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A Proposed Approach to Monitor and Control Sustainable Development Strategy Implementation

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Abstract: Due to the actual level of carbon emissions, climate change causes disruptions in business process development and also affects human health. The obvious solution, which will ensure a future for the coming generations, is related to sustainable development (SD). Furthermore, by the effective intervention of ergonomics in organizational processes, risk management and social aspects will improve. In this article, we argue that it is not enough to only define an effective approach to greening an organization—managers and leaders need effective tools to monitor and control the implementation of the proposed approach. Thus, with this article, we aim to bring theoretical and applicative contributions to SD management and to propose a conceptual model for green companies based on an integrated management strategy and a complex assessment model (the LeadSUS assessment methodology). In the first phase, the proposed methodology is developed based on qualitative theoretical research, analysis, comparison, deductions, and conceptualization. The research results highlight important issues for defining the Green Enterprise Model, which is based on elements of the integrated strategy definition. In the second phase, the model, together with an associated methodology for the assessment of SD maturity level, supports the process of monitoring and controlling the implementation of the strategy. This approach is intended to create the conditions for the integrated management strategy and green enterprise configuration models. Furthermore, three case studies validate the proposed approach.

Keywords: sustainable development (SD); management; integrated strategy; green enterprise model; ergonomics; the "7 Zeros" concept; green culture

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1. Introduction

Almost 20 years after the Rio Summit (2002), which raised the issue of sustainable development (SD) for our planet, significant steps have been taken at both theoretical and practical levels. Regarding theory, SD (including economic, social, and environmental dimensions) is defined more clearly, and the concepts of green economy (green industries, green processes, and green products) and circular economy have introduced new perspectives for the approach to new challenges. In addition, new business and management performance models [1,2], new sustainability assessment techniques [3,4], as well as novel approaches to the analysis of pollution risk have been developed in various fields [5–7]. Using natural resources rationally embodies the concept of circular economy [8].

From a practical perspective, because of innovation, new methods and tools have made valuable achievements in solving actual emergent problems. However, as has been stated in [9], there are still many obstacles in the way of achieving true sustainability: "However, it is clear that we are far from living in a sustainable society, as there are still some formidable barriers to sustainability goals, such as resistance to change, lack of system thinking, political factors, inability to ensure sustainable behaviors among suppliers and the

consumer culture of global capitalism". Indeed, a sustainable society requires conditions for all people to live and work in a healthy environment so that they can achieve sustainable results [10]. Ergonomics plays a decisive role in this regard, linked to the human factor, and supports the development of an SD strategy.

There is much to change in the direction of medium- and long-term SD in relation to managerial strategies and even in organizational configuration. Existing independent management systems that operate at the same time (the most common standardized, for example, quality, safety, occupational health, environment, and to which ergonomic principles are applied) in different organizations in a supply chain need to be integrated [11]. A specific strategy in the 21st century must be people-centered (which is more than people-oriented) [12]. Thus, organizational systems must be analyzed and managed in a unitary way, as underlined in [13]: "No single systems analysis method can be used in isolation to help identify key insights for intervention and that new methods may need to be developed or existing methods need to be adapted to understand these dynamic, adaptive systems". Furthermore, ergonomics itself is known as "a science concerned with human beings and their quality of life" [14]. In other words, there is a concern for "a new perspective on a way to integrate sustainability issues into company strategies" [15].

From this brief overview of the research context, we can perceive the necessity of providing managers with efficient and effective tools, frameworks, or methods for assessing their organizational progress in the field of SD, considering all three dimensions (social, environmental, and economic) [1–4]. The effects of climate changes and the new developments of exploiting circular economy principles constitute disruptions in risk management [1–8]. Consequently, organizations of all types are faced with an unprecedent situation characterized by limited resources (or even resource crises in some areas), high legal and regulatory pressure for limiting the environmental impact, and high competition in the market. Thus, organizations have a serious need for feasible SD strategies to achieve sustainable performance [14–16]. However, in the actual digital transformation era, organizations are exploring the role of digital technologies in improving their SD performance, too. Furthermore, in the past two years, due to the COVID-19 pandemic and the related restrictions imposed, managers were more concerned with aspects of occupational health and safety (OHS), searching for new methods to improve employee well-being and productivity, and ergonomics and OHS have been of valuable use [10,14,15].

Thus, the following research questions arise: What are the available methods and tools for measuring the ongoing transition to a green organization? Could this approach be easily adopted by any organization, and thus, in the short to medium term, improve leadership for SD? Before addressing these questions and designing the proposed approach for monitoring and controlling sustainable development strategy implementation, two major studies were previously carried out:

1. A survey based on a designed questionnaire which aimed to characterize the decision-making process, the strategic management, risk mitigation, and organizational efficiency (preliminarily considered as the main dimensions of green enterprise development) in the case of 374 industrial companies' top management representatives (mainly from the automotive industry located in the west and the central regions of Romania) [17]. The research results underline managers' strong need for tools, frameworks, methods, or systematic integrative methodologies to measure and monitor organizations' progress in SD and for the support of green enterprises'/companies' transformation; they also complained of an existing knowledge gap in SD and risk management assessment and they recognized a strong need for professional training in these areas. Furthermore, the survey results were considered as an extended knowledge base for the development of the integrated SD management strategy and the Green Enterprise Model (first research phase, see Sections 3.1, 4.1 and 4.2).
2. A survey based on a designed questionnaire for the assessment of training needs in the field of leadership for sustainable development [18]. The research aim was to characterize the SD skills and competencies of managers and specialists included in

the sample, which consisted of 207 respondents who were employees of different companies (from Austria, France, Romania, and Slovenia), with a balanced structure of management position and distribution of age. The research results (complementary to those achieved in the first survey) characterized different hierarchical level managers' needs for specific knowledge and/or topics in the SD field. Thus, based on the questionnaire structure (having questions related to the same topics as will be considered for the LeadSUS assessment approach), we gained an understanding of the needs of operational-level managers who are key employees in the green transformation of their companies. The results show managers' and specialists' SD knowledge levels and reveal knowledge gaps, clarifying if managers and specialists are well trained and have the right skills for operating with an SD assessment tool. The survey results were considered for the LeadSUS assessment approach design (second research phase, see Sections 3.2 and 4.3) and for providing a complex and coherent training schema for educating SD leadership skills and competencies. This research was related to the implementation of the "LeadSUS—Leadership in Sustainability" project (LLP-LdV/TOI/2013/RO/022) and the "TeachSUS—Teaching and Educating for Sustainability" project (2018-1-RO01-KA204-049253), founded with support from the European Commission and which allow the international dimension of the investigation.

The two exhaustive studies carried out [17,18] contributed to the creation of a critical mass of knowledge regarding the understanding of the needs of companies and their managers regarding SD management. Two fundamental ideas (needs and requirements) constitute the premise of further research for the development of an approach for the monitoring and control of the sustainable development strategy. (1) Managers need a coherent, systematic, and scientific approach to SD management (based on a complete and correct legal compliance), which should support the decision-making processes, especially based on the continuous monitoring and control of the recorded SD progress (through discrete but frequent and easy-to-achieve evaluations). These requirements could then support the SD strategic management. (2) The implementation of the previous need or requirement must be accompanied by consistent support for the development of competences through training provided to all categories of managers (as a continuous human resources development approach for leadership in sustainability), but especially to those at the operational level who have a key role in the implementation of their company's greening requirements.

In this context, we propose in this paper a green enterprise configuration based on an integrated dynamic management strategy. For this purpose, ergonomic principles are based on the management of occupational health and safety (OHS) of employees and other stakeholders, total quality management (TQM), information security, and SD management. Furthermore, to create the premise for the implementation of the model at the organizational level, an assessment methodology (together with a defined method and tool called the LeadSUS assessment methodology) was designed, tested, evaluated, and validated, which supports measuring the maturity level achieved by a company with respect to the implementation (diffusion) of SD values and guiding principles in the business strategy and model.

2. Literature Review

2.1. Sustainability Management

The approaches and analyses of sustainability studies (integrating social, economic, and environmental dimensions) and SD strategic management studies have been developed from different perspectives:

- Environmental issues: Risks of climate change [16], especially in urban agglomerations [19], water resources [20], energy [21], soil pollution [22,23], or biosphere imbalances [24–27], which are just a few cases. Human activities' environmental impact seems to still be of high concern [16,28], together with emergent topics such as circular economy [8],

- Economic and social issues: Studies draw attention to the dangers of the increase in the percentage of carbon emissions and other gases in the atmosphere [5,25–28]. The economic dimension of SD is usually associated with organizational performance management and competitiveness, by defining aggregate indexes or a system of indicators to measure and evaluate the level of development [1,3,15,24]. Social responsibility management has been approached using ergonomics and OHS knowledge as efficient and effective tools for improving the human side of enterprises [10–14].
- From the strategic perspective (short, medium, and long term to satisfy "the needs of present and future generations"), discussions are frequently associated with business models valorizing sustainability-oriented innovation approaches [2,3,12] or with impacts on achieving higher performances in the SD field [1,3,15,17].
- Overall, sustainability-based risk management is always considered in association with SD dimensions, with organizations' development and strategy. Researchers have agreed on considering in their research a large typology of risks: emergent risks (such as environmental, from the supply chain, cyber, and pandemic risks), risks related to business processes (mainly at the operational level), and social risks [29]. Each category of risks is approached and managed with specific methods and tools, actions, and skills, but it seems that there is a gap in considering the interdependencies between them and the cumulative effects [29]. Moreover, the transferability of specific sustainability-based risk management methods and tools into organizational practices is sometimes difficult [3,6,29].

Furthermore, the ability of an organizational system to thrive involves maintaining economic viability and using, in an efficient manner, the limited, scarce resources "to meet the needs of present and future generations is created" (as supported by the United Nations Brundtland Commission statement in 1987). According to this statement, "sustainable management is defined as the application of sustainable practices in commerce, agriculture, environment, production, and other fields by management in a manner that is beneficial to present and future generations" (Sustainable Management (a section of *Sustainability*) brief description. Retrieved from: https://www.mdpi.com/journal/sustainability/sections/management_sustainability (accessed on 16 August 2022)). In addition, the role of sustainability knowledge (as part of the knowledge management process), the need for leadership behavior, the organizational cultural expectation system, and learning organization conditions have been recognized as key factors in effective sustainability management [30]. Previous studies have supported that sustainability management is an evolved management and leadership style, using innovation to significantly change organizations and society by understanding the natural and economic systems and their interdependencies [30–32].

A new challenge for SD arises with the introduction of the concept of circular economy, which promotes the ideas of recycling, reuse, remanufacturing, and waste elimination [8,33]. Therefore, the development of the circular economy has led to the investigation and conceptualization of valuable ideas for the definition of new business models related to organizations, the supply chain, consumption, and information technologies, which are used together with proposals for performance indicators [2,17,33–38].

Sustainability cannot be weak or strong—rather, sustainability tools should "complement one another" [39]. Thus, despite the variety of approaches, research on this subject has not yet been exhausted, as sustainability is increasingly present in economic and social life and continues to find new extensions [32–38].

2.2. Integration of Ergonomics with SD

The International Ergonomics Association defines the concept of ergonomics as follows: "Ergonomics is the scientific discipline concerned with understanding of interactions between humans and other elements of a system, and the profession that applies theory, principles, data and methods to design to optimize human wellbeing and overall system performance" (Retrieved from: https://iea.cc/what-is-ergonomics/ (accessed on 16 August 2022)). Following our explanation of this definition, the question that will be answered

is if integrating ergonomics with SD knowledge fields will generate a more friendly, healthy, and safe working environment.

An example of a good practice is the climate ergonomics approach [40], which entails ergonomics or human factors principles, approaches and tools to set recommendations for the development of SD-focused green goods, services, and practices in organizations. Furthermore, ergonomics, being a multidisciplinary science, has enormous potential to positively affect SD, mainly because of the improvements in the human side of the enterprises [41], in occupational risk management [42], and consequently, in the workplace's social sustainability [40–45].

Researchers have recognized that ergonomics' main concern is adapting the job to operators and relevant products to user demands to create a balance in this interaction for efficient use or exploitation, seeking productivity, safety, and satisfaction [44]. Research evidence, such as [45], underlined the positive contribution of ergonomics to social sustainability in the workplace (through the exploitation of traditional and advanced ergonomic methods and tools). Overall, the important role ergonomics plays in increasing productivity [46–49] or product quality [50–52] is recognized. Therefore, ergonomics can improve workers' safety and performance simultaneously, and the integration of the ergonomics approach with SD has evolved continuously [4,10,13,14,41]. Thus, organizational ergonomics are considered valuable for providing innovative solutions for business process improvement [53]. Consequently, the concepts of green ergonomics have been introduced in various forms, such as constructive ergonomics, ergo-ecology, or ErgoSustaiNomics [13,14,40–47], to reflect the potential of ergonomics for innovative SD management. In addition, approaches and models of SD applied in ergonomics were designed [54]; overviews of already published studies in this area are presented in [10,55–57].

Ergonomics and SD integration brings numerous benefits to organizations, briefly summarized as follows.

- Design: Streamline design activity by adopting the commitment to SD [53,54,58], and, particularly significant, "Ergonomics is now an essential component of design culture and a key factor for both product and production process innovation, capable of guiding design processes toward the real needs and expectations of individuals and the community. Ergonomics also provides the necessary methodological content and an intervention philosophy that allow the construction of a user-oriented design process, and, at the same time, the design offers solutions capable of interpreting needs and expectations and suggesting new behaviors and lifestyles" [59].
- Manufacturing: Illustrates, to some extent, how ergonomics or human factors contribute to sustainable manufacturing [4,11,60–63]. Furthermore, the study presented by [41] emphasizes: "The conditions of the social dimension that must be evaluated for sustainable manufacturing are workplace accidents, physical workload, physiological workload, psychological workload, organizational workload, working conditions, system security, workplace safety, and defective tools, equipment, or supplies".
- Warehousing and packaging: Optimization of material handling activities and long-term reduction in physical and mental stress factors [49,64], and the use of biodegradable packaging, green ergonomics [65], and personalized workplaces (tailored to employees' anthropometry) [49,66,67].
- Urban development and life quality improvement [10,13,14].
- Transportation: To optimize driving comfort [13,48].
- Office work: Risks associated with online work and office work with a computer [65–67].
- Products and services (such as electric vehicles, green buildings, computers and devices, and biophilic and biomimetic systems) or the food industry: How ergonomics of the human factor can build a future of SD [13,66,67].

Ergonomics has been considered for different approaches of SD strategic management and circular economy [68]. Thus, ergonomics contributes to greener operations and processes of the enterprise and to the increase in its performance (productivity, low costs, efficiency, return on investment, etc.). Furthermore, ergonomics initiatives must concentrate

on both the larger corporate strategy goals of increasing human performance across the business and the creation and implementation of methods for injury prevention and/or reduction. Any ergonomic endeavor should ideally be completely integrated with the strategic imperatives of a business [10,13,14,41].

3. Methods

3.1. First Phase of the Research—Knowledge and Wisdom Capitalization

The qualitative research approach is based on opinions expressed by a series of studies, authors' direct observation, analyses, accumulated experiences, own judgment, and conceptualization. From a particular perspective, the method used resembles the so-called "triple-layered business model canvas" [69], which is a tool to explore the innovation of sustainability-oriented business models [69,70]. It extends the original business model canvas presented in the study by adding two more layers: (1) an environmental one, described from a life cycle perspective, and (2) a social one, related to the stakeholder perspective (as suggested by [69]). The proposed approach is based on identifying the specific elements related to sustainability and ergonomics in an organization, based on which a general, holistic, and dynamic model of managerial strategy is developed (which includes ergonomics in SD and, in turn, provides innovation in all aspects). The approach then continues with integrating economic, environmental, and social value creation in a holistic model of green enterprise configuration.

The theoretical research is based on studying articles published in three fields: (a) ergonomics, (b) sustainability, and (c) the link, implication, or cooperation between ergonomics and sustainability. First, these articles were analyzed to identify common ideas and interests of the two knowledge fields, ergonomics and SD. Then, based on the preliminary exhaustive studies, the managerial consulting experience of the authors and the direct observations of industrial companies from different industries that have made significant progress in improving well-being and ergonomics, a set of qualitative studies is presented. The results (based on generalization followed by an inductive approach) consist of two proposed models for the integrated management strategy and green enterprise configuration.

3.2. Second Phase of Research—The Proposed Model to Assess the Level of Sustainability Maturity of an Organization

A defining role in the operationalization of SD management concepts is to create a balance between the three dimensions, economic, environmental, and social. A severe lack of attention in the implementation of the environmental or social dimensions can radically unbalance the organization with a negative cross-cutting impact on the economic segment. This was the main concern in the first methodological phase, when the research focused on a more holistic perspective of SD applied, considering ergonomic awareness to better quantify the organization's management concern for its employees' rights, their OHS, and well-being.

Preliminary observations and analysis (first phase of the research) have underlined a strong need for a model which would allow for the assessment of organizational maturity in terms of the SD principles and concepts and their implementation in the business strategy, for awareness of the main, essential, converging, and/or emerging dependent variable. The purpose of this assessment is to create the basis for defining a new integrated management strategy, thus creating the premise for green enterprise configuration.

The assessment approach and the associated tool (call LeadSUS as an acronym for Leading Sustainability) were designed to be used by top management teams who know the business strategy and can define new goals in terms of business development and organization orientation towards a new SD model. On the other hand, the proposed assessment can be used by auditors and management consultants to diagnose the organizational business model and identify elements to improve SD implementation methods.

The evaluation process has been designed to highlight the maturity level of the implementation of SD in an organization and to easily generate recommendations for the

management team to initiate new actions necessary to increase the level of development. Therefore, the global result of the evaluation process has been defined and presented generically in the form of the LeadSUS footprint, which is the support of the SD management system at the organization level as a basis for developing a new business model or adapting it to a much higher level, as suggested in the first phase of the investigation. The LeadSUS footprint includes three levels (Figure 1):

a. The level of guiding principles and values related to SD (principles and values, organizational culture, mission and vision of the organization, leadership);
b. The level of management strategies for SD (consisting of the organization and management model of the organization, and the standards and the norms on which it is founded); and
c. The level of operational models for SD (consisting of the implementation of sustainability concepts in organizational practices).

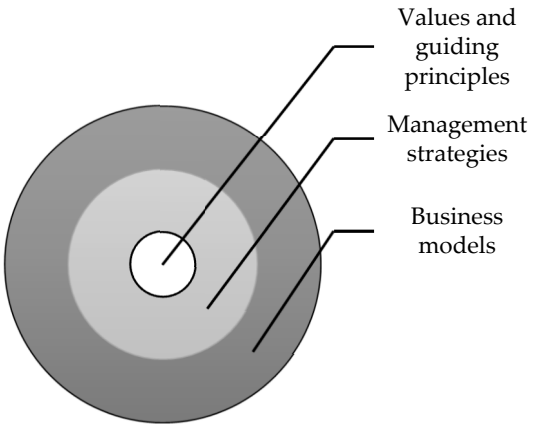

Figure 1. The levels of the LeadSUS footprint (associated with the LeadSUS assessment approach).

The LeadSUS footprint model was created in a circular shape, as the circular management model is the most effective, focusing on values, organizational culture, community, participation, and stakeholder relationships. The development of the LeadSUS assessment of the sustainable organization model uses 23 key aspects that must be analyzed at the organizational level for an overview of the cycle of progress toward excellence and maturity in the management of SD (Table 1). The core aspects 10, 13, 14. 15, 17, 18, 19, and 20 were defined to consider and evaluate ergonomic aspects and risks, occupational health and safety, and well-being of employees.

The evaluation of each aspect to define the LeadSUS footprint has been allocated to an SD area/pillar, which must be balanced in such a way that the synergies created between the areas offer long-term value, increasing the potential of the organization to achieve sustainability performance. The assessment uses specific questions (interrogative method) for each core aspect, so that they are easy to analyze and evaluate. The value of the score assigned to each aspect is established based on criteria such as the applicability and existence of relevant evidence within the organization in support of the specific issue assessed. Possible score/rate values (R) correspond to a four-point scale and consider the coverage of the aspect within the organization, either by practical application in the operational framework or supported by internal or external documentation or communications (Table 2). The number of questions per aspect is different depending on the assessment process, having multiple facets to complete to characterize the state of development (single question or multiple questions are used) and considering the complexity of the area covered. Information on the separation of the evaluation according to the complexity of the areas and aspects covered is presented in Table 3.

Table 1. The detailed structure of the LeadSUS assessment areas and aspects.

	Main Areas	Related Core Aspects
1.	General Requirements	Understanding and commitment Standard and norms (including those related to ergonomics and OHS) Context analysis
2.	Resource Management	Evaluation methodology Energy efficiency assessment Assessment of water efficiency Waste and material management
3.	Product and Service Sustainability	Life cycle concept Life cycle analyses Eco-design (including ergonomic aspects)
4.	Social Responsibility	Adoption of general social responsibility principles Stakeholder management Social impact analyses (including occupational health and safety (OHS) and workplace well-being) Materiality aspects (ergonomic processes)
5.	Implementation and operation	Competence, training, and development Employees' rights, diversity, and opportunity Communication Documentation requirements Operational control Sustainable procurement
6.	Management, Leadership, and Strategy	Corporate culture, values, and leadership Goals and strategy Management review

Table 2. Criteria used in the assessment process.

Evaluation Result (Score/Rate Value)	Coverage–Applicability–Evidence Available
N/A—0	Not applicable
None—1	No clear evidence of implementation
Partly—2	Partial results available, not documented, and recorded
Mostly—3	Results are available, documented, and recorded but not communicated to stakeholders
Full implementation—4	Evidence exists, procedures, and results are well documented and recognized; best practices and results/performance are communicated and shared with all stakeholders

The value of the degree level of implementation and the consideration of the aspect at the organizational management level are calculated according to the following formula.

$$APi = \frac{\sum_0^{23} P}{MaxR}[\%] \quad (1)$$

where:

APi—notation for practical implementation/in practice implementation, %, $APi \in [0\%, 100\%]$;
P—aspects/practices assessed, $P \in [0, 23]$, $P \in \mathbb{N}$;
R—score received for assessment, numerical, $R \in [0, 4]$, $R \in \mathbb{N}$; and
MaxR—maximum possible score possible per appearance, numerical, $MaxR \in [0, 32]$, $MaxR \in \mathbb{N}$.

Table 3. Number of questions allocated to the assessment and their complexity.

Relevant Domains (DCV)		Aspects under Assessment (PA)	No. of Questions	Type of Questions
General Requirements/Aspects	1.	Understanding and commitment	2	Simple
	2.	Standard and norms (including those related to ergonomics and OHS)	2	Simple
	3.	Context analysis	2	Simple
Resource Management	4.	Evaluation methodology	2	Simple
	5.	Energy efficiency assessment	2	Simple
	6.	Assessment of water efficiency	2	Simple
	7.	Waste and material management	2	Simple
Sustainable Products and Services	8.	Life cycle concept	2	Simple
	9.	Life cycle analyses	2	Simple
	10.	Eco-design (including ergonomic aspects)	2	Simple
Social Responsibility	11.	Adoption of general social responsibility principles	2	Simple
	12.	Stakeholder management	2	Simple
	13.	Social impact analyses (including occupational health and safety (OHS) and workplace well-being)	2	Simple
	14.	Materiality aspects (ergonomic processes)	2	Simple
Implementation and Operation	15.	Competence, training, and development	1	Complex
	16.	Employees' rights, diversity, and opportunity	1	Complex
	17.	Communication	1	Complex
	18.	Documentation requirements	1	Complex
	19.	Operational control	1	Complex
	20.	Sustainable procurement	1	Complex
Management/Leadership and Strategy	21.	Corporate culture, values, and leadership	2	Complex
	22.	Goals and strategy	2	Complex
	23.	Management review	2	Complex

To determine the coverage of the investigated domain coverage (DCV) or that assessed in relation to organizational management, the relationship $DCv \in [0\%, 100\%]$ is used:

$$DCv = Average\ APi\ [\%] \tag{2}$$

The degree of maturity LeadSUS (total score) for the sustainability assessment is calculated using the formula:

$$Lead_{SUS} = \frac{\sum_{D=1}^{6} DCv}{6} [\%] \tag{3}$$

where:

LeadSUS—the degree of maturity in sustainability management (total score) for the organization and expressed in percentages, $Lead_{SUS} \in [0\%, 100\%]$; and
D—relevant areas assessed, $P \in [0,\ 6],\ P \in \mathbb{N}$, considering that the assessment is focused on 6 relevant areas and 23 specific issues.

Based on the results achieved during the testing phase of the LeadSUS assessment tools (together with consultation with managers and consultants in the SD field), four levels of SD maturity have been defined. Thus, the general valuation can place the organization in one of the following four maturity levels, implicitly associated with the related leadership style.

- Level 1—Low level, Low LeadSUS (LeadSUS $\leq$ 50%): uneven implementation, without the basics transferred to the strategy, without a clear vision of sustainability;
- Level 2—Average level, Medium LeadSUS (50% < LeadSUS $\leq$ 70%): sufficient implementation of SD concepts, core elements of social and environmental responsibilities in the strategy;
- Level 3—High level, High LeadSUS (70% < LeadSUS 85%): relatively high implementation of SD concepts, incorporation of key elements of social and environmental responsibility in the strategy, orientation toward innovation and stakeholder management activities; and
- Level 4—Level of Excellence, Excellent LeadSUS (85% < LeadSUS 100%): high performance implementation of sustainability concepts, inclusion of elements converging to all principles of social and environmental responsibility in the strategy, continuous innovation practices within the organization, a sustainable business model with practices interconnected with stakeholders' interests.

After the determination of the LeadSUS footprint (detailed calculations based on available data at the organizational level and represented as a radar graph), the results are transferred to the 3BL diagram (Triple Bottom Line: profit/economic bottom line, people/social bottom line, and planet/environment bottom line), using a Venn diagram, which is generated by integrating the final scores (according to domain 3BL issues in Table 4):

- ECV (%)—Economic coverage: coverage of the economic dimension (%);
- CVM (%)—Environmental coverage (%); and
- SOV (%)—Social coverage: coverage of the social dimension (%).

The transposition was chosen through the Venn diagram because it is the simplest (and most used) representation of the interconnection between the three dimensions and the mapping of sustainability as a whole, and can additionally be understood by any leader who wants to learn the status quo and understand what changes he/she must make. Additionally, the LeadSUS footprint is translated into a 3BL graph to have an overall view of organizational maturity and the current balance between the three key domains. Each aspect of the 23 issues analyzed is allocated to an area of the 3BL pillars (Table 4). The final diagram highlights the weight of the effort that management allocates to each area (i.e., the effort to create opportunities and synergies for development between areas: social/environment, economic/environment, and economic/social).

At the end of the LeadSUS assessment approach, the SD Maturity Report is generated for the organization, which includes general and specific recommendations for improvement or even a change in the business model. To support the managerial processes, the report includes a spider diagram as a graphical representation of the organization's LeadSUS footprint and the 3BL map (Triple Bottom Line map in Venn chart format), highlighting the SD level of maturity achieved by the organization: Low LeadSUS, Medium LeadSUS, High LeadSUS, or Excellent LeadSUS.

Table 4. Integration of the issues identified in the 3BL Triple Bottom Line 3BL dimensions (economic, social, and environmental).

Indicators	Dimensions	Details
ECONOMIC $ECv = AverageAPi$ [%]		
PA1, %	Understanding and commitment	In the context of sustainability, the profit aspect should be seen as the real economic benefit for society, the organization having a positive economic impact on its economic environment. This is directly influenced by management practices, values and organizational culture, operational control, application of standards and norms that require day-to-day compliance, etc.
AP2, %	Standard and norms	
PA3, %	Documentation requirements	
AP4, %	Operational control	
PA5, %	Materiality aspects	
PA6, %	Corporate culture, values, and leadership	
PA7, %	Goals and strategy	
AP8, %	Management review	
ENVIRONMENTAL $MCv = AverageAPi$ [%]		This refers to the natural capital, the sustainable environmental practices that the organization practices. An organization that has environmentally responsible practices strives to minimize its environmental impact throughout the life cycle of the product or service and to increase its natural capital. The reduction in the carbon footprint is achieved through the careful management of energy consumption, the use of renewable sources, and the efficient use of water and materials so that waste generation is minimal.
PA9, %	Evaluation methodology	
AP10, %	Energy efficiency assessment	
AP11, %	Assessment of water efficiency	
AP12, %	Waste and material management	
AP13, %	Life cycle concept	
AP14, %	Life cycle analyses	
AP15, %	Ecodesign	
AP16, %	Sustainable procurement	
SOCIAL $SOv = AverageAPi$ [%]		This includes fair and labor-friendly business practices in the community and region where the organization operates. A sustainable company identifies its social impact and designs a social structure in which the well-being and interests of shareholders are interdependent with the interests of all stakeholders, and works with them to identify and manage them.
AP17, %	General SR principles	
AP18, %	Stakeholder management	
AP19, %	Social impact analyses	
AP20, %	Context analyses	
AP21, %	Competence, training, and development	
AP22, %	Employees' rights, diversity, and opportunity	
AP23, %	Communication	

Details on how to perform the assessment and generate the LeadSUS footprint are given in Section 4.3. Additionally, a tool has been developed to help operationalize the assessment process, allowing quick visualization of the LeadSUS footprint together with the SD maturity report (Figure 2). In addition, there are several roles defined for the use of the platform, namely:

- Administrators—Manage different service organizations or divisions of a large corporation or network;
- Content providers—Maintain the content of the application through an easy-to-use interface to introduce new aptitude models or process evaluation models;
- Organizations/Companies—Manage an unlimited number of assessments and create assessments for different organizations or locations with different workspaces;
- Participants—Make self-assessments, collect evaluation notes, and records. To extract recommendations for improvement related to a formal evaluation, participants can view or print the report and ask for suggestions from an independent evaluator (adviser);
- Evaluator/Auditor—Organizations can maintain their own group of evaluators. Evaluators are designated to assess organizations as third parties and have their own online interface, which is also organized in the form of a workspace assigned to the evaluator.

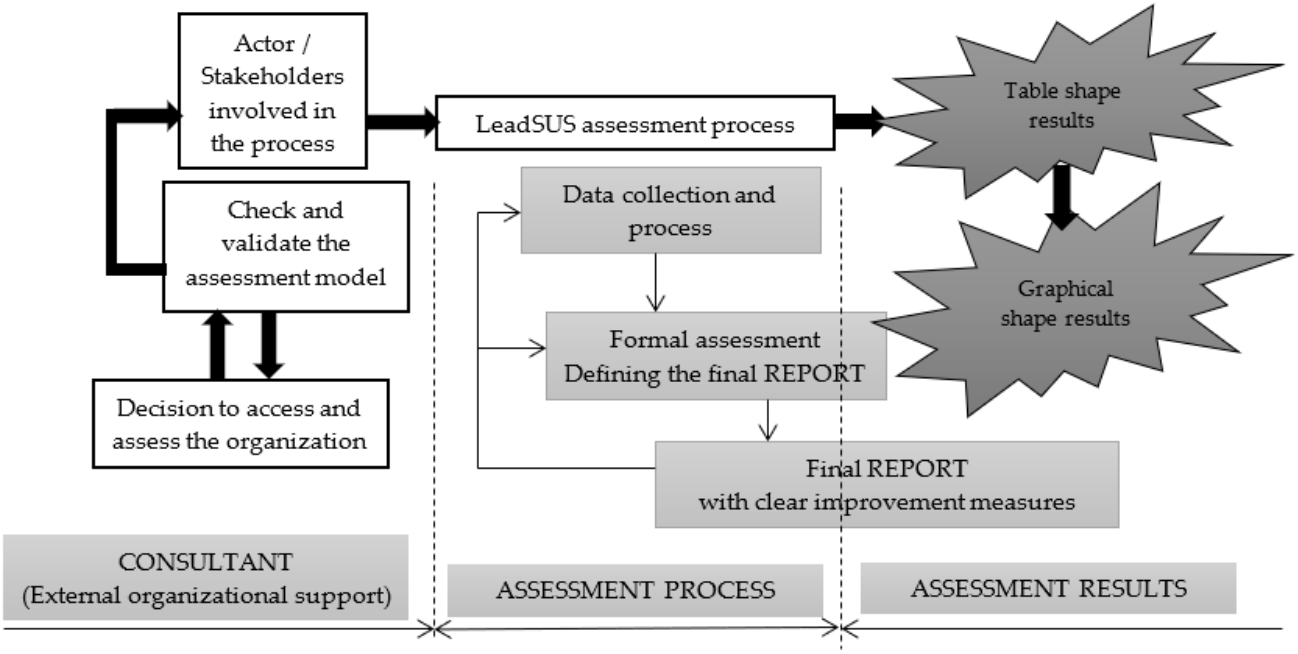

Figure 2. LeadSUS assessment—methodological approach (LeadSUS footprint and the Venn diagram representations).

Figure 2 briefly describes the methodological approach to using the designed tool to assess the maturity level of SD of an organization and the way in which the LeadSUS footprint is represented together with the report related to the domains and core aspects that are analyzed.

4. Results and Discussion

The research results of two conceptual models illustrate the contribution of ergonomics to the SD strategy and to the configuration of the Green Enterprise Model, respectively. Furthermore, the research results demonstrate that the LeadSUS assessment tool can provide valuable support to the decision-making process for implementing the integrated management SD strategy for a Green Enterprise Model.

4.1. Integrated SD Management Strategy

Organizations of different types (e.g., corporations, small and medium enterprises, private and public bodies) are increasingly concerned with formulating and implementing SD strategies to become greener. Furthermore, an ergonomic intervention could better support social and work safety aspects and contribute to the development of OHS management systems. The research depicted in [69] states that in many situations, ergonomics can make the difference in providing an innovative solution. It eliminates waste and operational variations through efficient design of workstations, facilitates measurement by establishing peak performance indicators, and increases productivity by reducing employees' risks of developing work-related musculoskeletal disorders.

Furthermore, to achieve immediate customer satisfaction, TQM systems and/or approaches of quality excellence or Six Sigma are applied. To support the communities in which they operate, organizations implement social responsibility systems. In the age of cyberspace development, many companies are implementing information management systems. All of this brings real benefits and positively impacts the reputation of organizations if an integrated SD strategy is designed and implemented with the participation and commitment of all stakeholders. Figure 1 shows the proposed approach to integrate ergonomics with sustainability to define the SD strategy, considering the following advantages:

- Ergonomics ensures physical, cognitive, and organizational working conditions for all the employees so that jobs are safe, in a healthy climate, with processes that are comfortable (with minimum movement, adequate rhythm, relaxed position, etc.), with minimal or zero risks of accidents and illness through prevention, and bring satisfaction to all stakeholders.
- Sustainability ensures the responsible and efficient use of natural resources (land, water, air, and ecosystem), of energy from clean sources (renewable) and non-polluting processes (cleaner production), garbage waste control, and recycling, ensuring safe and healthy working and living conditions for employees and other stakeholders and supporting the community through social responsibility actions.
- Common actions supported are, on the one hand, the strategic goals (economic performance and people's well-being) and, on the other hand, optimizing risk management, in the sense of analyzing, monitoring, taking responsibility, and reducing potential risks to the minimum.

Furthermore, the application and certification according to the related standards (see Figure 3) support the implementation of integrated management systems.

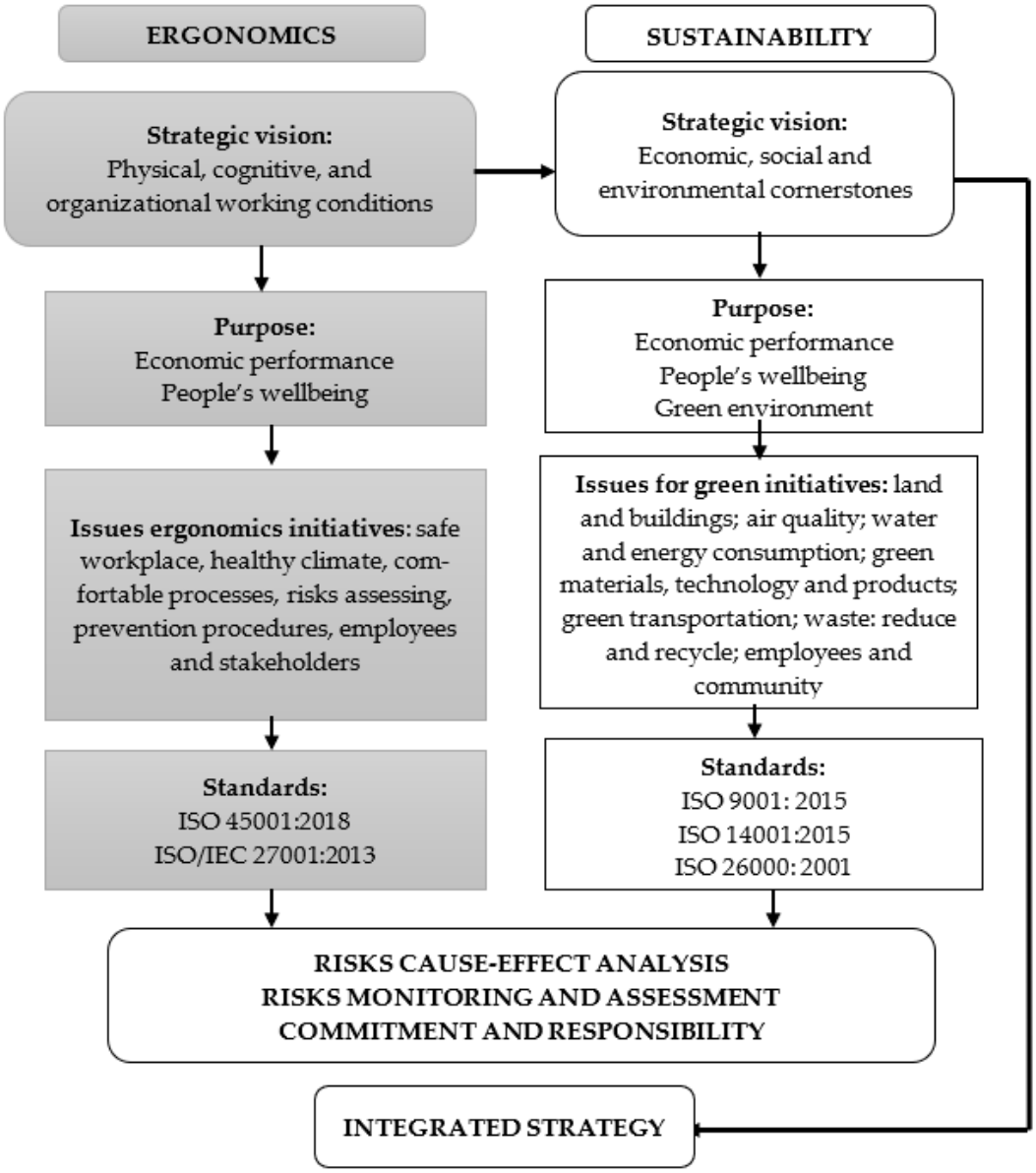

Figure 3. Integrating ergonomics and sustainability to define the integrated SD strategy.

- ISO 9001: 2015 Quality Management System;
- ISO 14001: 2015 Environment Management System;
- ISO 45001: 2018 Occupational Health and Safety Management Systems;
- ISO/IEC 27001 Information Security Management Systems; and
- ISO 26000: 2010 Guide to Social Responsibility.

These standards, used in a holistic manner, together with the specific technical standards for the industry and related products, allow all of an organization's activities to be channeled towards SD.

The integrated management strategy approach, conceptualized in Figure 4, is the essence of a green strategy. An organizational strategy built on SD objectives that includes ergonomic principles integrated with OHS could better address the optimization of risk management. Through green systems and processes, other stakeholders lead to an integrated management strategy and the development of a sustainable organizational culture.

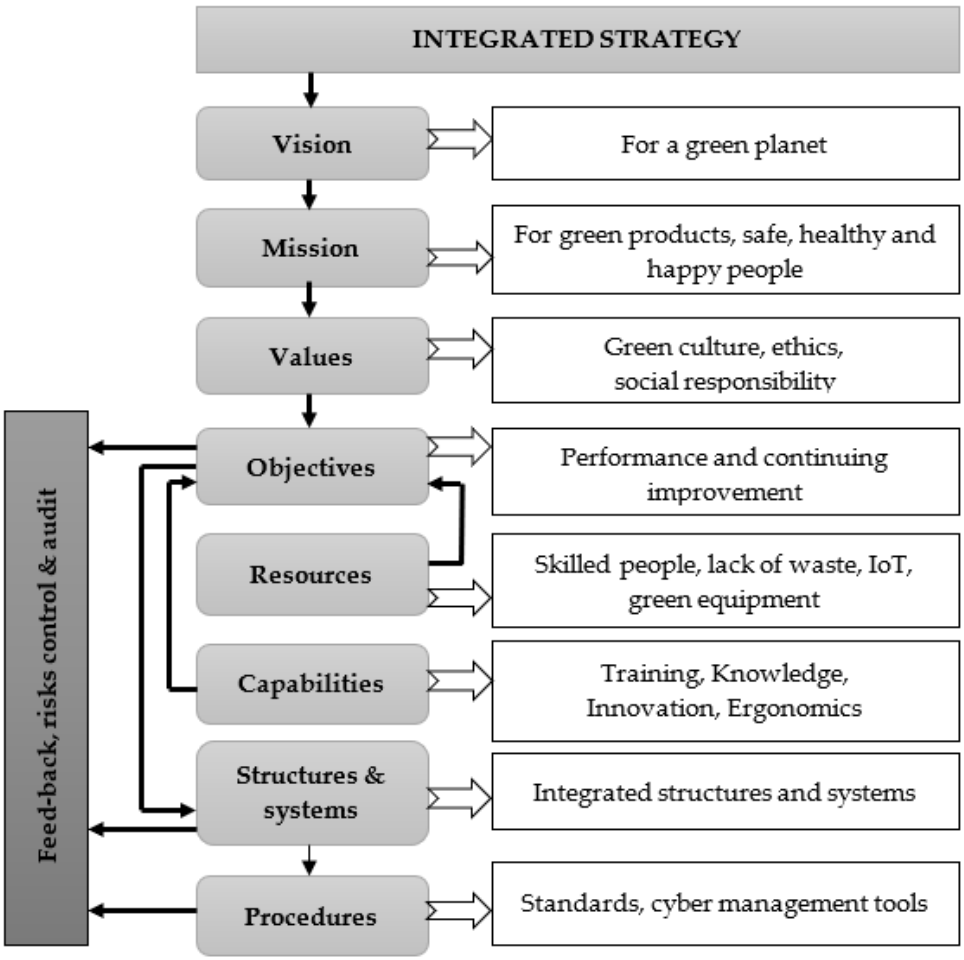

Figure 4. Integrated SD management strategy: a methodological approach.

By integrating ergonomic principles into the sustainable strategy, the following results are achieved:

- Safe workplace on land, in buildings, workshops, and offices (ergonomics in the facility management area);
- Healthy climate in terms of air, water, and energy quality;
- Comfortable processes in manufacturing, warehouses, transportation, and offices;
- Creating safety products using appropriate materials and recycling;
- Risks assessed include physical and psychological incidents, waste, carbon, and other pollution particles;

- Prevention procedures for ergonomics, quality, environmental, and information security; and
- Satisfaction of employees and other stakeholders.

The integrated management strategy ensures the following strategic objectives (combined as a unitary whole and correlated with each other, respectively):

- Protecting the environment through projects and the complete activity;
- The quality of the products/services offered;
- Job security for employees, suppliers, and customers;
- OHS of the employees;
- Product safety;
- Partnership relations with suppliers and customers;
- Permanent internal and external communication;
- Effective monitoring and management control;
- Business ethics;
- Risk assumption and management;
- Providing community support through social responsibility; and
- Performance and continuous improvement.

The integrated strategy is neither rigid nor static because the strategy is a moving target; it must constantly change in response to the new landscape given by action and must be systematically and regularly challenged to stay relevant [12,15,17].

4.2. The Integrated Green Enterprise Model

An integrated and dynamic management approach of the Green Enterprise Model includes decision blocks intercorrelated with each other (based on the elements for defining an integrated SD strategy approach, as shown in Figure 3), which can be customized to any type of organizational structure. The configuration or architecture of the Green Enterprise Model is built by creating and maintaining a green culture, which is based the 7 Zeros: zero carbon emissions (generic, since all harmful emissions are included here); zero defects; zero stocks of raw materials, materials, and products; zero waste of natural materials; zero work incidents; zero customer complaints; and zero wasted time.

1. Zero carbon emissions: Through clean processes and non-polluting equipment;
2. Zero defects: Automated and computerized processes, robotics, synchronized control of systems and processes, and the application of total quality management (TQM);
3. Zero stocks of raw materials, materials, and products: Supply and sale according to the JIT principle;
4. Zero waste of natural materials: Use of the principles of circular economy (recycling, reuse, waste management);
5. Zero work incidents: Application of ergonomic principles, implementation of the occupational health and safety management system (OHSAS) and of the informational management system (IMS);
6. Zero customer complaints: Offering and selling products/services according to the announced specifications; and
7. Zero waste of time: All activities must be performed within the time provided in the procedures.

The proposed Green Enterprise Model could be feasible, as the 7 Zeros on which it is based could be a viable benchmark for many organizations in the future. The proposed model presented in Figure 5 integrates the following concepts (explanations of support activities):

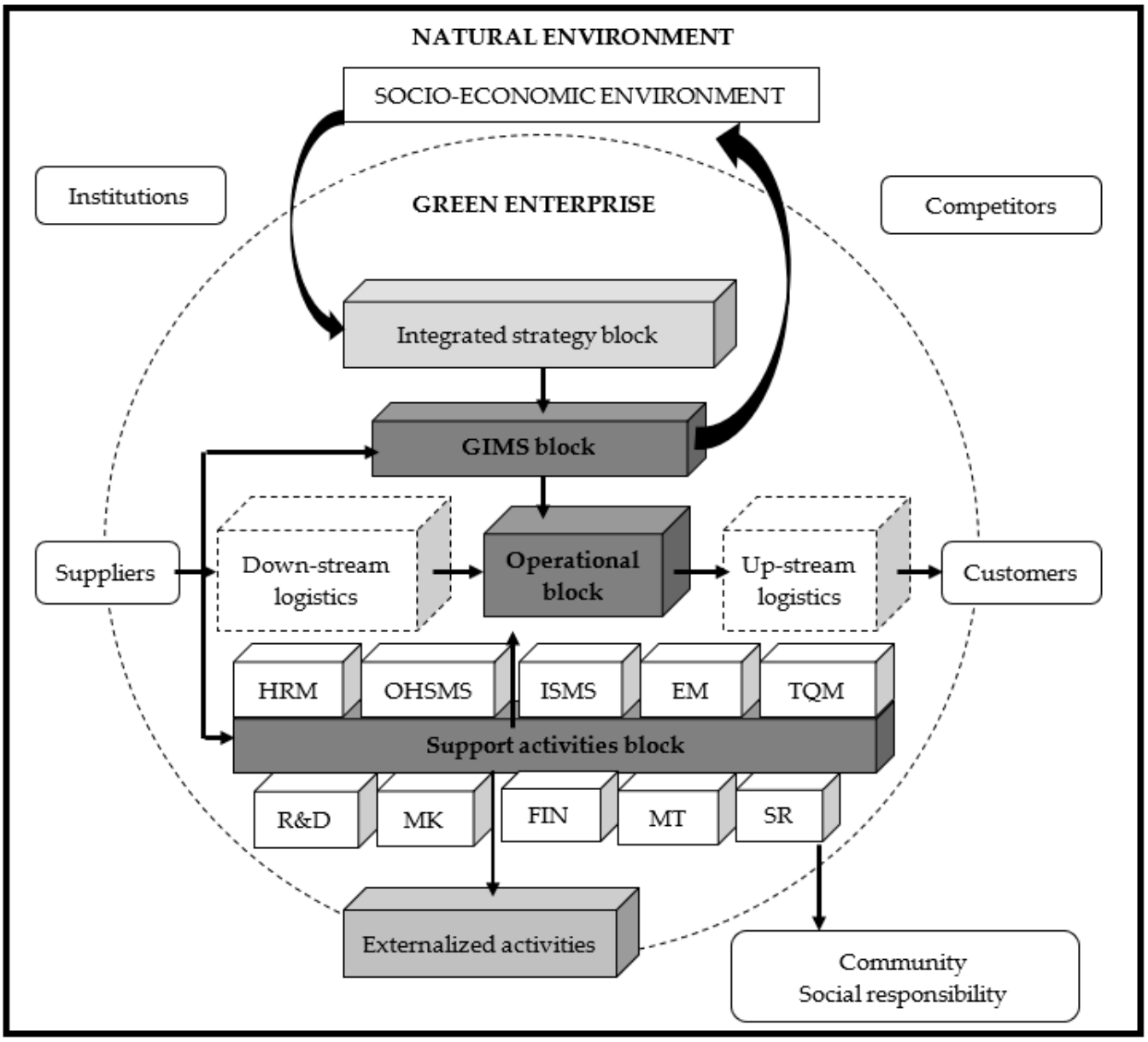

Figure 5. Green Enterprise Model—a proposed configuration model.

GIMS—green integrated management system;
HRM—human resource management system;
OHSMS—occupational health, safety, and security management system;
ISMS—information security management systems;
EM—environment management system;
TQM—total quality management concept applied by the organization;
R&D—research and development system responsible for innovation and the implementation of the sustainability-oriented innovation (SOI) approach;
MK—marketing system of the organization;
FIN—financial and accounting system;
MT—total maintenance applied; and
SR—social responsibility (approaches, projects, initiatives within the organization and its communities).

The four main strategic blocks considered in the model (Figure 5) are:

- Integrated Strategies Block—This block is similar to the general meeting of shareholders (associates, owners), intended to develop/approve the company's strategies (development, financial, personnel, social responsibility, etc.). The elaborated/approved strategies must consider the continuous protection of the natural environment; the permanent protection of the employees, the enterprise, and the other stakeholders; as well as the increase in the green competitiveness of the enterprise.
- Green Integrated Management System (GIMS) Block—The GIMS block comprises the top management who, based on the approved strategies, execute the plans and programs for implementing the strategy and make operational decisions. The whole block is an integrated system in which primary and support activities are managed according to the company's green and ergonomic strategies and principles, with the main purpose of developing a green organizational culture. At the same time, this block continuously maintains relations with the economic–social environment of the community in which the enterprise carries out its activities. Thus, including the natural environment, the information and communication flows are sustained in both directions.
- Basic Operational Block—The basic operational block comprises the basic activities that create added value and are continuously supervised and guided by the GIMS block and supported by the Support Activities Block.
- Support Activities Block—This block includes all support activities, and in turn consists of other blocks based on the functions of the enterprise: logistics, human resources, health and safety of the employees, computer security, quality, environment, research and development, marketing, financial, maintenance, social responsibility, as well as supervision of outsourced activities (if applicable). In addition, the entire block supports collaboration with the socioeconomic environment (suppliers, customers/beneficiaries/wholesalers/retailers, public institutions, and competitors) in the sense of carrying out green activities through the GIMS block or directly.

This configuration ensures the integration of ergonomic principles into the green strategy and the management of the enterprise, and thus becomes a goal toward progress.

An integrated configuration of the organization, based on a clearly defined sustainability strategy, not only ensures green ergonomics for all stakeholders, but also considers the medium- and long-term consequences of its activities: performance, economy, effectiveness, efficiency, and well-being.

4.3. Research Results on Assessing SD Maturity Level

The objective of this research stage is to demonstrate the validity of the designed LeadSUS assessment tool that can be used for the diagnosis, monitoring, and control of the SD management approach in an organization. The following activities are developed by exploiting the LeadSUS tool: (self-)assessment of the SD model, assessing organizational maturity in the field of SD, operationalizing the evaluation process, and immediately visualizing the results achieved, as well as formulating recommendations for business improvement at strategic and operational levels so that organizational development leads to improved SD performance.

In the following, we describe three organizational case studies of assessing SD maturity level. We picked the case studies randomly, but considering: (1) both B2B and B2C business models, (2) industrial/manufacturing companies related to the automotive industry (manufacturers, service providers, consulting, etc.), and (3) small- and medium-sized (SMS) enterprises type. The main difficulties that occurred were related to the COVID-19 restrictions that affected all the experimental research at the company sites (no companies allowed unvaccinated researchers to visit or interact with their employees in the factory or offices areas), and thus, establishing rigorous criteria for selecting the assessed companies was difficult. In this paper, we only present three assessment cases from companies operating in the automotive industry, which is representative for the West and the Central Development Regions of Romania (where the authors are from).

The first assessment case (Figure 6) is of a private company (small enterprise) which has consulting in the business management segment as its objective activity, primarily focused on providing specialized services and support in the field of SD management. The company has 10 employees and has had 10 years of activity in the Romanian market. Through its services, the company addresses both public bodies and companies in the productive or service sectors, its business model being business-to-business (B2B). The company has implemented an integrated SD management strategy in the past 10 years (continuous and adapted to the business and organizational needs) and makes efforts toward greening all the business processes (according to the approaches described in Sections 4.1 and 4.2).

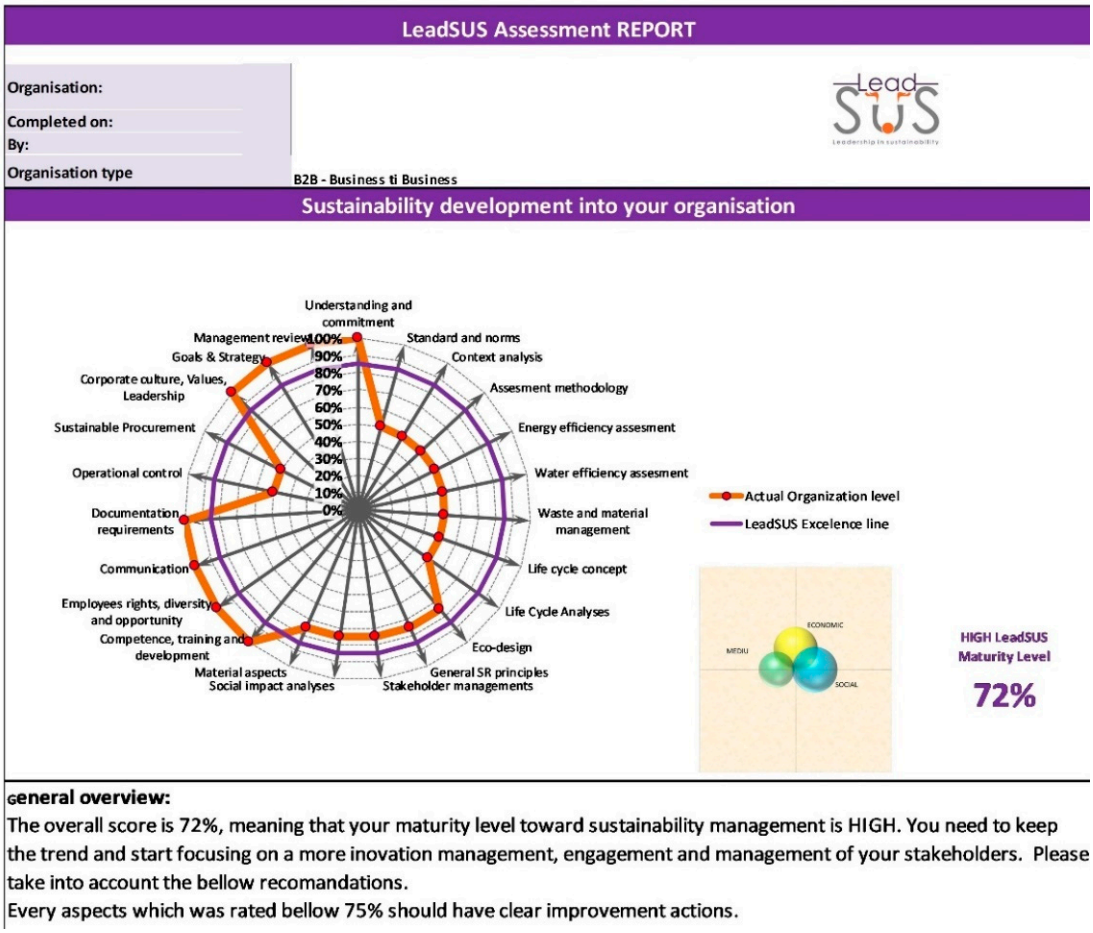

Figure 6. LeadSUS assessment result—the case of a small consulting company (private company), screen printed directly from the LeadSUS assessment tool.

As a result of the evaluation carried out for the private company, a total sustainability management maturity score of 72% was achieved, with a LeadSUS footprint at the high level (Figure 6). The assessment underlined that the company's activity is adapted, targeted, and structured to meet the needs of the Romanian market, especially the specific orientation of the services to the needs of the local market (West Development Region of Romania). Analyzing the LeadSUS footprint of the company's maturity level, several observations were made.

- General observation: The organization has a high, advanced implementation of the concepts of sustainable development; has in its strategy the essential elements of social and environmental responsibility; is oriented toward innovation and stakeholder management activities, with the organization's behavior highlighting a high degree of active social responsibility.

- Specific comments and recommendations:
  a. The organization relies on the involvement of its managers in SD management. Organizational management is heavily based on the values of individuals. Recently, the company adopted a new type of organizational management, based on a holacratic/circular structure, considering roles and responsibilities at the level of each employee, thus triggering a major change and evolution toward better performance. Also, voluntary allocations of roles were exercised to support individual participation of employees. The purpose of this initiative is to encourage and generalize self-management practices, constructive collaboration in joint teams, and the creation of new development perspectives at the individual and organizational level. Within this structure, the process that is considered a priority (the core process) is the sales one, based on the formation of three teams led by "sales force runners" who interact and work with the "supporters" and the "sales force owner" of the basic process.
  b. The company has a medium-level approach to environmental issues, considering that the environmental impact of its activity is not significant. However, the organization should have a systematic process to address environmental issues that could have a potential impact and should act accordingly to balance the environmental dimension.
  c. Even if it operates under the umbrella of well-supported system processes, the company does not have certification in the context of two standards on which its activity is based: ISO 9001 and ISO 14001. The certification process has started, in the context of the new requirements of the 2015 standards, with the two certificates obtained in 2018. Recognition of schemes by third-party bodies may add value to certain stakeholders and bring recognition of the organization as a center of quality and performance orientation.
  d. Even if it has very good stakeholder management, the company fails to meet all their needs. Instead, there are elements and objectives within its strategy that launch different activities that are aligned with the needs of stakeholders on the one hand, but also address relevant issues resulting from the company's materiality analysis on the other.

In conclusion, the evaluation carried out and its results were brought to the attention of the management and employees of the company who positively appreciated the LeadSUS approach, the methodology, and the created tool.

The second LeadSUS assessment was carried out in the case of a production company in the field of plastic waste collection and recycling, with approximately 40 directly productive employees, the company being in operation for 12 years in Romania (small enterprise). The company is an important player in the collection and recycling market in Romania, evolving significantly in the past 10 years, and has employed numerous resources to meet waste management needs on the national market, with a constant focus on the acquisition of high-performance equipment to meet the growing challenges and needs in the waste recycling segment, an invaluable source of raw materials for the industry. Waste is a huge source of secondary material for different sectors of activity and is key in sustainable development because recycling should be the safe way for the process of re-introducing and recovering some raw materials, thus coping with the stabilization of the enormous consumption of natural resources. Integration of the ergonomic approach to improve work conditions has been a priority in recent years. Studies such as [41,45] have been carried out partially in this company.

The company started to define an SD management strategy (according to the described model in Section 4.1) five years ago (managers have considered the business mature for this approach) and some business processes have been transformed into green ones. The evaluation carried out has shown that the company achieved a total SD maturity score of 61%, with a medium level LeadSUS footprint (Figure 7). The situation could be related to the fact that the case is of a small private company (not a large enterprise with a large

available budget for SD management). The level of implementation of SD principles is strictly dependent on the minimalist internal management system, and the approach of SD integration into business strategy, organizational culture, and values is often difficult to implement and support, given the limited resources available.

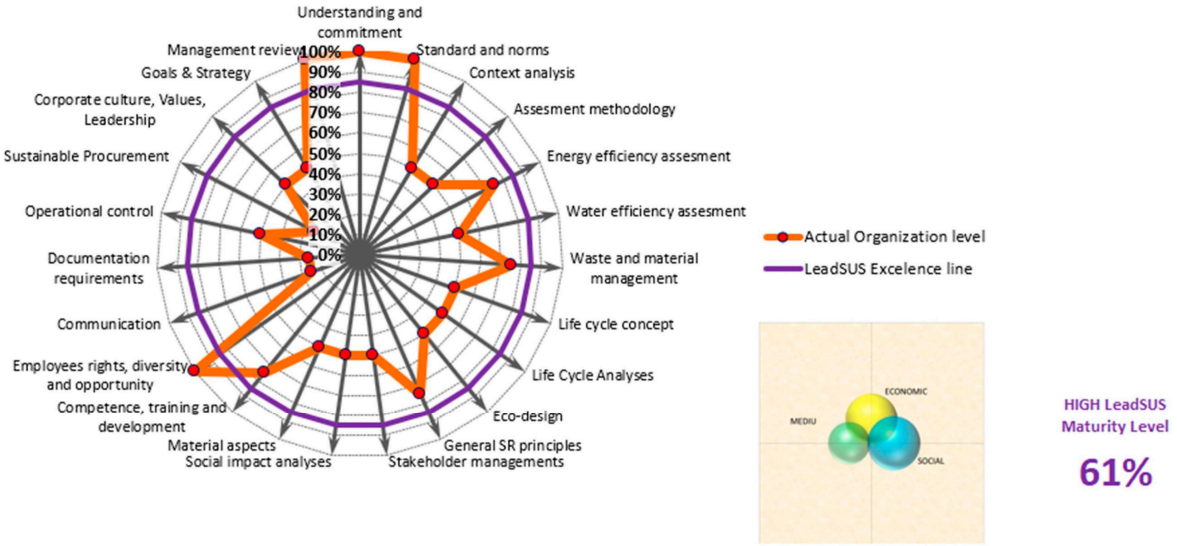

Figure 7. LeadSUS assessment result—the case of a production company in the field of plastic waste collection and recycling.

Analyzing the LeadSUS footprint in Figure 7, the following observations have been made:

- General observation: The organization has sufficiently implemented SD principles and values, still being oriented towards economic stability, the focus being on social responsibility, but also on environmental responsibility, with more emphasis on the former. Unfortunately, the core elements of social and environmental responsibility are not sufficiently supported in the strategy, as environmental responsibility elements are at an early stage of formulation compared to social ones. There is a powerful motivation policy, with the management of the organization making efforts to stabilize and balance activity, and directly reducing production costs by improving processes with priority impacts on the environment is a key concern.
- Specific comments and recommendations:
  a. The organization is based on an integrated environmental and quality management system with well-defined and functional operational and system processes and procedures.
  b. Even though the system still works, the organization is at an early stage in innovation processes in both the management segment and the segment supporting operational sustainability, very much considering the economic and social elements and aspects, and creating constructive synergies in balancing the two dimensions, but with minor environmental measures, even though in terms of the specificity of its activity, it provides direct support to all sectors of activity and directly productive companies in the integrated waste management segment.
  c. The analysis of stakeholders and their needs in close correlation with potential interests and influences on business is still in its early stage and not very well structured so that they can address certain opportunities from the external environment; moreover, potential risks that may adversely affect business processes are managed.
  d. Analyzing the values and principles on which the organization is based is essential, as it can bring about a change in the direction of business in terms

of stabilizing and balancing the three dimensions, but it can also bring about a major change in the business model.

The research carried out and its results were brought to the attention of the company's management, who positively appreciated the LeadSUS approach, methodology, and the created tool. The management team decided to implement this approach and follow the LeadSUS assessment to control and monitor their SD maturity level (developments have been implemented since 2019).

The third LeadSUS assessment was performed for an industrial company which represents a production unit in the wood industry sector, with about 400 employees. The company has been in operation for 10 years in Romania, and it is part of a multinational corporation operating in several European countries, being a major player in the timber and wood products industry market, operating in the B2B (business-to-business) sector, delivering finished products to the European market to customers, which in turn are welcomed by the B2C (business-to-consumer) segment. The company has integrated SD management strategy almost from the beginning an (the multinational company aligned its values and culture with the Romanian legal environment from 10 years ago and has adapted continuously to the business requirements). All the business process and activities are defined as green, but operational management still has aspects to be greened. The organizational management has defined an ergonomic team tasked with improving risk management; the recent studies described in [41,45] have been partially developed in this company.

As a result of the assessment carried out, a total SD maturity score of 83% was achieved, with the company having a high level LeadSUS footprint (Figure 8).

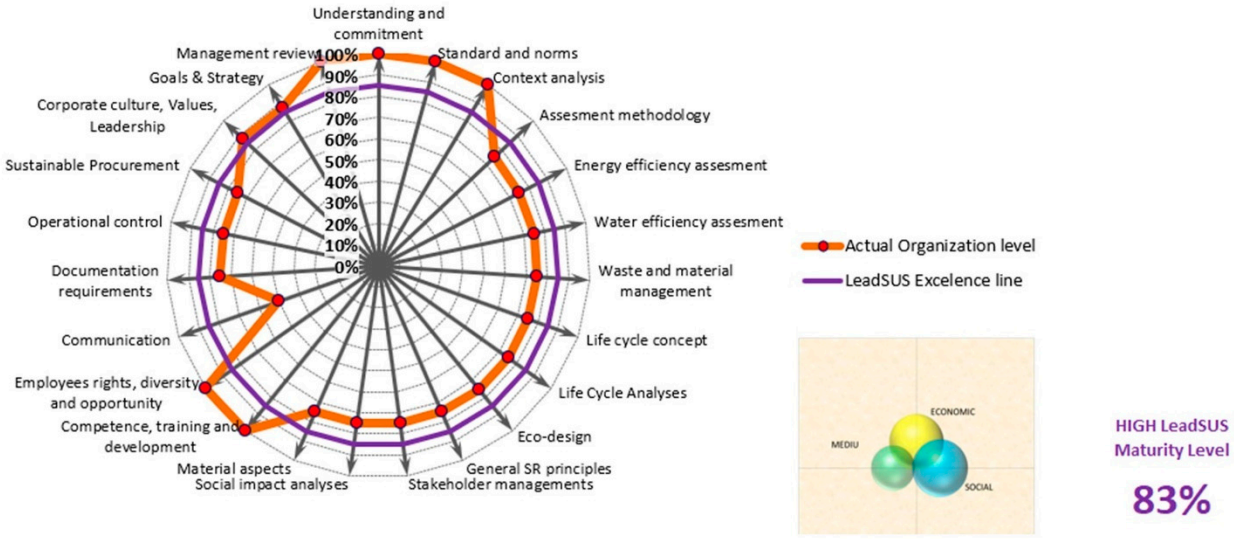

Figure 8. LeadSUS assessment results—the case of a production unit in the wood industry sector.

The analysis of the LeadSUS footprint of the company's maturity level led to the following comments:

- General observation: The organization has high implementation of SD principles and includes essential elements of social and environmental responsibility in the strategy, focusing on potential innovations and considering outputs from product life cycle analysis. Stakeholder management is still at an early stage of development, but is already included in the business strategy as a priority. There is concrete motivation towards performance, with the management of the organization making efforts to stabilize and balance economic, social, and environmental responsibility. The SD performance progress over the past 5 years has been positive, and the organizational strategy incorporates clear objectives on environmental and social performance in addition to the usual economic ones.

- Specific comments and recommendations (related to the LeadSUS footprint in Figure 8):
  a. The organization is based on an integrated environmental and quality management system (compliant with the related standards) with well-established and functional operational and system processes and procedures.
  b. The organization has assessed the environmental impact of the product from a life cycle perspective and has developed a strategy to continuously optimize the environmental dimension and progress towards performance in this area. Moreover, the company has used consultants and external experts to identify the best options that can lead the business towards performance and SD.
  c. Even if there are clear elements of implementation of SD principles at the organizational level, the company failed to integrate an efficient stakeholder management process, and communication with them (especially external ones) is not fully supported in a balanced way. Future priorities are already in favor of radical changes that will lead to easy communication with all stakeholders, and a recommendation would be to make permanent use of the LeadSUS approach, methodology, and means, with the sustainability report drawn up at defined timeframes as support for decision-making and communication processes, ensuring transparency in detailing environmental, social, and economic performance.

The research carried out and its results were brought to the attention of the company's management, who positively appreciated the LeadSUS approach, methodology, and tool created.

5. Conclusions

The presented research argues that it is not enough to only define a suitable approach for greening an organization—managers also need effective tools to monitor and control the implementation of the proposed approach. Consequently, we introduced theoretical and applicative contributions to SD management and proposed a conceptual model for green companies based on an integrated management strategy and a complex assessment model. Thus, the presented research approach is of value not only for the academic world, but mainly for its practical perspectives (managerial):

- SD management is an important subject, and organizations need simple tools to diagnose their progress in this field. The presented research demonstrates the effectiveness of the LeadSUS assessment approach as an original collection of methods and tools that could help SD managers/leaders pursue continuous greening of their organizations.
- The presented integrated SD management strategy approach and the Green Enterprise Model could offer feasible ways for better business alignment to the actual legal framework and requirements (as policy makers' decisions). Through green organizational systems and processes and defining international green supply chains, there will be a generalization of these practices worldwide.
- The idea of integrating ergonomics with the SD management approach has been considered valuable and effective for improving occupational risk management and workplace well-being, as previous studies [41,45] connected to this one have proven.

From the theoretical perspective, the proposed research approach is based on five categories of references (knowledge fields of interest):

1. Ergonomics and sustainable development (SD), as reflected in [10,14,40,41,54–59,65–68], which mainly explain the way knowledge and principles of these two different fields could be integrated. All the previous studies presented in the above-mentioned references have underlined that ergonomics is a valuable "knowledge tool" that could support SD improvements in an organization.
2. SD considered in the product design process (design for sustainability, eco-design, green product development, etc.), as supported by [3,34,50,53,59,62–64], which are connected to the life cycle thinking approach and/or circular economy principles.

3. SD related to manufacturing processes, as presented by previous studies [4,60–62,71], which had a significant impact on the field of resource efficiency and cleaner production approaches, improving quality and reducing all categories of waste.
4. SD and business model development (including SD strategic management), as reflected by [2,31,33–38,69–72], which support the core idea of sustainability-oriented innovation (SOI) to support organizations' competitiveness in a strategic manner [70,72]. These references constitute the basis for the LeadSUS assessment tool design, which is simple and easy to use even by a non-professional or non-skilled employee.
5. SD and performance management, reflected in [1,15,22], which have economic dominance due to the fact that the performance concept should be demonstrated using organizational results, output indicators, indexes, etc.

Consequently, the practical, operational gaps filled by the proposed approach are as follows:

- It can be applied for small- and medium-sized enterprises (SMEs) without a long period of assessor preparations (learning and training for understanding how to operate), with the aim of monitoring and controlling the enterprise's greening process. This is a contribution to the gap identified by [73], but the authors limited their research to the companies' engagement and contribution to the Sustainable Development Goals (SDGs) reporting and Global Reporting Initiative (GRI) indicators. The already existing standards and reporting procedures are difficult for SMEs to adopt (too expensive) but are effective tools for multinational companies, which frequently conduct their reporting activities with external experts or consultants [74,75].
- It is focused on and the operational level of the SD strategic management and thus, a bottom-top approach for SD continuous improvement is proposed and strongly supported; it promotes the green culture through the leadership pro-sustainability behavior at all hierarchical levels of management. Also, it is simpler and more effective from the practical perspective (at the operational level of the SD strategic management) than other solutions presented in the literature, such as [1,3,5,72,73].
- It is versatile to be adopted to different types of organizations. The proposed approach could be easily adapted to public organizations and institutions (e.g., already tested in the case of a university to diagnose green university development).

The novelty brought about by this research consists of the defined configuration of the Green Enterprise Model and the associated approach to monitor and control the SD maturity level using the LeadSUS assessment tool.

Authors of different studies on SD evaluation/assessment [1,3,5,72–76] stressed the management needs for tools, frameworks, methods, and methodologies to measure the organizations' progresses related to SD, but they could not overcome the systems indicator paradigm of evaluation or the adoption of qualitative research (survey based on a questionnaire inspired by SDGs or GRI indicator fields). The proposed approach differs from others presented in the literature as follows:

- It is associated with a bottom-up approach to evaluation (contrary to the presented research of [1,3,72,73]), offering the top management and leaders concrete and suggestive presentations of the state of their greening organization development. Consequently, the proposed approach could be considered a veritable support of decision-making processes.
- It is focused on all the business processes and organizational areas (not only the manufacturing processes, as in [4,60–62,71]).
- It can support the dynamic analysis of the continuous improvements related to the organizational SD, as it is associated with predefined steps as SD maturity levels.

Furthermore, the proposed integrated SD management strategy pays more attention to the social dimension with the support of ergonomics and OHS knowledge (without neglecting SR and HRM). This was an innovation induced by the COVID-19 pandemic conditions and restrictions of companies' activities (the changes occurred in the development of employees' professional life) that have linked risk management techniques (methods

and tools used in practice) more to the human side of the enterprises. In addition to these, the proposed approach for greening enterprises integrates the creation and maintenance of a green culture, which is based on the 7 Zeros. Consequently, the LeadSUS assessment (Tables 1 and 3) takes into consideration these novel ideas which have been proven to be of valuable importance for companies' SD operational management (as demonstrated by the case studies).

From the praxiological point of view, the integrated SD management strategy model and the Green Enterprise Model configuration should be customized for a company or enterprise, and these models should be developed in a synchronous manner within all three SD dimensions (the socio-economic and technological/technical environment changes are essential for managers as they help them create value and bring competitive advantage). Furthermore, the research results of the LeadSUS assessment process in the case of three companies proved the feasibility and utility of developments for managers to build a holistic and logical vision for the green transformation of their companies, in the short and medium term. We consider this approach mature and ready to be exploited by different companies in different industries.

Similar studies and developments such as [1,15,22,65] are heavily focused on SD management in relation to an organization's performance management (based on outcome indicators mostly reflecting financial and economic results of the organization), and it is difficult for small- and medium-sized enterprises to adopt the defined models and approaches. The LeadSUS assessment model is adequate for such organizations, as proven by the case studies described here. In addition, the studies [2,33] introduced the association of integrated SD management strategy to business model transformation, which was incorporated into the proposed approach through the design of the integrated Green Enterprise Model.

The limits of this research are related to the following aspects not yet covered or less covered: (1) greening the organizations (as presented in the case studies) should be accompanied by organizational re-design and business model alignment (change in accordance with the green SD strategy), which seem to be sensitive aspects (management teams are often very close to these topics). Thus, for the three presented case studies, it was difficult to collect data and information for the customization of the Green Enterprise Model. (2) The definition of the LeadSUS maturity level could be affected by the legal SD context (new limits or boundaries for SD indicators could be imposed by national or international regulations, or by stakeholders present in the value chain, including customers). Thus, legal compliance and stakeholder management are key dimensions of the proposed approach that could be better explored in the future.

Future research will be dedicated to the LeadSUS assessment in the case of public organizations (such as museums, schools, universities, hospitals, public institutions, etc.) because they are most open to defining and implementing the integrated SD management strategy related to a Green Institution Model design (considering the legal context and compliance of these organizations).

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