

RESEARCH PAPER

# Analysis of the contribution of ergonomics to the management system and organizational governance

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## ABSTRACT

**The purpose is** To analyze the application of ergonomics in management systems and organizational governance demonstrating the relevance of the potential of its application.

**The methodology** is marked by three major stages. The first is the identification of scientific texts that address the theory of ergonomics. The second is the identification of reports of experiences of application of ergonomics. In the third, the content analysis of the identified scientific texts is carried out and the discussion of the results obtained contributing to organizational theory and practices.

**The findings** come from literature review methods and secondary data from case studies. It concludes that the organizational culture should value the application of ergonomics in projects. The contributions of ergonomics to the management system, compliance and organizational governance are described. The main limitations present in the research are inherent to the chosen methods, that is, the Bibliographic Review does not cover all the possibilities of application of the concepts of ergonomics to the management system and to governance. The conclusions, finally, go through the subjectivity of the researcher in the analysis of the peculiarities of the case studies identified and cited. The main contributions of this work are focused on the support and guidance of organizational practices for the management system and good governance practices. The academic contribution consists of the ergonomic analyzes articulated and aggregated to the management system and organizational governance.

**Originality is supported by** the governance and management system approach under the ergonomics guideline.

**Key-words:** Ergonomics; Management system; Governance.

## 1. INTRODUCTION

Brazilian organizations have integrated actions linked to ergonomics to their production and support processes (HR, Finance etc.) according to ergonomic action initiatives (Vidal, 2006, SÍGOLO et al., 2019 and SILVA, 2021.). Some organizations include ergonomics as a potential possibility to identify improvements in work and management system and governance. (VIDAL et al., 2009).

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(Sanches and Andrade, 2022) and (Silva, 2021) mention factors that explain the absence of ergonomics in management practices and organizational governance : (i) the lack of managerial actions in ergonomics in economic or cost-effective terms and (ii) the lack of ergonomics as an appropriate design element for each organization.

According to (Fontes Filho, 2004) organizational governance practices are based on the theoretical scope and on the choices of inclusion in organizational strategy, according to the principles of international and Brazilian legislation.

Previous studies have raised attention to this issue in areas of knowledge intrinsic to ergonomics, management system and organizational governance, such as (Meira, 2019), (Guizze, 2011); (Ferreira et al., 2019); (Lubis et al., 2021) e (Suhada, 2018). More recently, the COVID-19 pandemic has impacted work processes, with changes in activities from face-to-face format to remote around the world, influencing leadership practices and operational efficiency. Thus, the implications caused by the pandemic exposed additional gaps in the contribution of ergonomics to organizational management and governance. The ergonomic concepts applied to organizational governance are a viable solution to reinforce the synergistic effect of different fields of knowledge, according to (Meira, 2019).

The premise of this research is the importance of integrated ergonomics to important aspects of the management system and organizational governance (Guizze, 2011; Ferreira et al., 2019).

Based on these arguments, the objective of this study is to answer the research question: How to demonstrate that there is synergy between the application of ergonomic concepts and the dynamics of the management system and organizational governance?

The work presents in chapter 1 an objective and context approach about the contribution of ergonomics to management and governance. Chapter 2 presents the literature review and describes the history of the subject in this literature. Chapter 3 addresses the chosen research methodology. Chapter 4 presents the result of the literature review and chapter 5 makes the analysis and discussion of the results. Chapter 6 presents the conclusions and proposals of new research.

## 2. THEORETICAL BACKGROUND

### 2.1 History of the development of the theme

In the context of the synchrony between the application of ergonomic concepts and the dynamics of the management system and governance, are the expressions “ESG”, “responsible investment” and “sustainable investment”, which formulate the set of concepts that combine in the incorporation of indicators that measure the impacts on the environment, in society and governance. According to the Brazilian Institute of Organizational Governance – IBGC, the fundamentals of governance are:

- *Disclosure*; Fairness; Accountability;
- Compliance; Ethics.

Ergonomic initiatives should be included in the strategic guidelines of governance, incorporating the effect of ESG methodology on the organizations' performance (Lubis et al., 2021). The ESG indicators are used to generate criteria in organizational decision-making processes. The term ESG was presented in 2006 in the United Nation's Principles for Responsible Investing (PRI) publication, and ESG-based decision practice begins in the 60's.

(Guizon, 2011) and (Suhada, 2018) propose 14 requirements to analyze the level of integration of ergonomics in governance practices: Subject Acceptance; Organizational Culture recognizes the contribution of Ergonomics; Ergonomics Integration in Management Training; Process Mapping and Standardization; Organizational Structure; Strategic Planning; Continuous Improvement; Relationship; Leadership and Organizational citizenship; Certifications; Social Responsibility; People valorization and Information Technology.

According to (Sarbat and Oz Mehmet Tasan, 2020), due to the interdisciplinary nature of ergonomics, which treats the complexity of contexts, the new organizational paradigms demand the application of ergonomics. ESG concepts integrated with ergonomics are used to meet the needs of stakeholders, put into practice social, environmental and economically appropriate and balanced actions. The authors consider that one of the results of the organizational culture, which values the application of ergonomics in their projects, is the ability to develop flexible production systems.

## 2.2 Ergonomics and governance

According to (DÜZGÜN, 2020), the concept of work environment can lead to the understanding that it is the physical environment that guarantees safety and hygiene for workers, limitation of working hours and regulation of the work of women and children. However, the relationship with the work environment is not restricted in objectivity and has complexity. The expression in the literature is the environment of work: It is not just a physical space. The work environment is conceptualized by ergonomics as a healthy space for the worker – regulated by state norms, constitutionally established and assumed by the employer.

According to (Guizze, 2011) and (Betty et al., 2021), contemporary ergonomics changed the focus of the experimental action of recommendations on human factors for the “situated analysis of activity”, by identifying the reality of socio-cognitive systems (SSC) that articulate people, technologies and the organization.

For (Ruiz and Mergarejo, 2018) and (Iora, 2019) the ergonomic maturity in an organization is an essential requirement for ergonomics to contribute at the strategic level to organizational governance (Disclosure; Fairness; Accountability; Compliance; Ethics).

As an unfolding of this maturity assessment, “ergonomics management skills” are identified in organizations. According to (Carvalho & Rabechini Jr., 2009) the evaluation of an organization when managing projects considers competences in three dimensions: individuals, project teams and organizational sectors involved. The mature organization in project management has for each of the three dimensions implementation methodologies, process design for each, control and monitoring.

It can be deduced that for ergonomics to exercise strategic function it is necessary to identify the maturity level of application of the concepts of ergonomics in the organization.

According to (Betty et al., 2021) and (De Souza et al., 2021) the contemporary concept of health established by the World Health Organization (WHO), consists of the “state of complete physical, mental and social well-being” or “effective quality of life”. The quality of life in the work environment considers not only physical, chemical and biological risks, but should also consider risks inherent to the reality of the work environment: ergonomic risks and psychosocial risks. The work environment should not only be focused on traditional issues of danger and unhealthy, but also on the issues inherent to the practices of work organization, the quality of interpersonal relationships at work, governance and organizational positions.

Added to the challenge to provide a healthy work environment the reality of the gap between managers and workers, inhibiting communication in organizations. Such evidences lead to moral harassment.

It is demanded from the worker to be competitive, qualified, creative and polyvalent. On the other hand, the belief remains on this worker that, by not being fit for these new conditions, it could mean the loss of employment, generating constant tension (Schmidt, 2013, p. 91; Rocha, 2020).

Globalization and the current practices of labor relationships support human relationships centered on utilitarian logic, full of rivalry and hostility and set up a scenario that favors psychological violence at work and the occurrence of moral harassment (Schmidt, 2013, p. 91).

Ergonomics, as an accepted activity and with maturity of the organization, establishes in systems projects and strategies to take into account the rights of the human person in an unrestricted manner.

## 2.3 Compliance and organizational governance

Organizational governance emerged as a result of the growing need for readjustment of corporate structures and the adoption of new management models by national and international organizations.

It is a management model whose purpose is to optimize the performance of the organization and facilitate access to capital, covering the relationship among the stakeholders (partners, boards of directors, public oversight bodies, employees and other stakeholders) (Silva, 2019).

In other words, organizational governance practices are transformed into principles and guidelines that contribute to the quality of management of organizations, aiming to perpetuate their economic value in the long term. Thus, organizational governance is a kind of gender that holds the responsibility to ensure that the organization complies with its values and guidelines (Andrade, 2017).

### 3. RESEARCH METHOD

The research is qualitative, applied, with citation of secondary data of case studies. To carry out this study a systematic review of the literature was used. The methodology was structured in five stages:

(1) Secondary data were used in case studies published in journals and congresses. The Scopus database was chosen due to its large repository of international titles and publishers. The bibliographical analysis sought to identify articles in the search period from 2017 to 2022.

(2) Refinement of the research: it is composed of identification of the relevant aspects found, after the content analysis of the selected articles.

(3) Selection of articles for literature review for reading, in full, the articles that had greater alignment with the subject under study;

(4) The documents selected to serve as the basis for this research have been read in full and

(5) Search to achieve the research objectives: question formulation, location of case studies, selection and evaluation, analysis and synthesis, reports of the application of ergonomic concepts in support of good governance practices and management systems. The described steps are essential to carry out the systematic review of the literature, according to (Garza-Reyes, 2015).

To explain the contribution of ergonomics to Governance and the organizational management system, secondary data are used for case studies. Regarding the use of secondary data, DRUMOND et al (2009) state that there is a tendency to increase the use of secondary data in research.

### 4. APPLICATION OF CONCEPTS OF ERGONOMICS TO THE MANAGEMENT SYSTEM AND ORGANIZATIONAL GOVERNANCE.

This chapter consists of 4 topics that focus on analyzing cases from the literature.

#### 4.1 Case based on Mazucatto, (2017): contribution of ergonomics in integration with compliance and governance. It describes research results on “moral harassment in the workplace: compliance as an instrument for mitigating occurrences”.

It addresses contemporary theme, which consists of situations of psychological violence at work, called moral harassment. This topic analyzes the characteristics of moral harassment in the workplace, reports that prevention through compliance programs is effective in promoting ergonomic ethics and mitigating moral harassment.

According to (Mazucatto, 2017), the contribution of ergonomics to governance needs to focus on how people management develops in hostile conflicts and consequent behaviors that give rise to moral harassment.

Damage from moral harassment in the workplace has an impact on the worker (victim) and the employer. Traditional organizational practices are directed to remedy the consequences. However, remedying the consequences is insufficient to achieve effectiveness by continuing to cost for organizations and the State.

Cases of moral harassment have as a consequence the dismissal of the victim from the staff of the organization. There are requests for dismissal of the victim and the removal occurs accompanied by social security assistance or retirement due to invalidity.

As an indicator of the criticality of the occurrence of moral harassment, costs of shutdown of the harassed worker are counted, as well as replacement and training of the substitute. By itself, this is already a negative impact to be considered. Occurrences of moral harassment generate passive labor litigation. Moral harassment represents wear and tear in the workplace and cost to the organization.

What is ergonomically ethical? There are essential aspects (Colombo Filho, 2016, p. 149- 150) such as to encourage family life through the correct concession of rest periods and prior communication of the scales; To require work in extraordinary hours only exceptionally; To avoid labor overload, increasing jobs proportionally to the growth of labor volume (new hires, temporary hires are even more economical alternatives in relation to the payment of overtime); To watch over the enjoyment of breaks and intervals, preventing the worker's psychic and physical fatigue; enable and encourage professional improvement through investment in technical training; do not require physical activities of workers, either for motivational purposes or for training, removing the possibility of occurrence of situations that expose workers; do not restrict visits to the bathroom and know how to treat cases of abuse; know how to organize the work system without imposing abusive goals; to organize work methods that aim to optimize productivity without, however, exerting undue pressure on the worker; to issue clear, objective and precise orders and instructions, removing the possibility of misconceptions about the interpretation of these; To have qualification, promote the exchange of knowledge and always transmit the maximum information

for the prevention of accidents; to count on a body specialized in organization, systems and methods, and work safety for the planning, training and supervision of activity related to the work environment.

In this gap, compliance programs are presented as a tool to mitigate the occurrences of moral harassment in the workplace and promote ergonomic ethics.

The mere documentation of the ethical precepts adopted by the organization (through codes of ethics and conduct) does not properly bring practical effectiveness that results in the change of conscious posture of the functional body of the organization.

#### **4.2 Case report of Rosa (2018), which highlights the contribution of ergonomics and its integration with people management. It describes the research results on the sexual division of labor in the textile industry, and presents the role of ergonomics.**

This case is described from primary data obtained by (Rosa, 2018) and is part of the work-education approach in socioeconomic and political-cultural contexts, highlighting the historical and cultural processes, the relationships among organizational changes, education and the world of work. In this context, the dialogue is analyzed between the sexual division of labor and ergonomics in the textile industry. It is demonstrated the importance of the gender variable in studies on work and ergonomics.

All quantitative and qualitative data were collected (Rosa, 2018) in the documents provided by the organization, in *the on-site observations* and in semi-structured interviews with managers and workers in the operational areas. The data were analyzed in three aspects: (i) sexual division of labor in the textile industry; (ii) the relationship between productive work and reproductive work in the domestic sphere; and (iii) ergonomics. The articulation of these categories of analysis made it possible to approach the object of study, the dialog between the sexual division of labor and ergonomics in the textile industrial sector. The analysis of the results reveals gender segregation in the organization with a larger number of women in the spinning sector and in the positions of assistant and operator, while men stand out in the processing/finishing and maintenance sector, as well as in the positions of leadership and command.

It was found that in the conception of the organization and of the workers themselves there is work of man and woman work, which require differentiated skills. Women are required for tasks/functions considered "light" and that require manual skills, such as dexterity and perfection in performing details or to operate machines, in a simple and repetitive work. Patience, docility and discipline are also competencies considered positive of the female workforce. The preference for male workers for other tasks/functions is justified with arguments in which the need for physical strength often appears. However, even in the spinning sector, mostly female, it is the men who occupy the most qualified positions/functions and are in the tasks that require, in addition to physical strength, technical knowledge and command. Women are more accepted in tasks that require greater care and attention, mainly cleaning and compliance verification activities in detail. The results point to the silence in the social relationships of sex/gender in the textile industry studied, especially when analyzing the ergonomic conditions of the activities in the perspective of a sexual working class, which hinders this dialog.

#### **4.3 Case report based on Hafemann, (2021), describes the contribution of ergonomics in people management, promoting the quality of life at work.**

It analyzes the application of ergonomics in Public Management and the benefits brought to the servers and the institution. It presents contextualization of public management, as well as the application of ergonomic studies for the physical health of the server for a healthier life in the workplace. The author presents results of a theoretical investigation in order to understand the elements that associate the consequences arising from the application of ergonomics with the purposes proposed by Public Management and its interrelation, in which the role of the manager becomes essential. Based on a reflection on the way the manager acts, it is verified fundamental contribution to the ergonomic actions performed, given its inability to deal with complexity. Table 1 presents the principles of Public Management.

Ergonomics is part of studies called "Quality of Life at Work" (QVT), with wide application and scientific literature, resulting in rare results in public management.

In this scenario, the manager's action is identified as fundamental for the planning and control of environmental factors that affect the workers' quality of life.

Ergonomics is relevant for the prevention of work accidents to be effective. Therefore, the participation of workers and managers of the institution is imperative in order to implement prevention policy. Thus, the relevant meaning of ergonomics for the beneficial social impact is configured.

#### **4.4 Case report based on Vieira et al., (2009): contribution of ergonomics and its integration with strategic management.**

This report presents results collected through the diagnosis carried out in Micro and Small Organizations (MPEs) enrolled in the project "Introduction of continuous innovation practices in Micro and Small Organizations of the Local Productive Arrangement (APL) of Maringá Clothing".

It is observed in the obtaining and analysis of the data that the MPEs present lack of management. The diagnosis began in the areas of production management and use of the 5 senses. It was concluded that the organizations included in the study do not present a systematic of technological innovation and actions for continuous improvement. A first conclusion of the diagnosis: to promote actions for improvements that stimulate cooperation with consequent strengthening of integration among the organizations components of the productive arrangement.

Systematically, the workers of APL organizations use Personal Protective Equipment – PPE, such as gloves for the cutting sector, masks in the finishing sector and ear protectors.

As for the poor conditions of the work environment, the following are present as a quotation in interviews with the workers: in the twenty organizations, 40% of workers pointed to high temperature and 30% to ventilation. In an organization noise was pointed out by the workers as a factor of dissatisfaction regarding the environmental conditions of work and the lack of lighting. It was observed that APL organizations do not have a culture of application of ergonomics in their projects of improvement at work.

Employee turnover in organizations is high: 70%, and productivity is impaired with such performance.

The seasonality of demand for the market causes layoffs and systematic admissions, pressing workers and managers, establishing a vicious cycle of absence of motivation and losses and increasing costs in the production process.

There is no methodology to align the business strategy with the production strategy and other functions to support the management of the business itself.

### **5. ANALYSIS AND DISCUSSION OF RESULTS**

The findings in the literature review and the premise that there is relevance in the contribution of ergonomics to the management system and organizational governance are based on this chapter.

Table 1 presents the description of the contributions of ergonomics to management systems and governance, obtained in the literature.

**Table 1** - Summary of the contributions of ergonomics to the management system and governance

(continue)

REFERENCES TO AUTHORS	SUMMARY DESCRIPTION OF THE CONTRIBUTION OF ERGONOMICS TO THE MANAGEMENT SYSTEM AND ORGANIZATIONAL GOVERNANCE.	TOPICS CHARACTERISTIC OF MANAGEMENT SYSTEMS AND GOVERNANCE
(Barbosa, Miriam et al., 2022)	Overview of QVT in Brazilian organizations. It describes implementation of a program of quality of life at work, research carried out during the pandemic.	QVT and Ergonomics; management systems.
(Ruíz, Mergarejo, 2018 and IORA,2019)	Ergonomic maturity in the organization, essential for ergonomics system with strategic contributions to compliance and organizational governance.	Ergonomics applied in management systems.
(Schmidt, 2013)	Globalization and the current practices of labor relationships support human relationships centered on the competition logic, full of rivalry and hostility and set up a scenario that favors psychological violence at work and the occurrence of moral harassment.	Ergonomics, Governance, Moral Harassment.
(Hendrick, 2003)	Examples of economic and financial feasibility studies related to ergonomic projects.	Economic and financial management, feasibility study of ergonomic projects.
(Guizze, 2011 and Betty et al., 2021)	Contemporary ergonomics changed the focus of the experimental action of recommendations on human factors for the "situated analysis of activity", by identifying the reality of socio-cognitive systems (SSC) that articulate people, technologies and the organization.	Ergonomics, socio-cognitive systems (they articulate people, technologies and organization)
(Zink, Klaus J.; Fischer, Klaus, 2018)	Concepts of human factors and their contribution to the sustainable management of organizations - including governance, economic, social and environmental performance.	Innovation and technology; collaboration; knowledge management; sustainability reports; resources (materials, energy) including recycling; emissions to the atmosphere; emissions to water; emissions to the soil; hazardous waste and waste; biodiversity; environmental issues of the product; corporate governance; motivation and incentives; health and safety; human capital development; ethics and human rights; no corruption and cartel; corporate citizenship.

**Table 1** - Summary of the contributions of ergonomics to the management system and governance

(continue)

REFERENCES TO AUTHORS	SUMMARY DESCRIPTION OF THE CONTRIBUTION OF ERGONOMICS TO THE MANAGEMENT SYSTEM AND ORGANIZATIONAL GOVERNANCE.	TOPICS CHARACTERISTIC OF MANAGEMENT SYSTEMS AND GOVERNANCE
(Vidal, M.C., Guizze, C.L., Mafra, J.R., Bonfatti, R.J., Santos, M.S., Pacheco, R., Moreira, L.R., 2009)	Maturity in the application of ergonomics to achieve superior performance results in management systems. The model adopted for the management system is focused on sustainability and IT resources, in the context of the implementation of digital transformation.	It comprises and adopts global sustainability standards, anticipates and responds to the requests of stakeholders and incorporates and develops organizational sustainability in the technological environment of digital transformation.
(Ikram;Ahmed., 2022)	Governance of public organizations under the influence of digitalization in their processes.	Governance, digital transformation into administrative processes. Ergonomics.
(Straus et al., 2022)	<p>The impact on productivity, effectiveness in organizational performance, from the application of ergonomic concepts. In the context of remote work due to the COVID 19 pandemic.</p> <p>Waste recovery mechanisms, practices that integrate the environmental eco-design process. In the development of related products and processes. The goal is to minimize environmental impact throughout the product lifecycle without compromising criteria such as performance, functionality, quality and cost.</p>	Management practices (to ensure commitment, support and resources to carry out activities related to ecological design, incorporate ecological design tasks into the daily routine of employees, formulate and monitor mandatory rules regarding the environment so that the organization complies with legal requirements and implement life cycle thinking in the organization) and operational (phase of the material life cycle: prefabrication; manufacturing; distribution and packaging; use and maintenance; and end of life, environmental aspects: material, energy consumption, solids, waste, effluents and emissions).
(Andrade, 2017)	Management system practices and organizational governance are transformed into principles and guidelines, aiming at the perpetuation of their economic value. Thus, the organizational governance holds the responsibility to ensure that the organization complies with its values and guidelines.	Governance and organizational management system, <i>compliance</i> and ergonomics.
(Sarbat, Irem; Oz Mehmet Tasan, Seren, 2020)	Framework for sustainable processes from ergonomic methods and factors. It adopts a network and a TBL perspective that allows systematic analysis and evaluation of practices that support sustainable operations.	Strategic and business vision; leadership objectives and values; project and program portfolio management; supplier/partner integration strategies; strategic positioning and marketing; network coordination and leadership; service and product systems offer; effective intra-organization integration and business tools; business and network improvement processes



**Table 1** - Summary of the contributions of ergonomics to the management system and governance

(continue)

REFERENCES TO AUTHORS	SUMMARY DESCRIPTION OF THE CONTRIBUTION OF ERGONOMICS TO THE MANAGEMENT SYSTEM AND ORGANIZATIONAL GOVERNANCE.	TOPICS CHARACTERISTIC OF MANAGEMENT SYSTEMS AND GOVERNANCE
		and performance measurement; waste minimization; "carbon footprint"; <i>design</i> of new products and services; people's ability and design organizational sustainability; industrial process innovation.
(Betty et al.,2021 and De Souza et al., 2021)	WHO defines health "state of complete physical, mental and social well-being" or "effective quality of life". The quality of life in the work environment considers not only physical, chemical and biological risks, but should also consider risks inherent to the reality of the work environment: ergonomic risks and psychosocial risks.	Work Health; Ergonomics, QVT; Integration with Ergonomics.
(Pereira, Alexia Maria Soares et al., 2021)	Concepts of ergonomics applied in management and governance systematize a conceptual framework that refers to principles of respect, the humanization of work, the work environment and favor the governance structure.	Ergonomics, Governance, Humanism.
(De Souza, Olga Suely Soares; De Limabarbosa, Annie Marcelle Marçal, 2021)	Contribution of ergonomics to the implementation and use of COMPLIANCE concepts as a guarantee of the fundamental right to the environment of HEALTHY work.	Use of technical standards and good practices; legal frameworks, aiming to establish limits, standards and continuously improve the treatment of pollution; outline the strategy of managing the relationship with suppliers, customers and society; personnel management; profitability management; management of the distribution of economic value.
(Praxedes et al., 2020)	Application of Quality Tools in a QVT Assessment: Case Study in the Fish Market of Abaetetuba-PA.	QVT; Total Quality Management; Social Responsibility.
(Leite, AM et al., 2021)	Development of theoretical framework correlates social responsibility, sustainable management with ergonomics.	Organizational sustainability policy; supply chain (corporate social responsibility); ecological labeling;
(Fine, V Sojo, H Lawford-Smith, 2020)	Contribution of ergonomics to policies/programs on gender diversity in the workplace. Justice, organizational benefits and governance.	Concepts of applied ergonomics and governance, all related to sustainability
(Ferreira, Danúbia Leite; Morioka, Sandra Naomi; Valadares, Jeferson André Silva, 2019)	The well-being of the worker, the organizational social responsibility, carrying out the case studies.	QVT; Emphasis on production organization; quality management; <i>workplace design</i> ; ergonomics and safety; employee training and development; innovation management; corporate image.

REFERENCES TO AUTHORS	SUMMARY DESCRIPTION OF THE CONTRIBUTION OF ERGONOMICS TO THE MANAGEMENT SYSTEM AND ORGANIZATIONAL GOVERNANCE.	TOPICS CHARACTERISTIC OF MANAGEMENT SYSTEMS AND GOVERNANCE
(Sarbat AND Oz Mehmet Tasan, 2020)	New organizational paradigms are indispensable in the application of ergonomics for the well-being of people. ESG concepts, of organizational management and governance integrated with ergonomics are used to meet the needs of stakeholders, put into practice social, environmental and economically appropriate and balanced actions.	Ergonomics, ESG, organizational management systems.
(Mazucatto, Isadora Gomes, 2017)	Contributions of ergonomics to the treatment of the problem "Moral Harassment in the Workplace", Compliance approach as an instrument for Mitigating Occurrences.	<i>Compliance</i> , ergonomics, moral harassment, people management.
(Jonsdottir et al., 2021)	The dynamics of organizational management structured according to ESG principles.	Management of environmental, social governance, ESG.
(Fernandes, Priscila Rodrigues; Batiz, Eduardo Concepción, 2020)	Analysis of ergonomic factors and their impact on sustainable organizational management, considering the SDGs.	Ergonomic factors, SDG, sustainable management
(Dugué et al., 2013)	Corporate governance, through employee involvement and the dynamics of ergonomic factors, is an essential prerequisite for efficiency and safeguarding workers' safety and health.	Organizational governance, ergonomic factors, safety management and occupational health.
(Leite et al., 2021)	Organizational Social Responsibility (RSO) is the ongoing commitment of organizations to ethics and economic development, while incorporating it into the application of ergonomics and QVT.	QVT, Organizational Social Responsibility (RSO)
Düzgün et al., 2020)	The correlation among job satisfaction and quality of life in workers and risks in the work environment.	Ergonomics; QVT; well-being at work.

(conclusion)

As a result of the analysis of the literature, whose main findings are presented in Table 1, the limitations identified are:

- In the literature identified, predominantly, the focus of the contribution of ergonomics is presented in only one aspect, mainly treatment of the workstation and its ergonomic risks.
- Predominantly, there is no direct relationship between the characteristic elements of organizational governance and ergonomics.
- The approach to the contribution of ergonomics is somewhat generic when it comes to sustainability (social, environmental and economic).
- In scientific documents the premises of the contribution of ergonomics are not evaluated in relation to a practical context.
- Some texts do not clearly present their characteristic elements of the contribution of ergonomics to management systems, including governance.
- No articles using a decision support method that would assist in the ordering of the areas to be prioritized aiming to increase the level of maturity and contribution of ergonomics to the organizational management system.

Matakanye et al.(2021) clarify that decisions involving the adoption of sustainability in organizations depend on how they act due to exposure to external and internal pressures. Organizational Sustainability involves the practice of ethics in the relationship with stakeholders. The organizational capacity to commit to sustainable development is currently translated into the acronym ESG. In the business environment, in an increasingly demanding and engaged society, it is necessary to have committed people and organizations.

According to (Souza, 2019), ergonomics is a source of methodologies necessary for the adaptation of management and work systems to man.

According to (Praxedes, Gabrielly Malato et al., 2020) organizations with a culture matured in ergonomics, present synchronism between ergonomics and organizational strategies.

According to (Ikram, K. R. I. T.; Ahmed, Aftiss, 2022), the contemporary concept of digital transformation into organizational processes has become a requirement to increase efficiency and competitiveness in a global market. This encourages managers to restructure and rethink their performance in decision making. This transformation can be carried out by establishing credibility for digitalization, demonstrating significant effects on success in the relationships between the organization and consumers. Good governance practices (disclosure, compliance, ethics) are fundamental to structure the process of digital transformation in the organization, registering relevance in the contribution of ergonomics.

In this context, we formulated 4 propositions on the application of ergonomic concepts in management systems and organizational governance:

**Proposition 1.** Being aware of the reality that the application of ergonomic concepts will be strengthened by increasing examples of success.

Brito (2018) argues that economic development focusing on moral and ethical issues, more valued than economic results, improves the quality of life of internal and external "stakeholders", without causing the irrational exploitation of natural resources and the environment.

Pereira et al. (2021) claim that concepts of ergonomics applied in management and governance systematize a conceptual framework that refers to principles of respect, the humanization of work, the work environment and favor the governance structure.

**Proposition 2.** There is a trend toward a management model with a systemic approach, linked to good governance practices, with concerns in the economic, environmental and social fields. In this sense, Boris et al. (2014) describe the conceptual basis on which sustainability integration is based, including ergonomics, management system and governance. This integration is based on principles that support management decisions: society, environment, economy and it is conceptualized that governance enables the synchrony between principles of sustainability and organizational maturity in ergonomics.

The managers should use in their decisions the systemic, transparent and environmental and social management frameworks.

**Proposition 3.** They are considered as a contribution to the management system and to organizational governance :organizational maturity in ergonomics confers effectiveness in the contribution of ergonomics in the conduction of performance improvement projects. Ergonomics has not yet been widely disseminated in management practices and governance, what contrasts with its potential. Organizations need to assume ergonomic action as an effective contribution to their purposes of practicing humanistic, environmentally correct and economically responsible management, managed by good governance practices.

In tune with the function of the management system and governance, ergonomics creates safe and healthy working conditions.

Depending on the cases analyzed, it can be considered that not assuming the strategic

contribution potential of ergonomics to the governance of organizations is a huge waste.

Cosio (2019) expands the application of ergonomics in management and governance decisions. It develops an intelligent model based on machine learning in applying macro-ergonomic methods in human resource processes based on ISO 12207. To achieve the goal, a method of building a Java language algorithm is applied to select the best alternative for a given position. Among the findings, it is shown that the model is useful in identifying the best profiles for a given position, optimizing time in the selection process and human resources, as well as reducing stress at work.

As a result, the practice of anticipating ergonomic risks in a holistic approach was the main benefit, generating socioeconomic impact in the promotion of worker health, reducing work absences and ensuring a continued ergonomic program.

Zink and Fischer (2018) analyze globalization and digitalization of the value chain, which pose new challenges in relation to sustainability and decent work. They discuss possible contributions that Human Factors and Ergonomics can provide in relation to these challenges. They demonstrate that although Human Factors and Ergonomics already offer results from extensive research, it is also important to deepen their development to be prepared to deal with challenges and opportunities in this field. These range from updating the normative mindset of Human Factors and Ergonomics to expanding their modeling approaches and developing curricula and cooperation with key actors. Ergonomics presents itself as a valuable resource and present in the various analyzes of the contemporary scenario related to organizational performance.

**Proposition 4.** Hendrick (2003) and Barbosa (2022) propose the question: What is the evidence that investment in ergonomic interventions in the organization is worth? The answer is important for organization and ergonomics. Hendrick (1996) and Tompa, (2010) claim that ergonomics have been recognized since its inception as "a discipline with immense potential for improving the comfort, safety and health of workers and improving the productivity of systems and product quality." Vicente,(2020) presents the integrated report as an important accounting instrument for the dissemination of financial and non-financial information to organizations. The globalization of markets and its consequent competitiveness makes organizations more competitive and seek to make their integrated report clearly and objectively, directed to its stakeholders. The integrated report enables the visualization of the results of application of ergonomic concepts and sustainability in organizational improvement projects.

Straus (2022) describes that in European countries, the COVID-19 pandemic has given rise to the demanding work situation for office employees who have been forced to work from home (such as remote workers).

Barbosa (2022) states that the Quality of life at Work - QVT facilitates the needs of employees by developing their activities in the organization, having as central axis the fact that people can be more productive the more satisfied and involved with the work environment. However, QVT only occurs to the extent that organizations become aware that their employees are a fundamental part of their organization.

## 6. CONCLUSION AND SUGGESTIONS OF NEW RESEARCH.

Among the lessons learned in this work, there is the observation that the application of ergonomics in organizations values the humanization of work and impacts decisions that take into account human qualities and limitations.

The first stage of this research was the development of a theoretical framework, resulting in Table 1: Summary of the contributions of ergonomics to the management systems and governance. This development was relevant due to the rarity of this approach in the literature, being a frontier theme little explored.

Regarding the literature review, it was possible to better understand the knowledge bases on the context of synchrony between the application of ergonomic concepts and the dynamics of the management system and organizational governance. We obtained findings in the literature regarding the integration of ergonomics with organizational and governance management.

In the second stage, chapter 4 "Cases with application of the concepts of ergonomics to Governance" was elaborated. Through the analysis of these cases it was possible to observe that the principles of ergonomics fully covered the topics of governance and management systems addressed by the authors analyzed in this research, which were the contribution of ergonomics and its integration with the concepts of *compliance* and governance, with the management of people by promoting the quality of life at work and its integration with the strategic management of the organization.

In the third stage, chapter 5 was developed, analysis and discussion of the results, where 4 propositions that report the lessons learned are described.

The traditional priority of organizations to create shareholder value is being expanded to include humanistic, social, ethical and environmental considerations. Although a strong link

between organizational management and integrated governance with ergonomics and shareholder value has not been proven, there is now a consensual vision and the establishment of acceptable minimum values on what is expected of organizations. It is the responsibility of organizations to publicly explain their approach to organizational management and governance.

As a suggestion of new research could be cited the identification of organizational skills necessary to enable the implementation of the management system and governance integrated to ergonomics and proposals for the development of practical tools for organizational management and governance integrated to ergonomics.

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## REFERENCES

- Araújo, A.R. Assédio moral organizacional. *In: ARAÚJO, A.R. (2007), "Assédio moral organizacional", Revista do Tribunal Superior do Trabalho, Porto Alegre, Vol. 73, No. 2, p. 203-214, 2007.*
- Barbosa, M.M.P; Cardoso, E.F. (2022), "panorama da QVT no mercado brasileiro: programa de implantação da Qualidade de Vida no Trabalho em tempos de pandemia", *Revista Científica Doctum Multidisciplinar*, Vol. 1, No. 5, 2022.
- Betty, I.B; Gemma, S.F.B (2021), "A saúde mental no trabalho: atores envolvidos no Brasil contemporâneo. *Seminários do LEG*, No. 12, 2021.
- Brito, M.S. *Gestão corporativa e aprendizagem organizacional por meio de ilhas de aprendizagem – um modelo de referência*. 2018.
- Olvera, B.C. (2021), "Innovation in mining: what are the challenges and opportunities along the value chain for Latin American suppliers?", *Mineral Economics, [S. l.]*.
- Carvalho, M.M.; Rabechini, JR.R. (2009), "Construindo Competências para gerenciar projetos: teoria e casos", 2 ed. São Paulo: Atlas, 2009.
- Colombo Filho, C. (2016), "*Quem paga essa conta? Danos morais, assédio moral e outras encrencas – Manual de diretrizes de compliance para gerenciamento da ética laboral*", Curitiba: Direito Prático.
- Cossio, E. *Implementation of an intelligent model based on machine learning in the application of macro-ergonomic methods in a human resources process based on ISO 12207*. Instituto de Ciencias Sociales y Administración, 2019.
- Souza, O.S.S; Barbosa, A.M.M. COMPLIANCE COMO GARANTIA DO DIREITO FUNDAMENTAL AO MEIO AMBIENTE DO TRABALHO. *Revista Veredictum*, No. 4, 2021.
- Drumond, E.F. et al. (2009), "Utilização de dados secundários do SIM, Sinasc e SIH na produção científica brasileira de 1990 a 2006", *Revista Brasileira de Estudos de População*, Vol. 26, No. 1, pp. 7-19.
- Düzgün, F. et al. (2020), "The correlation between work satisfaction and quality of life in nurses and risks in the work environment: a university hospital example", *Archives of health science and research (Online)*, Vol. 7, No. 1, pp. 50-59.
- Fernandes, P.R. and Batiz, E.C. (2020), "Ergonomics Management Model with a Focus on Resilience Engineering", *In: International Conference on Applied Human Factors and Ergonomics*. Springer, Cham, pp. 620-626.
- Ferreira, D.L., Morioka, S.N., Valadares, J.A.S. (2019), "O RECONHECIMENTO DO BEM-ESTAR DO TRABALHADOR E A RESPONSABILIDADE SOCIAL CORPORATIVA: ANÁLISE DE ESTUDOS DE CASO BRASILEIRO", *Revista Gestão & Sustentabilidade Ambiental*, Vol. 8, No. 3, pp. 438-456.
- Fine, C., Sojo, V., Lawford-Smith, H. (2020), "Why does workplace gender diversity matter? Justice, organizational benefits, and policy", *Social Issues and Policy Review*, Vol. 14, No. 1, pp. 36-72.
- Garza-Reyes, J.A. (2015), "Lean and green – a systematic review of the state of the art literature", *Journal of Cleaner Production*, Vol. 102, pp. 18-29.
- Guizze, C.L.C. (2011), Modelo de avaliação de maturidade organizacional para ação ergonômica. Tese (doutorado) – UFRJ / COPPE / Programa de Engenharia de Produção
- Hendrick, H.W. (2003), "Determining the cost-benefit of projects and ergonomic factors leading to

- their success", *Applied Ergonomics*, Elsevier.
- Iora, I.M.L. (2019), "Capitalismo, tecnologia e "Uberização: um estudo sociológico da precarização do trabalho no Brasil a partir da reforma da legislação trabalhista de 2017".
- Ikram, K.R.I.T.; Ahmed, Aftiss (2022), "The governance of public organizations in the digital era: case of Moroccan organization", *International Journal of Mechanical Engineering*.
- Jonsdottir, G.E., Sigurjonsson, T.O., Alavi, A.R., Mitchell, J. (2021), "Applying responsible ownership to advance SDGs and the ESG framework, resulting in the issuance of green bonds", *Sustainability* (Switzerland), Vol. 13, No. 13, pp. 1–20. DOI: 10.3390/su13137331.
- Jyoti, G., Khanna, A. (2021), "Does sustainability performance impact financial performance? Evidence from Indian service sector firms", *Sustainable Development*, Vol. 29, No. 6, pp. 1086–1095. DOI: 10.1002/sd.2204.
- Khaled, R., Ali, H., Mohamed, E.K.A. (2021), "The Sustainable Development Goals and corporate sustainability performance: Mapping, extent and determinants", *Journal of Cleaner Production*, Vol. 311, No. May, p. 127599. Disponível em: <https://doi.org/10.1016/j.jclepro.2021.127599>.
- Kunisch, S. et al. (2018), "Feature topic at organizational research methods: How to conduct rigorous and impactful literature reviews?", *Organizational Research Methods*, Vol. 21, No. 3, pp. 519–523.
- Leite, L.O.M. et al. (2021), "A Theoretical Framework Between Corporate Social Responsibility and Ergonomics for Sustainable Development". In: *Integrating Social Responsibility and Sustainable Development*. Springer, Cham, pp. 581–589.
- Lubis, M.F.F.; Rokhim, R. (2021), "The Effect of Environmental, Social, and Governance (ESG) Disclosure and Competitive Advantage on Companies Performance as An Implementation of Sustainable Economic Growth in Indonesia for Period of 2015-2019", *IOP Conference Series: Earth and Environmental Science*, Vol. 940, No. 1, p. 012059.
- Matakanye, R.M., Van der Poll, H.M., Muchara, B. (2021), "Do companies in different industries respond differently to stakeholders' pressures when prioritizing environmental, social and governance sustainability performance?", *Sustainability* (Switzerland), Vol. 13, No. 21.
- Mazucatto, I.G. (2017), "Assédio Moral no Ambiente de Trabalho: Compliance como Instrumento de Mitigação de Ocorrências", *Revista Raízes Jurídicas*, Curitiba, Vol. 9, No. 2, pp. 173–192.
- Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W. (sem ano), "The limits to growth - A report for The Club of Rome's project on the predicament of mankind".
- Meadows, D.H., Randers, J., Meadows, D.L., Meadows, D.H. (2005), "Limits to growth: the 30-year update". Earthscan.
- Meira, A.A.F. et al. (2019), "A política ambiental dos resíduos sólidos na União Europeia: o princípio da coerência nas ações de governança".
- Mello, M.F. de; Mello, A.Z. de (2017), "Uma análise das práticas de Responsabilidade Social e Sustentabilidade como estratégias de empresas industriais do setor moveleiro: um estudo de caso", *Gestão & Produção*, Vol. 25, pp. 81–93.
- Pereira, A.M.S. et al. (2021), "DESAFIOS ORGANIZACIONAIS DECORRENTES DA PANDEMIA", *Inova+ Cadernos da Graduação da Faculdade da Indústria*, Vol. 2, No. 2.
- Praxedes, G.M. et al. (2020), "Aplicação das Ferramentas da Qualidade em uma Avaliação da QVT: estudo de caso no Mercado de Peixe de Abaetetuba-PA", *Brazilian Journal of Development*, Vol. 6, No. 1, pp. 1362–1376.
- Rehman, A., Hashim, F. (2020), "Is corporate governance maturity measurable?", *Corporate Governance: The International Journal of Business in Society*, Vol. 20, No. 4, pp. 601–619.
- Rocha, T.A. da (2020), "O culto da performance: as percepções do trabalho contemporâneo e a saúde mental dos trabalhadores na cidade de Araraquara-SP".
- Rosa, M.A.G. (2018), "A DIVISÃO SEXUAL DO TRABALHO NA INDÚSTRIA TÊXTIL: INTERLOCUÇÕES COM A ERGONOMIA/The sexual division of work in the textile industry: interlocutions with ergonomics", *Trabalho & Educação*, Vol. 27, No. 2, pp. 195–196.
- Ruíz, Y. R., Mergarejo, E.P. (2018), "Ergonomic maturity model: a practical macroergonomic tool". In: *Congress of the International Ergonomics Association*. Springer, Cham, pp. 173–185.
- Siman, R.R. et al. (2020), "Governance tools: Improving the circular economy through the promotion of the economic sustainability of waste picker organizations", *Waste Management*, Vol. 105, pp.

148-169.

- Sanches, M.R.N.B.; Andrade, E.D. (2022), "Análise da agenda de sustentabilidade de uma indústria mineral: priorização de drivers ESG com aplicação do método fuzzy decision making and trial evaluation laboratory (dematel)". UFF. Escola de engenharia. Niterói - RJ.
- Schmidt, D.R.C. et al. (2013), "Qualidade de vida no trabalho e burnout em trabalhadores de enfermagem de Unidade de Terapia Intensiva", *Revista brasileira de Enfermagem*, Vol. 66, pp. 13-17.
- Silva, P.F.A. (2021), "Maturidade organizacional e qualidade de vida no trabalho: levantamento dos fatores críticos para implementação de ações nas organizações".
- Souza, J.M. et al. (2019), "Ética e sustentabilidade na construção civil". Disponível em: <http://dspace.est.edu.br:8080/jspui/handle/BR-SIFE/1009>.
- Suhada, R.T. et al. (2018), "ERGONOMIC WORK ENVIRONMENTAL MANAGEMENT FOR INFORMAL SECTOR WORKERS (CRAFTSMEN EMPING AND CRIPPERS) IN CILEGON CITY". In: ICCD, pp. 628-633.
- Santos, R.C. V. (2021), "Contribuição do setor mineral no produto interno brasileiro", Radar: tecnologia, produção e comércio exterior, No. 65, pp. 33-36. DOI: 10.38116/radar65art6.
- Sarbat, I., Oz Mehmet Tasan, S. (2020), "A structural framework for sustainable processes in ergonomics", *Ergonomics*, Vol. 63, No. 3, pp. 346-366.
- Straus, E. et al. (2022), "Remote workers' well-being, perceived productivity, and engagement: which resources should HRM improve during COVID-19? A longitudinal diary study", *The International Journal of Human Resource Management*, pp. 1-31.
- Tompa, E. et al. (2010), "A systematic review of workplace ergonomic interventions with economic analyses", *Journal of Occupational Rehabilitation*, Vol. 20, No. 2, pp. 220-234.
- Vicente, C.C.S.P.S. (2020), "A prática de relato integrado: estudo de caso: Galp Energia". Tese de Doutorado. IPS - Instituto Politécnico de Setúbal, IPS - ESCE - Escola Superior de Ciências Organizacionais, IPS - ESCE - CDOC. Disponível em: <http://hdl.handle.net/10400.26/32579>.
- Vidal, M.C., Avancinni, F., Campos L.E.P. (2006), "Anthropotechnology of ergonomics programs in Brazil". *Proceedings of the XVI Triennial Congress of the IEA, Maastricht*.
- Vidal, M.C., Guizze, C.L., Mafra, J.R., Bonfatti, R.J., Santos, M.S., Pacheco, R., Moreira, L.R. (2009), "The ergonomic maturity of a company enhancing the effectiveness of ergonomic process". *Proceedings of the XIV Triennial Congress of the IEA*.
- Vieira, A.M. et al. (2009), "Diagnóstico das Áreas de Gestão, Qualidade e Ergonomia: Estudo de Caso em MPEs do Arranjo Produtivo Local de Confeccção de Maringá". In: Simpósio de Engenharia de Produção.
- Zink, K.J.; Fischer, K. (2018), "Human factors and ergonomics: contribution to sustainability and decent work in global supply chains". In: *Ergonomics and Human Factors for a Sustainable Future*. Palgrave Macmillan, Singapore, pp. 243-269.

**Author contributions:** ITRY: Introduction, Literature review, data analysis and conclusion; GBAL: Literature review, data analysis and conclusion; LPZ: data analysis and conclusion; WLF: scientific methodology and data analysis; WL: scientific methodology and data analysis.