility:

Occupational compatibility within a production organization is associated with two primary indicators: the human and the machine. The relationship between them is a significant factor in measuring success or failure. Employee satisfaction manifests through their work performance, especially when the job aligns with their capabilities and aspirations, both immediate and future.

Therefore, occupational compatibility can be seen as grounded in a set of competencies available to the worker that contribute to their performance. These competencies can be summarized as inclinations, readiness, abilities, intelligence, support, and personality traits (Al-Sheikh, 1430, p. 35). Regarding intelligence, it plays a crucial role in occupational compatibility; the more aligned the worker's tasks are with their intelligence and abilities, the better the compatibility. Conversely, when tasks do not match the worker's intelligence and readiness, this leads to a lack of compatibility, resulting in various issues such as distraction, disengagement, and decreased morale (Al-Ka'id, 2015, p. 14). Additionally, personality traits significantly influence occupational compatibility through their fundamental components. These components include physical attributes that determine the worker's endurance for specific tasks, as well as mental and psychological aspects that equip the worker to face their responsibilities. Emotional components also come into play, as they result in physiological changes that may be internal or external, often expressed through verbal communication.

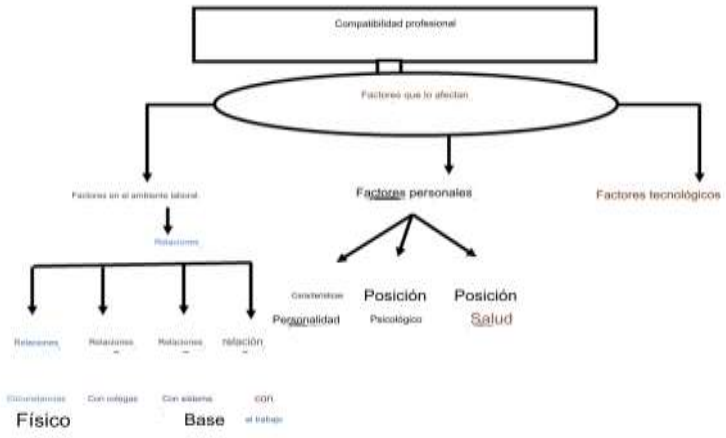



**Figure 03:** Represents the factors affecting occupational compatibility.
Source: Designed by the researcher.

- **Condor Company, Bouira**

Moreover, certain technological factors, particularly those related to management tools within the organization—such as machinery, equipment, and tools—also play a role in this context (Mustafa, 2012, p. 81).Today, ergonomics has become vital in aligning the work environment with workers' capabilities, readiness, inclinations, and traits to achieve occupational compatibility. The factors influencing occupational compatibility can be summarized in the following figure.

These factors constitute the environment in which the production process and the worker's activity take place. Therefore, production organizations and institutions must pay considerable attention to ensure that workers feel regarded as human beings (Faraj, 1980, pp. 56-57).

Thus, we can consider both technological factors at the technical level and personal factors, whether health-related or psychological, as well as factors linked to the work environment—such as relationships with work, the organizational system, colleagues, and physical conditions. On this basis, human engineering in production institutions becomes an imperative and an organizational procedure within its applications at work sites. However, this can be implemented in stages during the design process to ensure the adaptation of machines and tools to workers' capabilities, especially when establishing new work sites or introducing new machinery. It can also be applied in existing projects to accommodate workers' needs and comfort, allowing them to carry out their activities and tasks effectively.

This type of ergonomics is the most prevalent in production institutions, ensuring a positive image and acceptable reputation. In Algeria, "Condor" is among the institutions that meet these criteria of image and reputation, enabling it to compete in the African market. Moreover, it is one of the institutions that excels in attracting workers, enhancing their performance, and ensuring quality. The Algerian experience in the economic field has shown that the path to development passes through essential stages, whether to control production and its efficiency or to explore possible methods to ensure this, which includes benefiting from human engineering applications that contribute to achieving harmony between workers and machines, ensuring production, and creating occupational compatibility.

## Conclusion:

Based on the preceding analysis, human engineering or ergonomics represents the evolution that has taken place in work studies and is also a natural outcome of these studies. This is because the study of work facilitates its specific applications, focusing primarily on the human component, which is the essential element in the production process of production and industrial institutions.

Scientific advancements have also affected the work environment, with machinery replacing manual labor, providing workers with contributing factors to performance. To control the national economy, production institutions serve as a tool for achieving this and ensuring development. Thus, the importance of ergonomics in the production sector emerges through the modifications and designs that offer contributing elements for adapting machines to workers' capabilities, thereby facilitating the worker's compatibility within their work environment and promoting harmony between them and the machines they operate.

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