sustainability

MDPI

Article

Sustainable Development Model for the Automotive Industry

Lucian-Ionel Cioca [1,2], Larisa Ivascu [2,3,*], Attila Turi [3], Alin Artene [3,*] and George Artur Găman [4]

1 Department of Industrial Engineering and Management, Faculty of Engineering, Lucian Blaga University of Sibiu, Bd. Victoriei No. 10, 550024 Sibiu, Romania; lucian.cioca@ulbsibiu.ro
2 Academy of Romanian Scientists, 3 Ilfov Street, Sector 5, 010071 Bucharest, Romania
3 Department of Management, Faculty of Management in Production and Transportation, Politehnica University of Timisoara, via Victoria Square No. 2, 300006 Timisoara, Romania; attila.turi@upt.ro
4 National Institute for Research and Development in Mine Safety and Protection to Explosion–INSEMEX Petroşani, 32-34 General Vasile Milea Street, 332047 Petroşani, Romania; artur.gaman@insemex.ro
* Correspondence: larisa.ivascu@upt.ro (L.I.); alin.artene@upt.ro (A.A.)

Received: 22 September 2019; Accepted: 12 November 2019; Published: 15 November 2019

Abstract: The relationship between sustainability and business has become one of the central debates at the national and international level in both industrialized and emerging countries. A series of existing business models lack some critical aspects. The automotive industry strongly affects economic development, requiring rethinking business models in order to reduce their impact on the environment. An evaluation of the websites of the major automotive industry companies shows they have reported sustainability (through different methods) and present various practices in implementing organizational sustainability (OS). This paper aims to present a new business model for the automotive industry that takes into account the three dimensions of sustainability and emphasizes the importance of involving stakeholders in the OS approach. This model is developed based upon the literature review of three focus groups with a participation of 33 automotive industry members, of which three are highly-skilled experts of the industry. The proposed sustainable development model is scientifically relevant as it considers that all dimensions of sustainability exist and aims to increase organizational capacity for sustainable organizational development. It is also relevant from a practical point of view because it has been developed and validated by industry experts with automotive industry companies, taking into account the industrial, technical, and technological requirements for organizational sustainability assessment. The findings of this research will guide shareholders and managers in planning and developing organizational strategies.

Keywords: sustainability; SGDs; innovation; stakeholder; shareholder; competitiveness; industrial sustainability; sustainable strategy

1. Introduction

Concerns at the international level regarding the environment and social development are an important part of the business activity [1,2]. Business activities are considered to be some of the main reasons for environmental pollution, and this issue has become important in the evaluation of the roles that shareholders and their organizations have. According to sectors, after electricity and heat production, the manufacturing sector is the one that generates the highest levels of CO_2, both at the European Union level as well as in Romania [1]. More recently, greater attention has been given in understanding the impact of large companies on society. The literature on sustainable business practices has focused on large companies, such as multinational companies, in which individual

impacts are significant [2–6]. Under the pressure of market regulations and procedural requirements, large manufacturing companies have started to report their efforts and involvement in sustainable development according to standards established on an international level. Small and medium-sized enterprises (SMEs), on the other hand, play an important role in enabling efficiency within the economic structure and social stability for developed and emerging economies. These companies undertake substantial approaches to expand and communicate their sustainability efforts to stakeholders, but their implications remain limited [2–4].

Many studies on sustainable development show that OS in small companies has, as a consequence, potential gains and improved financial results only at the conceptual level, with no real results in the annual financial reports [1–4]. As a concept, organizational sustainability addresses the issue of changing the vision and mission, structure, processes, and organizational activities so as to produce more of what the organization wants (i.e., sustainable) and less of what the organization does not want (i.e., unsustainable) to increase organizational competitiveness and reduce the environmental impact [1]. OS has become a concern for companies due to several advantages, especially regarding the image they generate and process efficiency. The implications of the organizations should be reflected in those three dimensions: economic, social, and environmental [3–8].

However, if OS application aims to apply clear tools and methods, then results are visible (e.g., using clean production or Kanban contributed to the improvement of financial and production results by 12%, implementing international environmental and quality standards contributed in making the production process 3% more efficient). The application of clean production has contributed to the improvement of production results [9]. In the field of information technology (IT), the implementation of the 14,000 family of standards has contributed to "green IT" [8].

In this respect, other studies demonstrate that the application of tools that contribute to streamlining processes and reducing environmental impact have real outcomes within organizations [6–10].

When evaluating the practices of Romanian companies, according to the National Institute of Statistics (NIS), it can be observed that those that apply and report their OS are in a percentage of: 21% of micro, small, and medium-sized companies and 87% of large companies (by large company we understand: average number of employees exceeds 250, annual turnover exceeds 50 million euros, assets over 43 million euros). Since there is no model of OS development, in Romania, most of the companies' implications were outlined by using a model developed within the company, according to its characteristics [7]. Based on the fact that there is no national model (on any sector), which takes into account the characteristics of the Romanian market, and the automotive industry is the industry with the highest share of employees and turnover, and generates as a sector 16.90% of the CO2 emissions at the national level (being a major polluter), the present research analyzes the automotive industry sector [1,7]. Currently, the industry in Romania has a share of 23.2% of the Gross Domestic Product (GDP)—according to the data of the National Institute of Statistics, more than the contribution of trade (18.2%), construction (3.9%), and agriculture (4.9%) [7]. The automotive industry has undergone a radical change in recent years as a result of new technologies introduced (electric cars and other solutions for energy efficiency). It is a constantly developing industry that has considerable potential for improving environmental conditions and enabling more efficient use of its resources.

The present paper aims to evaluate the sustainability practices of large companies with headquarters or subsidiaries in Romania, from the automotive field, to identify the most important aspects of OS that should be included in the proposal of a new model for the implementation of sustainability in the automotive industry. This model is presented at the level of graphic schemes, in stages, based on market research in this industry, workshops, and the development of principles by the authors based on the other research and the 2030 Agenda. The purpose of this paper is to contribute, theoretically, in developing a model in the automotive industry with stakeholder awareness, and practically, to involve the companies in validating and accepting a model for OS.

2. Research Methodology

2.1. Focus Group Method

A focus group is a qualitative research technique used by companies for marketing research purposes. The group is made up of a small number of participants, usually from six to 12 people, from the target market of a company. Consumers are gathered and led by discussions about important company topics or elements subject to being improved. This method has been around since the 1920s when focus groups were used to collect different market information [11], and in the 1950s to evaluate the public's response to war propaganda [12–14].

Focus groups provide information on how stakeholders think and provide a deeper understanding of the phenomena and activities studied. This method collects a large amount of information, compared to surveys that generally address closed questions, which limit the feedback. It thus obtains in-depth information, aimed at the objective of the marketing research; from a cost perspective, focus groups can be expensive and involve more resources [12–17]. Focus groups enable the operator with the ability to capture deep and complex information about the target topic. Advantages of this method include group interaction and non-verbal communication [17]. Group interaction between target respondents, during focus groups, may encourage participants to make connections with various concepts through discussions that may not occur during individual interviews, thus leading to important information that can be collected. If there is a qualified facilitator, he or she may encourage these group interactions, and the data collected may be comprehensive. Non-verbal communication is also important in the process of data collection. Participants in a focus group may respond very differently to a topic. A topic related to gender equity, for example, can provoke intense discussions among female participants, while male participants withdraw from the discussion. This type of interaction represents observational data for analytical purposes. Also, non-verbal language can underline important reactions to an important topic (how the respondent looks at or how he or she interacts with others, etc.) [12–17].

In the field of sustainability, focus groups are often used because the responses expected from the respondents are based on their experience, with sustainability being a development direction and not a destination. The topics covered by the concept of sustainability involve creativity and communication [13–18]. The advantages of using a focus group in OS research are:

- The possibility of appointing a qualified facilitator to encourage interactions between the members present;
- The interaction between the participating members leads to complex debates that generate new results;
- Non-verbal communication regarding a concept that proves to be approached by organizations as a result of an imposition from the business environment;
- Sustainability is intensely debated by researchers, and so far, no concrete performance indicators and tools for implementation have been established. Therefore, the debates are appropriate to address this concept.

2.2. Data Collection

The purpose of this study is to highlight the attitude and perception of respondents regarding certain key elements, which is one of the traditional uses of the focus group method [11]. The research objectives led to the selection of persons with experience in OS from organizations in the automotive field. In order to obtain results, the sample should be chosen correctly and cover the target market respondents [11]. The sample of the present research consists of companies that are active in the automotive field. To encourage focus group discussions, a facilitator was appointed for each focus group (the financial results of the selected companies were evaluated, and 3 individuals from the companies with the best results were designated as experts/facilitators). Three focus groups were organized, the structure of which is presented below. Each focus group includes companies that make

auto parts, components, and consumables. The overall topic of the focus groups was related to the most important aspects of OS that should be included in the proposal of a new model. The participants are general managers, production managers, and production specialists. The companies they work for are foreign companies with branches in Romania, which produce different car parts, components, and consumables. The selection criteria were the location of the branch, the average number of employees to exceed 250, the annual turnover to exceed 50 million euros, and the assets to be over 43 million euros. The activity fields of the 33 companies and of the facilitators/experts are presented in Table 1.

Table 1. Focus groups' structure and activity fields of companies.

Focus Group 1	Focus Group 2	Focus Group 3
Company 1—electronic control modules, vacuum pumps, accelerator pedals, and electric power control modules	Company 1—car tires	Company 1—multifunction steering wheel switches, light-block switches, climate control systems, and center console control elements
Company 2—injection components, electronics, car wiring	Company 2—headlamps, fog lamps, additional stop lamps, and truck headlights	Company 2—assemblies, engine components
Company 3—car seats and interior elements	Company 3—automation, control systems	Company 3—anti-vibration components
Company 4—car wiring	Company 4—car wiring	Company 4—tires, electronic components
Company 5—steering wheels, seat belts	Company 5—trailer components	Company 5—rubber and plastic components
Company 6—electric cables	Company 6—car ceiling components	Company 6—car wiring
Company 7—car lighting	Company 7—cable protection	Company 7—electric systems, cables
Company 8—chair control systems, integrated window modules	Company 8—hydraulic braking equipment	Company 8—car ornaments
Company 9—upholstery	Company 9—chassis solutions, steering, powertrain, torsion bars	Company 9—high precision components and systems for engines, transmission, and chassis applications
Company 10—electric cables	Company 10—automotive control units, electronics, research center	Company 10—electric systems, cables
Company 11—alternators	Company 11—sintered mechanical parts, and spark plugs	Company 11—radiators, condensers and air conditioning systems, compressors, exhaust
Facilitator—electronic modules (general manager)	Facilitator—rubber and plastic components (general shareholder)	Facilitator—high precision components and systems for engines (manager)

In order to standardize the discussions within the three focus groups, the three moderators followed the same specific procedures, which were printed and distributed only to the facilitators. The instructions were designed, on the one hand, to reflect the purpose of the study and, on the other hand, to allow for a different group dynamic. The presentation for all participants in the form of a single group, before the beginning of the individual group sessions, provided general information about the study, and a series of questions were presented on which the discussions were to focus upon, as shown in Table 2.

Table 2. Topics of discussion.

Common Questions Discussed in the Three Focus Groups	Questions Discussed in Focus Group 1	Questions Discussed in Focus Group 2	Questions Discussed in Focus Group 3
Knowing the OS concept Sustainability is important for the strategic practices of the organization 5 tools used for OS Training employees regarding OS 3 objectives targeted by OS 3 benefits after adopting OS3 disadvantages of OS	Periodicity of reporting sustainability Main organizational advantage OS results within the organization	Interest of stakeholders in OS Shareholder OS approval OS reporting costs	Appreciation of the company's maturity level Strategic planning Stakeholder interests

2.3. Stages of Present Reserach

Based on the advantages of using focus groups, the details of data collection, and the main theme of analysis, a series of stages for conducting the research have been established. This research was based on the following methodology with the following steps:

1. Listing of the literature based on empirical experience, with qualitative research. Based on this inventory, we identified and structured: 2030 Agenda principles, sustainability objectives, sustainable development models, stakeholder engagement models in sustainable development. Based on these qualitative assessments, 15 important principles for organizational sustainability applicable to the automotive industry were mapped. These principles underpin the development of the sustainability model proposed in this paper.
2. Analyzing focus group data, in which 33 employees were invited. This market research was conducted in order to identify the most important aspects of OS that should be included in the proposal of a new model. Three focus groups were made, each person being present just one time. Each focus group had a duration of 90 min and was coordinated by a facilitator/an expert (the expert was chosen from the categories: shareholders, manager, or general manager by the authors, according to the proven skills on the OS). There were 7 questions established for discussions, and 3 questions were established by each expert who coordinated the interviewed group. The sample consisted of all large (multinational) companies with branches in Romania.
3. Using logical diagrams to describe the steps of the proposed model.
4. Conducting 3 in-depth interviews to prevalidate the proposed model. The interviews were conducted with the three experts from point 2.
5. Validating the proposed model within the largest automotive industry company in the Western Region of Romania.
6. Evaluating and analyzing the results and suggesting future research.

2.4. Details of the Company Evaluated

Organizational sustainability implies the evaluation of the three responsibilities: economic, social, and environmental [17–21]. For the proposed model, a series of areas related to these responsibilities have been defined and are structured in Table 3. These areas have been established according to the particularities of the automotive domain, following the organized focus groups. As this industry generates a considerable amount of greenhouse gases, the participating specialists and experts considered these fields comprehensive and relevant for the assessment of organizational sustainability. Each domain has a series of indicators. A score is assigned to each indicator, in line with the team's appreciation in stage 1, then the field's score is calculated as the arithmetic mean, and finally, the company's total score is calculated. The score obtained is the input data for the next stage. Each indicator is assigned a score of 1—not implemented, up to 7—fully implemented. If the indicator does not apply, zero is given.

Table 3. Organizational sustainability (OS) responsibilities and domains.

Responsibility	Domain	Number of Indicators
Economic	financial stability	10
	developed partnerships	5
	organizational efficiency	8
	capacity to reduce production time	7
Social	communication and human resource	20
Environment	environment	15
	waste management capacity	15
	greenhouse gas reduction	5

2.5. Validating the Proposed Model

The proposed model was validated on a company from the automotive field with an average number of employees of 4000, an annual turnover exceeding 400 million euros, and assets exceeding 400 million euros. To validate the model, the necessary data from the company were used, and the evaluation was done with managers and specialists from 5 departments. The semi-quantitative assessment of the indicators was constituted from the arithmetic mean of the evaluations of the 5 specialists. The elements of strategic management were sourced from the company's website. The vision is "The company aims to become a world leader in the automotive industry, based on the principles of durability." The mission includes key elements, ranging from employees to caring for the community, customers, and suppliers.

3. 2030 Agenda, Principles, and Objectives

By approving the 2030 Agenda for Sustainability in 2015 (2030 Agenda for Sustainable Development), 193 member states committed themselves to ensuring economic growth, social inclusion, and protecting the environment. This document is the most complex project aimed at eliminating extreme poverty, maintaining economic balance, reducing inequalities, and protecting the planet [12]. It includes 17 principles (17 Sustainable Development Goals—17 SDGs) and 169 targets. The essential principles [8–14] of the 2030 Agenda are:

- Universality: the area of application is universal; it refers to all countries and can be applied at any time.
- Leaving no one behind: the agenda supports anyone, no matter where they are and what the environmental conditions are.
- Interconnectedness and indivisibility: interconnection and indivisibility of its 17 SDGs to any entity.
- Inclusiveness: supporting the participation of any market segment, irrespective of race, ethnicity, identity, or interests.
- Multi-stakeholder partnerships: developing communication across multiple partnerships that facilitate the exchange of knowledge, experience, technology, and facilitate the use of organizational resources.

In line with the 17 principles of 2030 Agenda and the 169 targets, the authors proposed 15 principles applicable to the automotive industry that have been underlying in developing the model for the automotive industry [1,2]. These principles target, in combination, the 17 SDGs (see Table 4). These principles are used, in implementation phases, within the proposed model. The principles have been developed in line with the automotive industry's functionalities.

Table 4. The 15 principles of sustainability proposed, and the implications and objectives of Agenda 2030 covered by them, after [2].

No.	Principle	Implication	Goal
S1	Interests of stakeholders	Putting into operation activities that are in line with stakeholders' strategic plans.	SDG1, SDG12
S2	Reduction of toxicity	Reducing the toxic impact of the workplace on employees.	SDG4, SDG5
S3	Reducing operator overload	Reducing operator overload on production jobs	
S4	Reducing resources	Reducing process losses contributes to improving financial results.	SDG9, SDG12
S5	Time efficiency	Increasing production capacity as a result of reducing activities time	SDG9, SDG12
S6	Reducing waiting time	The company has to reduce its waiting time to improve its production capacity.	SDG9, SDG12
S7	Monitoring fixed costs	Reducing fixed costs contributes to the efficiency of the production activities	SDG12, SDG17
S8	Stakeholder engagement in strategic decisions	Strategic planning should take into account the functions of sustainable development	SDG6, SDG8, SDG17
S9	Supporting community activities	Company involvement in society contributes to improving living conditions	SDG2, SDG3, SDG16
S10	Training human resources	By training human resources, the company's performance level is improved.	SDG4, SDG5
S11	Corporate Social Responsibility (CSR)	CSR actions improve employee wellbeing and improve public image	SDG 1, SDG10
S12	Increasing recycling capacity	Reducing the amount of waste generated contributes to reducing the organizational impact on the environment	SDG14, SDG15
S13	Increasing the capacity of the reuse, remanufacturing, reconditioning	Waste management functions generate added value for the organization	SDG7, SDG12
S14	Reducing energy consumption	Increasing the capacity to generate energy and reducing energy consumption contribute to protecting the environment	SDG9, SDG13
S15	Greenhouse gas reduction	The implication of the company în this activity leads to reducing pollution to the environment.	SDG11, SDG13

4. Theoretical Grounding

Organizational sustainability practices vary according to company size, level of business maturity, complexity of business processes, strategic planning, organizational structure, and stakeholder interests (mostly of the shareholders) [8–11]. From this perspective, organizations plan and operate their activities on medium and long-term based on the OS principles [9], innovation, and tools for improving and implementing sustainability in their business activity [18]. Organizations that plan and implement sustainability practices report and control their involvement by delivering sustainability reports. Sustainability reports have grown in popularity, with the most widely known report being the Global Reporting Initiative (GRI), used and accepted internationally. There are no legal impositions in reporting on sustainability, so each organization uses its own reporting model. The accepted national and international report is the GRI, especially in large companies [18–21]. This reporting of sustainability is not required by law, but many times, the OS practices approach is imposed by stakeholders (mainly business partners and customers) [18–23]. Organizational practices differ from one domain to another, from one organization to another, depending on the ability to transfer knowledge [23–30].

4.1. The Importance of Stakeholder Involvement in Organizational Sustainability

Stakeholder involvement in the decision-making process is a useful way to explore stakeholder satisfaction and increase their interest in business regulations [31–33]. Few studies on stakeholders' expectations of OS have been identified by various authors. It is recommended to use the stakeholder theory to achieve performance in organizational sustainability [33–36]. Stakeholder theory was first introduced in 1984 by Edward Freeman and addresses the interaction between specific groups of individuals and their interests based on the organization. From this moment on, a series of stakeholder theories have emerged regarding the organization. In the latest studies [33–36], it is shown that stakeholders must advance this concept and take the most effective organizational measures to contribute to building a better future. Stakeholder management must have a positive responsibility to promote sustainability. Involvement in sustainable development is not mandatory for organizations, so stakeholders will accept involvement in OS only if they see an economic benefit. [36–45]. It is specified that different stakeholders have different expectations within a company, and relationships may be different. There is no unified theory of stakeholder roles, but there are multiple theories regarding organizational conflicts, stress, or health conditions. Stakeholder roles can be grouped so that organizational goals are achieved. At the same time, groups of common expectations of stakeholders can be created regarding the process of implementing sustainable development. There is also a knowledge gap in the misunderstanding of the usefulness of indicators for managers [45–48]. Although stakeholders play a key role in organizational sustainability and its evaluation, their expectations still remain unclear [48–50].

The performance in terms of sustainability is insufficient for their needs, which are mostly transposed into financial results. In view of the large and growing number of publications in this field, we can say that there is a great difference between research and practice. This fact is supported by authors' concerns over the years, the results of the research carried out within the focus groups and the existing data at the NIS. This part of the paper aims to identify the common part of the types of stakeholders who accept and adopt the activities of OS [11–20].

There are a series of models presented regarding the implications of the stakeholders in OS [11–16]. Some models classify stakeholders according to their interests and present mechanisms for solving the interconnection [11,13], others divide stakeholder typologies into categories according to their interests [51], whilst others identify interactions based upon stakeholder interests [52–58]. In Table 5, models of stakeholder engagement in sustainable development are presented. These models claim that stakeholders' interests are different in the context of organizational development and need to be addressed separately. From the perspective of sustainable development, shareholders' interests need to be addressed in a complex manner by integrating OS principles from the strategic planning phase (from defining the vision, mission, and strategic objectives) [46].

Table 5. Models of stakeholder involvement in sustainable development.

Authors	Model Description
Hoerisch et al., 2014 [27]	The research identifies three challenges related to the interaction of stakeholder and OS relations: strengthening the specific interests of stakeholders' sustainable development, creating mutual sustainability interests based on this particular interest, and empowering stakeholders to act as intermediaries for nature and sustainable development. Three interdependent mechanisms are suggested to help solve interconnection: education, regulation, and the creation of sustainable values with stakeholders.
Apte and Sheth, 2017 [28]	Stakeholders have a direct, indirect, or enabling impact. The stakeholders that have a direct impact are: consumers, customers, and employees; stakeholders with an indirect impact are: government, organizations, and media. Investors, suppliers, and communities are tangential to OS principles.

Table 5. *Cont.*

Authors	Model Description
Poponi et al., 2019 [29]	Stakeholders reinforce their ability to engage in sustainable development based on incentives and financial opportunities.
Iamkovaia et al., 2019 [30]	Stakeholders share their influences on putting the OS into operation in two large categories: direct, from the inside of the company and indirect, from the outside the company.
Canh et al., 2019 [31]	This study evaluates stakeholders' interests according to the performance of the employed actions. Research has been carried out on a sample of Vietnamese production firms over the period 2011–2013.
Silva et al., 2019 [32]	This research distinguishes stakeholders and their expectations with regard to their various roles in the process of evaluating and controlling sustainability performance: standards-setting factors, information providers, affected stakeholders, decision-makers, and recipients. The analysis of individual roles reveals that stakeholders' expectations are rarely specifically taken into account.

4.2. Methods and Tools for Sustainable Development

Organizational sustainability is of interest to many of the national and international companies. As noted above, applying and implementing OS can lead to a series of organizational benefits (increasing production efficiency, improving financial results, developing green technology information, and others [1–10]). The approach and involvement in OS are often realized as a condition of organizational collaboration (between stakeholders). OS is a direction that can help decision makers from organizations decide what actions need to be taken to contribute to reducing the impact on the environment and in the development of a sustainable society. Several studies have been conducted on the evaluation of OS and the implementation of its methods [45–53]. Most of the models developed are based on the three responsibilities of economic, environmental, and social sustainability [42–45]. Generally, the evaluation methods of the OS are developed by using a set of key indicators [44]. Several studies evaluating the efficiency of production activities and sustainability have been carried out [44,45]. Other studies are based on the Life Cycle Assessment (LCA) in determining energy efficiency to reduce the impact on the environment by production. In other studies, we find that the neural network and neuro-fuzzy approaches are used for production sustainability. The results of this study showed that the neuro-fuzzy approach could provide more accurate results compared to the neural network approach. The sustainability assessment model through Fuzzy Evaluation (SAFE) is one of the best-known sustainability systems [48].

Another research presented the sustainability assessment method using a fuzzy logic approach. Their method was mainly based on two responsibilities: social and environmental. The selected indicators are also provided in the GRI reporting. Their method was applied to measure the sustainability of the development of 15 countries: Mozambique, Colombia, Canada, Germany, China, India, Greece, Japan, Madagascar, Senegal, Australia, the Philippines, Switzerland, South Africa, and the United States. For each indicator, they considered a triangular member function and used Matlab. The SAFE model was subsequently extended by introducing sustainability thresholds and compiling the bases of SAFE rules algebraically. A new sustainability assessment method was developed using the Neuro-Fuzzy approach (ANFIS) [44]. All these models and methods require knowledge, involve infrastructure resources, and a considerable transfer of knowledge. For the automotive industry, many approaches and methods are of a qualitative nature and fail to consider, in a holistic manner, all three pillars of the triple bottom line [53–58]. Many manufacturers often focus on the economic aspect and the associated benefits. In automotive, the selection of materials is emphasized and represents a starting point for approaching and improving the sustainability of the industry. Holistically, there are many other variables and processes involved in the manufacturing of cars that can contribute to improving production conditions. One way to evaluate the increased capacity for sustainability of these processes and products is through the use of decision analysis. Decision analysis tools used include the criteria decision analysis (MCDA), which is very close to the thinking of shareholders and

other stakeholders. The methods of evaluation and approach are different, depending on the industry, but often the choice is made according to the held knowledge, the allocated time, and the obtained benefits. Often, the qualitative methods are approached through assessments using scales due to the ease of use and the minimum knowledge that needs to be held [53–57].

The automotive field is a developed one, with collaborations existing between different continents. Thus, the environmental challenges are numerous. A major change in the auto industry is necessary to meet increasingly demanding environmental regulations worldwide. A central component of greenhouse gas generation is the internal combustion engine, associated with emissions, fossil fuel consumption, and noise. As a requirement of more and more countries, complex actions have been taken in the production activities of this industry to improve the products. Significant amounts of resources have been invested in the development of fuel vehicles, in which the fuel cell replaces the combustion engine [54–56].

At present, a debated issue is the way in which the sustainable development of the organization can be assessed [17]. There are many different methods and tools for measuring sustainability, and each of these offers potentially useful information, albeit different, for decisions [18]. These tools are known internationally and fundamentel, and published studies show that there are economic benefits, especially [52–58]. Such tools are International Standards Organization (ISO, mainly: ISO 14000 series—Environmental Protection Oriented, ISO 9000 series—Quality Oriented, ISO 45000 series—Health and Safety Oriented, ISO 27000 series—Information Security Oriented), Occupational Safety and Health Administration (OSHA); Occupational Safety and Health Administration (OSHA): Occupational Safety and Health Act of 1970—Safety and Health Oriented; British Standards Institution (BSI): OHSAS 18000 series—Health and Safety Oriented), 7 Wastes, Life Cycle Assessment (LCA), Eco-design, Learning curve, Value Stream Mapping (VSM), US Environment Protection Agency (EPA); Lean and Environment Toolkit—Environment Protection Oriented; Lean, Energy and Climate Toolkit—Environment Protection and Resource Preservation Oriented; European Union (EU) Standards: Eco-Management and Audit Scheme (EMAS)—Environment Protection Oriented, Health and Safety at Work Act, 7 Waste; Life Cycle Sustainability Assessment—LCSA; Resource Efficient and Cleaner Production—RECP, Kaizen, Just-In-Time (JIT), Cellular Manufacturing, Single Minute Exchange of Dies (SMED), Standardized Work, and Total Preventive Maintenance (TPM), Plan-Do-Check-Act (PDCA), and Problem Solving, Sort—Set In order-Shine—Standardize-Sustain (5S), Six Sigma, Jidoka, Gemba Walk, Kaikaku, Shop Floor Management (SFM), Bottleneck Analysis (related to clean production–lean production) [6–10]. Thus, one of the ways in which large organizations try to maintain competitiveness is to seek and implement sustainable practices involving different approaches to innovation [7]. These matters can help improve organizational image, improve resource utilization, and create the conditions for gaining a real competitive advantage [8].

Despite this variety of tools and methods, the assessment criteria and indicators of durability almost always play a fundamental role in any durability assessment [27]. The criteria for the assessment of sustainability are found in the literature; there is currently no framework agreed upon by automotive experts and other stakeholders (especially shareholders) on which key criteria should be found in the OS rating scheme. Point by point, regarding the field of activity and organizational dimension, there are a number of models for sustainability assessment.

5. Results

The three focus group sessions took place between January and May 2019. Out of these, two were conducted within the university (F1 and F2), and a meeting was held within a company A on which the proposed model was validated. The results of the focus group one are presented in Table 6. The expert, chosen among the 11 participants, was the general manager of the most important multinational company in Romania. It can be noticed that the majority of respondents were aware of the concept of sustainability, feel it is important (95%), and know the tools for putting the OS into operation. The objectives targeted by the respondents relate to innovation, responsible production, and sustainable

jobs. The first expert chose to discuss issues regarding the periodicity of reporting sustainability, the main organizational advantage, and the discussion of OS results within the organization. The results obtained in the focus groups are presented systematically in accordance with the expected results (only the important information used to develop the evaluation method is presented). The key actions described by the respondents were extracted to better shape the proposed model.

Table 6. Synthesis of the results obtained in focus group F1 with 11 companies of the automotive industry.

No.	Question Discussed	Key Actions Identified
1	Knowing the OS concept	89% of the participants know the concept and have applied it within the company they work for.
2	Sustainability is important for the strategic practices of the organization	95% replied in the affirmative and consider sustainability as an integral part of the vision and mission.
3	5 tools used for OS	ISO Standard, LCSA, RECP, problem solving, sustainable indicators.
4	Training employees regarding OS	47% of participants were trained on the principles, objectives, and tools of the OS, and the rest were self-educated.
5	3 objectives targeted by OS	Decent work and economic growth (69.23%); industry innovation and infrastructure (64.62%); and responsible consumption and production (61.54%) (multiple answer).
6	3 benefits after adopting OS	Improving the quality of processes and operations (55%), standardizing activities (23%), teamwork (76%).
7	3 disadvantages of OS	Cost, time, unprepared employees.
8	*Periodicity of reporting sustainability*	In 70% of cases, reporting is done annually, whereas in 30% of cases, it is done once every two years.
9	*Main organizational advantage*	The following advantages have been mentioned: strategic planning in line with OS objectives (40%), motivation of human resources (30%), and reduction of production waste (30%).
10	*OS results within the organization*	Over 70% of the first group's members responded that it had visible results within the organization.

The next focus group was made up of 11 companies operating in the automotive field, and the expert was the youngest manager. The results obtained within this focus group are presented in Table 7. The second expert chose for discussion topics based on the interest of stakeholders in OS, shareholder involvement and OS approval, and OS reporting costs.

Table 7. Synthesis of the results obtained in focus group F2 with 11 companies of the automotive industry.

No.	Question Discussed	Key Actions Identified
1	Knowing the OS concept	81% of the participants know the concept, have studied it, and have applied it within the company they work for.
2	Sustainability is important for the strategic practices of the organization	84% replied in the affirmative and consider OS as being an important direction for the company.
3	5 tools used for OS	Lean manufacturing (Kanban, 5S), ISO Standard, LCSA, problem solving, sustainable indicators.
4	Training employees regarding OS	30% were trained, whilst 70% were self-educated.
5	3 objectives targeted by OS	Process and Material Losses Reduction, Increasing Resource Efficiency and Customer Satisfaction (83.08%), Cost Reduction and Increasing Product Quality (80.00%), and Productivity Improvement and Company Image Improvement (78.46%).
6	3 benefits after adopting OS	Work standardization (70%), improving public image (20%), visual management (10%).
7	3 disadvantages of OS	Cost, training employees, and the infrastructure related to information technology.

Table 7. *Cont.*

No.	Question Discussed	Key Actions Identified
8	*Interest of stakeholders in OS*	Shareholders from within the company are involved directly or indirectly in OS.
9	*Shareholder OS approval*	In 85% of cases, shareholders approve of OS and take its principles into consideration when defining strategic planning.
10	*OS reporting costs*	Expenditures are covered by internal funds and are supported by shareholders.

The next focus group was made up of 11 companies operating in the automotive field, and the chosen expert was the most important shareholder according to the turnover achieved in the previous year. The results obtained in this focus group are presented in Table 8. The expert of this target group chose three directions for the discussions: the appreciation of the company's maturity level, the strategic planning, and stakeholder interests.

Table 8. Synthesis of the results obtained in focus group F3 with 11 companies of the automotive industry.

No.	Question Discussed	Key Actions Identified
1	Knowing the OS concept	95% of the participants know the concept, and 81% have applied it within the company they work for, whilst 13% apply it partially.
2	Sustainability is important for the strategic practices of the organization	80% replied in the affirmative and consider sustainability as an integral part of the vision and mission.
3	5 tools used for OS	ISO Standard, sustainable indicators, LCSA, environment-related tools, Waste Management
4	Training employees regarding OS	The majority of employees, 83%, were self-educated. The organization does not have resources for training.
5	3 objectives targeted by OS	Improving the activity processes (71%), attracting new collaborators (89%), improving public image (54%).
6	3 benefits after adopting OS	Improving the quality of processes and operations (75%), increasing recycling capacity (53%), increasing employees' interest in the company.
7	3 disadvantages of OS	Lack of reporting required by legislation, lack of information and ambiguity triggered by the lack of indicators for evaluation, internationally endorsed.
8	*Appreciation of the company's maturity level*	Companies have reached the maturity level regarding organizational activity.
9	*Strategic planning*	In 91% of cases, strategic planning takes OS objectives into consideration.
10	*Stakeholder interests*	Stakeholder interests are partially aligned with OS objectives. In 65% of statements, shareholders support investments in OS.

The results obtained within these focus groups were correlated with the 15 principles developed for the automotive industry. The matrix of the principles resulting from the intersection of the results obtained after the focus groups and the meetings with experts are presented in Table 6. An "x" was marked if the focus group discussions intersected with the principles developed and presented in Table 9. Table 9 also includes the column for the implementation phase of the principle within the proposed model (which is presented in Section 5).

Table 9. Matrix of principles applicable in the automotive industry following the presented focus groups.

No.	Principle	Phase of Implementation	Focus Group 1	Focus Group 2	Focus Group 3
S1	Interests of stakeholders	1	x	x	x
S2	Reduction of toxicity	2		x	
S3	Reducing operator overload	2	x	x	x
S4	Reducing resources	2	x	x	x
S5	Time efficiency	2	x		x
S6	Reducing waiting time	2	x	x	x
S7	Monitoring fixed costs	2			x
S8	Stakeholder engagement in strategic decisions	1	x	x	x
S9	Supporting community activities	2	x	x	x
S10	Training human resources	2	x	x	x
S11	Corporate Social Responsibility (CSR)	2	x	x	x
S12	Increasing recycling capacity	2		x	x
S13	Increasing the capacity of the reuse, remanufacturing, reconditioning	2	x		x
S14	Reducing energy consumption	2	x	x	x
S15	Greenhouse gas reduction	2	x	x	x

6. Sustainability Model Proposed for the Automotive Industry

The characteristics of the automotive industry are: qualifications of human resources, innovation, high complexity, standardization, reputation, high technology, high quality products, and others. The operations and processes of the industry are quite complex, being much technologized. The level of innovation is high, and the standardization of processes and activities is important [18–21]. The level of knowledge is high, and collaborations with universities are intense [22–25]. The quality of the products is considered to be high, and training human resources is carried out continuously. Throughout the entire automotive industry, cost-cutting efforts and approaches are emphasized [23–27]. The automotive industry is a complex system of connections, direct and indirect products, and interactions in order to create economic value [35]. As this industry has a significant impact on the environment, economy, and people [45], it also plays a significant role in sustainable development. Vehicle and auto parts manufacturing companies are evaluated by regulatory agencies to ensure they meet environmental standards and reduce the impact on both products and their manufacturing processes [23]. This pressure led them to adopt innovative business strategies and prime information and communication technologies to achieve environmental and economic performance goals [25]. Implementing sustainable development helps them reduce their organizational impact on the environment, economy, and society.

The model proposed for the automotive industry is based on the following: evaluation of the principles and targets of sustainable development found in the literature and the results of the focus groups conducted with the representatives of the automotive industry. This model includes four stages, as follows:

(1) The understanding and assessment of organizational capacity for sustainable development—identifying, evaluating, and understanding the factors affecting the development of a program for launching sustainable development.
(2) Evaluating the activities launched for sustainable development—identifying and evaluating the activities undertaken for the OS.

(3) Generating the report of the evaluation—generating the report based upon the organizational assessment.
(4) The action plan of the organization—developing an action plan to increase the likelihood of OS.

6.1. Stage of Understanding and Assessment of Organizational Capacity for Sustainable Development

All the organizational information used at this stage is retrieved from the evaluated company (vision, mission, and organizational objectives). They are elements of strategic planning. Organizational assessment begins with elements of strategic management [59]. The vision being a projection of the business in the future, which underlines what the company wants to become, and it is essential for it to suggest organizational sustainability [47,57–59]. The mission is another strategic element that includes the basic elements of the business' existence. These refer to innovation, employees, customers, markets, technology, environmental responsibility, products, philosophy, and the relationships with collaborators. They are elements that must express the sustainability of the business [57–59]. These elements are evaluated to identify whether they are based on the principles of sustainable development. The first step in the proposed model is to consider the elements related to the functional requirements of strategic planning. It assesses the current state and future design (vision) of the organization. At this stage, the following steps are taken, as shown in Figure 1:

1a. Input data is used: vision, mission, and the organizational strategic objectives.
1b. Check that the input data from point (1) integrates the principles of sustainable development.
1c. In the event that the input data does not integrate elements of sustainability, a focus group with the stakeholders is organized to understand their interests (emphasis is put on understanding the interests of stakeholders). After that, the strategic plan is checked to be in line with the OS objectives.
1d. Check whether there was a previous sustainability report. If it exists, it is retained for comparison purposes, if not, it will be mentioned that no previous reporting exists. A team is established to implement the OS activities.

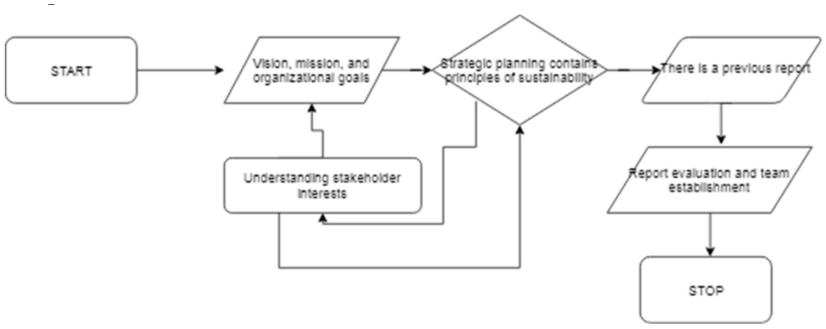

Figure 1. Stage 1 of the model proposed for sustainable development in the automotive industry.

6.2. Evaluating the Activities Launched for Sustainable Development

The evaluation stage of the sustainability indicators is one of the most important. In the models proposed for the assessment of organizational sustainability [17,22,35] the number of indicators differs depending on the company's field of the activity. For automotive, the emphasis is placed on the impact of the raw materials used and the emissions generated [59]. That is why the economic and environmental dimensions include more indicators. These indicators relate to the reduction of production costs and time, zero waste, the amount of energy consumed, the amount of industrial waste generated, and others, which are important indicators [59]. For the proposed model, 80 indicators were established, divided into domains for the three sustainability responsibilities. The division into domains was made for the ease of evaluation. At this stage, eight domains are evaluated according to a set of defined indicators. The domains evaluated are environment, financial stability, developed partnerships, organizational efficiency, waste management capacity, capacity to reduce production

time, greenhouse gas reduction, and communication and human resource. The steps of this stage are shown in Figure 2, as follows:

2a. Data from the company is collected, and the members of the team are identified in order to apply scores for the following domains: environment, financial stability, developed partnerships, organizational efficiency, and waste management capacity, capacity to reduce production time, greenhouse gas reduction, and communication.

2b. The domain "environment" is assessed, and its corresponding score is calculated.

2c. The domain "financial stability" is assessed, and its corresponding score is calculated.

2d. The domain "developed partnerships" is assessed, and its corresponding score is calculated.

2e. The domain "organizational efficiency" is assessed, and its corresponding score is calculated.

2f. The domain "waste management capacity" is assessed, and its corresponding score is calculated.

2g. The domain "capacity to reduce production time" is assessed, and its corresponding score is calculated.

2h. The domain "greenhouse gas reduction" is assessed, and its corresponding score is calculated.

2i. The domain "communication" is assessed, and its corresponding score is calculated.

2j. The total score of OS is calculated.

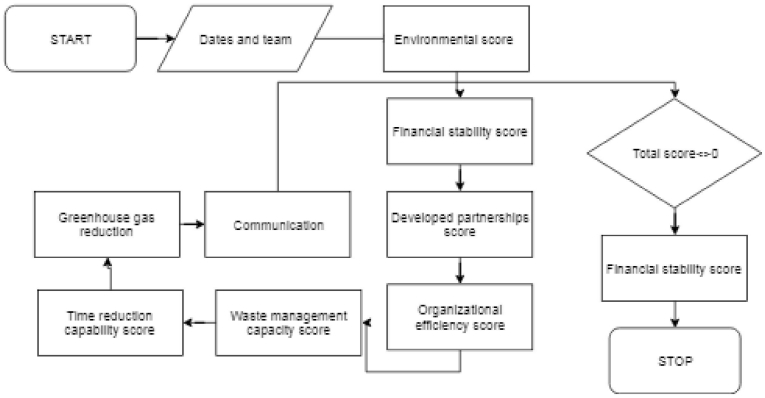

Figure 2. Stage 2 of the model proposed for sustainable development in the automotive industry.

6.3. Generating the Report of the Evaluation

The stage of generating a report is important in management and for the decision makers in the company [19]. Obtaining a report that can be looked into by stakeholders contributes to future decisions and can convince the shareholders of the benefits of sustainable development [19,22,35]. Models of sustainability assessment, like management models, end with the stage of generating an organizational footprint that encompasses its situation and leads to new solutions for increasing competitiveness [59,60]. In the proposed model as well, the last step is to generate a report. Depending on the score obtained in the previous stage, a report is generated, which is based upon a series of organizational strategies and integrates the methods, techniques, and methodologies for OS in the automotive industry. In view of the final score, the following steps are taken, as shown in Figure 3:

3a. The team meets for the planning activity.

3b. The mission and vision of the organization are reexamined.

3c. The proposed tools for implementing sustainable development are examined.

3d. The elements that need to be maintained, eliminated, or adapted are determined.

3e. The sustainability domains are prioritized.

3f. The action plan is transcribed to be line with the specificity of the organization.

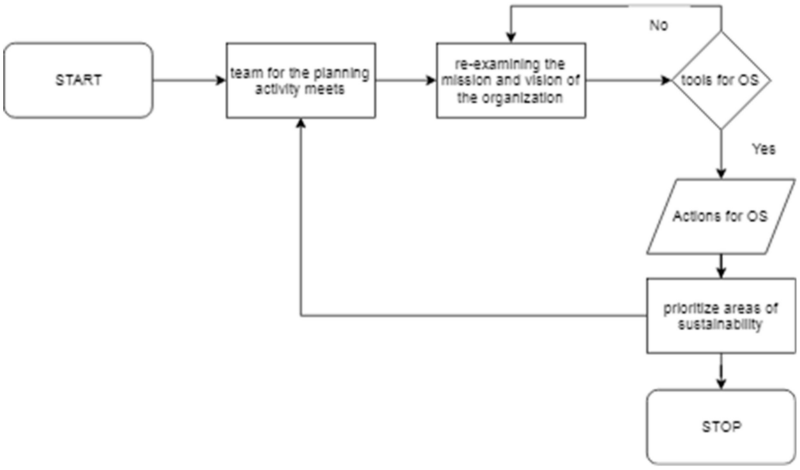

Figure 3. Stage 3 of the model proposed for sustainable development in the automotive industry.

6.4. The Action Plan of the Organization

After obtaining an in-depth overview, the organization proceeds to propose solutions in accordance with those suggested within the report [22,35]. Systematizing an action plan is an important step in increasing organizational competitiveness [35]. This action plan must be developed in accordance with organizational strategies and organizational objectives [59]. For the proposed model, at this stage, the plan and activities prioritized in stage three are transcribed. The proposed plan is controlled and monitored until the organizational re-evaluation.

6.5. Case Study: A Large Multinational Company

Within this section, the proposed model has been validated on one of the most important multinational companies in the automotive industry. The results of this validation are presented in Table 10.

Table 10. Validation of the proposed model.

Step	Implication	The Situation within the Organization
1a/1b	The vision, mission, and organizational goals are identified. They can be found on the company's website.	The company's vision integrates OS elements stating that "The company aims to become a world leader in the automotive industry, based on the principles of durability." The mission includes key elements, ranging from employees to caring for the community, customers, and suppliers.
1c	The importance of sustainability for the company	Within the discussions with the shareholders, a disposition towards the OS is noticed if improved financial results are also achieved.
1d	Status of previous reporting of sustainability	A check was carried out to see whether there was a previous sustainability report. There was an earlier report. Sustainability was reported between 2010–2019. The way of reporting differs. In the first years, a qualitative type assessment was carried out on the basis of evaluating the internal and external environment, whereas the GRI reporting was used in the last three years. The report is retained, and the team for the next stage is identified as being formed by the leaders of the production, development, warehouse, sales, financial-accounting, and human resource teams.
2a.	Data from the company is collected.	All data has been identified, and there is a representative for each domain.
2b	Environment domain €	A score of E = 4.0 is obtained. This value places the company above the average implications in the protection of the environment; however, actions for improvement are still necessary.

Table 10. *Cont.*

Step	Implication	The Situation within the Organization
2c	Financial stability domain (FS)	A score of FS = 3.8 is obtained. This score is average, meaning that financial stability can be improved.
2d	Developed partnerships domain (P)	A score of P = 5.4 is obtained. As can be observed for the development of partnerships, the company obtains an above average score, being proof of the good relationship with its partners.
2e	Organizational efficiency domain (EO)	A score of EO = 5.8 is obtained. Organizational efficiency is proven by the organization, the score being positioned in the upper half of the total implementation (towards the maximum of 7).
2f	Waste management capacity domain (WM)	A score of WM = 6.4 is obtained. The capacity for waste management obtains a maximum score, which means that this company has good waste management.
2g	Capacity to reduce production time domain (TR)	A score of TR = 4.4 is obtained. The capacity to reduce time positions the company slightly above the average maximum value of the domain.
2h	Greenhouse gas reduction (GHG) domain	A score of GHG = 3.0 is obtained. The value of the domain is lower, being evidence of generating a large quantity of greenhouse gases.
2i	Communication domain (C)	A score of C = 4.0 is obtained. Communication is positioned within the domains that need to be improved, due to the score obtained.
2j	The total score of OS is calculated (TOS)	TOS = 4.6. This obtained score, above average, highlights the fact that the organization has to improve some of its domains to reach the maximum value of 7.
3a, 3b	The team meets for the planning activity.	The team was reunited, and the mission was reformulated by adding elements related to equal opportunity at the workplace and ethics in promoting human resources.
3c	The proposed tools for implementing sustainable development are examined.	The tools used for implementing sustainable development were examined, and it was revealed that the following were used: 5S, Kanban, Kaizen, RCEP, problem solving, and waste management.
3d	The elements that need to be maintained, eliminated, or adapted are determined.	The elements that need to be maintained, eliminated, or adapted are determined. It is shown that communication needs to be intensified within the organization.
3e	The sustainability domains are prioritized.	The sustainability domains are prioritized, with the domain of "organizational efficiency" being established as the most important.
3f	The action plan is transcribed.	The action plan is transcribed and aligned with the specificity of the organization. A new report was obtained, which will be implemented within the organization.

7. Discussion

By using the previously presented model with the three experts who moderated the three focus groups, the following deficiencies of the proposed model were found: the interests of the shareholders must be concatenated with the OS priorities, the tool does not include its own procedures related to the OS, and the transcription of the plan may take longer. To address these changes, the authors will develop an open-access online platform. Following the research, it is observed that the companies in the automotive industry are aware of the organizational sustainability as long as there are legislative regulations, demands from the collaborators, or financial benefits. The facilitators of the three focus groups challenged members of the focus groups to answer the challenges of specific questions for each group (three questions). These questions were selected based on the previous answers and based on the experience of the facilitators. The main benefits obtained by the organizations were: increasing the quality of processes, work standardization, and increasing recycling capacity. The meetings have

outlined that the benefits of OS exist, but in most cases, costs, time, and the lack of knowledge lead to a lack of implementing the concept. Conducting external training, OS education in higher education, or open collaboration of organizations with universities could contribute to increase the interest of organizations for OS and reduce costs (with education and the barrier of a new concept for employees).

From the perspective of the obtained results, it can be noticed that:

- Compared with some models [18,25], the proposed one emphasizes the need for environmental impact assessment in order to improve environmental indicators;
- The proposed model uses the experience of specialists from the automotive industry to define the indicators and the domains that need to be evaluated [18,25,45];
- Evaluating elements of strategic management (starting from vision, mission, to objectives) is important for proposing a new model [49];
- Appreciating the level of maturity of the company, strategic planning, and the stakeholders' interest are important dimensions for organizational sustainability;
- The 15 proposed principles cover the 2030 Agenda principles, and they identify themselves with the objectives of the companies from the automotive industry;
- Stakeholder models show that the interests of OS are different, as shareholders should be interested directly in sustainability. Their direct interest could lead to improving financial results if we take into consideration a longer period of time;
- The three conducted focus groups with employees from the automotive industry, have highlighted that: over 80% of participants were aware of the sustainability concept, the training part was mainly done by self-education, the tools used for OS are numerous (ranging from implemented international standards to clean production tools such as lean), and the stakeholders target financial results;
- From the conducted focus groups, it can be concluded that most organizations are aware of organizational sustainability as long as it is required by environmental regulations (e.g., waste management) and ISO standards, which are the norm in the auto industry and in situations where a friendly behavior towards the environment is considered economically beneficial for the company;
- Another important aspect is the one related to the economic benefits. In the case of the OS approach within the organizations, economic benefits are usually recorded (decent work and economic growth; industry innovation and infrastructure; and responsible consumption and production; process and material losses reduction, increasing resource efficiency and customer satisfaction, cost reduction and increasing product quality, productivity improvement and company image improvement, et al.). In the event that these economic benefits would not exist, the interviewees appreciated that the organizational involvement would be minimal or lacking. The implications of organizations for sustainable practices exist, as long as there are economic benefits;
- The results obtained within the focus groups underly the knowledge development basis for the proposed sustainable development model;
- Validating the tool within one of the most important companies of the automotive industry has strengthened the correctness of the proposed logic and has helped make modifications related to: the number of indicators used for each domain. These indicators are taken over from the GRI type reporting of sustainability;
- For large multinational companies, the implementation and execution of the concept is usually done at the headquarters areas. That is why the decision to use a new model must be accompanied by a strong motivational driving force;
- The free use of a proposed model can be, for starters, a good motivational driving force for companies in the automotive field;

- For the multinational companies in the automotive field, the concept of sustainable development is a well-known one. The decisions of the implementation of the different concepts are made in headquarters, where the know-how is supported;
- Developing sustainable strategies is a priority for these companies;
- The homogeneity of the groups has led to expected results that outline the idea that these companies are open to aligning with international imperatives as long as they have an economic benefit;
- The barriers in implementing the proposed model are relative to the motivational factors and to the communication with the headquarters of the companies;
- The economic benefits are the imperatives that contribute to implementing the concept of sustainable development in organizations;
- The shareholders of multinational companies must be convinced of the economic benefits of OS.

8. Conclusions

In this article, we have demonstrated the benefits of sustainability in economic, social, and environmental areas [28]. Even if sometimes assessing sustainability can be difficult, the resulted benefits will source a lasting competitive advantage. Evaluation is sometimes difficult because there may be a number of barriers, such as lack of staff training, too much time spent on one evaluation, lack of trust by employees in sustainability, and others. These aspects listed here have also been encountered in the current case study evaluation.

Using focus groups as a research method for the concept of OS has proved to be very efficient because, during the debates, the respondents were encouraged to participate with as many opinions as possible. Within these focus groups, over 80% of the stakeholders were aware of the importance of sustainable development, but they would only implement it if it enabled economic benefits. Depending on the field of activity and vision of the company, numerous and varied methods and tools are applied by companies to improve the efficient use of resources. The implementation of some tools or concepts in large organizations is done at headquarters, which is usually outside of Romania. That is why, in these companies, a number of concepts related to organizational competitiveness are already implemented. The concept of sustainability is known in the automotive field, which is why the use of focus groups was a good choice for identifying the main directions to be included in the proposed tool. This tool has been validated on a well-known company, but in the future, extending this framework to the level of several industries is considered, and its evaluation will be performed exclusively online based on identification data that will also retain the organization's history (previous sustainability reports). Validating this variant contributes to broadening the horizon of research and lays the foundation for the research team to develop an integrated tool applied across different industries.

The concept of sustainable development is not fully defined yet, and there are no concrete indicators set, which is why these debates have led to the configuration of eight domains comprising the 80 evaluated indicators. The established domains are related to the three responsibilities and contribute to a better understanding of the evaluation process [60,61].

Companies from the automotive sector are among those that generate a large amount of greenhouse gases. Therefore, the implementation of various actions for the protection of the environment and the efficiency of these related activities are demanded by stakeholders. OS is a well-known concept in these companies. There are a number of tools to enhance the capacity for sustainable development, but there is no universal model for OS assessment. Therefore, this paper proposes a model for this industry whilst future research will aim to develop other models applicable in other industries, based upon the current proposed model.

Author Contributions: All authors contributed equally to the research presented in this paper and to the preparation of the final manuscript.

Funding: This work was partially supported by research grant GNaC2018-ARUT, no. 1359/01.02.2019, financed by Politehnica University of Timisoara. Project financed from Lucian Blaga University of Sibiu research grants LBUS-IRG-2018-04.

Acknowledgments: The authors want to acknowledge the support of Politehnica University of Timisoara, Faculty of Management in Production and Transportation, and Management Department, Department of Industrial Engineering and Management, Faculty of Engineering, Lucian Blaga University of Sibiu, Academy of Romanian Scientists for administrative and technical support, for the use of the infrastructure, for allowing to create a new tool for research and didactic use. We want to also acknowledge the support of industry in the region for helpful discussions and survey responses.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Cioca, L.-I.; Ivascu, L.; Rada, E.C.; Torretta, V.; Ionescu, G. Sustainable Development and Technological Impact on CO_2 Reducing Conditions in Romania. *Sustainability* **2015**, *7*, 1637–1650. [CrossRef]
2. Prashar, A. Towards sustainable development in industrial small and Medium-sized Enterprises: An energy sustainability approach. *J. Clean. Prod.* **2019**, *235*, 977–996. [CrossRef]
3. Arruda, L.R.; de Jesus Lameira, V.; Quelhas, O.L.G.; Pereira, F.N. Sustainability in the Brazilian heavy construction industry: An analysis of organizational practices. *Sustainability* **2013**, *5*, 4312–4328. [CrossRef]
4. Chang, D.S.; Chen, S.H.; Hsu, C.W.; Hu, A.H. Identifying strategic factors of the implantation CSR in the airline industry: The case of Asia-Pacific airlines. *Sustainability* **2015**, *7*, 7762–7783. [CrossRef]
5. Garcia-Torres, S.; Rey-Garcia, M.; Albareda-Vivo, L. Effective Disclosure in the Fast-Fashion Industry: From Sustainability Reporting to Action. *Sustainability* **2017**, *9*, 2256. [CrossRef]
6. Batista, A.A.D.S.; Francisco, A.C.D. Organizational Sustainability Practices: A Study of the Firms Listed by the Corporate Sustainability Index. *Sustainability* **2018**, *10*, 226. [CrossRef]
7. National Institute of Statistics, Statistical Data. Available online: http://statistici.insse.ro:8077/tempo-online/ (accessed on 27 August 2019).
8. Patón-Romero, J.D.; Baldassarre, M.T.; Rodríguez, M.; Piattini, M. Application of ISO 14000 to Information Technology Governance and Management. *Comput. Stand. Interfaces* **2019**, *65*, 180–202. [CrossRef]
9. Simoes, P.; Marques, R. On the economic performance of the waste sector. A literature review. *J. Environ. Manag.* **2012**, *106*, 40–47.
10. Tăucean, I.M.; Tămășilă, M.; Ivascu, L.; Miclea, Ș.; Negruț, M. Integrating Sustainability and Lean: SLIM Method and Enterprise Game Proposed. *Sustainability* **2019**, *11*, 2103. [CrossRef]
11. Bogardus, E. The group interview. *J. Appl. Sociol.* **1926**, *10*, 372–382.
12. Merton, R.; Fisk, M.; Kendall, P. *The Focused Interview: A Report of the Bureau of Applied Social Research*; Columbia University: New York, NY, USA, 1956.
13. Kitzinger, J. The methodology of Focus Groups: The importance of interaction between research participants. *Sociol. Health Illn.* **1994**, *16*, 104–121. [CrossRef]
14. Morgan, D.L. Focus Groups. *Annu. Rev. Sociol.* **1996**, *22*, 129–152. [CrossRef]
15. Skop, E. The Methodological Potential of Focus Groups in Population Geography. *Popul. Space Place* **2006**, *12*, 113–124. [CrossRef]
16. Giannetti, B.F.; Sevegnani, F.; Almeida, C.; Agostinho, F.; Moreno, R.R.; Liu, G.G. Five sector sustainability model: A proposal for assessing sustainability of production systems. *Ecol. Model. J.* **2019**, *406*, 98–108. [CrossRef]
17. Säynäjoki, E.S.; Heinonen, J.; Junnila, S. The power of urban planning on environmental sustainability: A focus group study in Finland. *Sustainability* **2014**, *6*, 6622–6643. [CrossRef]
18. Opazo-Basáez, M.; Vendrell-Herrero, F.; Bustinza, O. Uncovering productivity gains of digital and green servitization: Implications from the automotive industry. *Sustainability* **2018**, *10*, 1524. [CrossRef]
19. Rodríguez-Olalla, A.; Avilés-Palacios, C. Integrating Sustainability in Organisations: An Activity-Based Sustainability Model. *Sustainability* **2017**, *9*, 1072. [CrossRef]
20. Siew, R.Y.J. A Review of Corporate Sustainability Reporting Tools (SRTs). *J. Environ. Manag.* **2015**, *164*, 180–195. [CrossRef]

21. Amui, L.B.L.; Jabbour, C.J.C.; de Sousa Jabbour, A.B.L.; Kannan, D. Sustainability as a Dynamic Organizational Capability: A Systematic Review and a Future Agenda toward a Sustainable Transition. *J. Clean. Prod.* **2017**, *142*, 308–322. [CrossRef]
22. Baviera-Puig, A.; Gómez-Navarro, T.; García-Melón, M.; García-Martínez, G. Assessing the Communication Quality of CSR Reports. A Case Study on Four Spanish Food Companies. *Sustainability* **2015**, *7*, 11010–11031.
23. Falle, S.; Rauter, R.; Engert, S.; Baumgartner, R.J. Sustainability Management with the Sustainability Balanced Scorecard in Smes: Findings from an Austrian Case Study. *Sustainability* **2016**, *8*, 545. [CrossRef]
24. Klewitz, J.; Hansen, E.G. Sustainability-oriented innovation of SMEs: A Systematic Review. *J. Clean. Prod.* **2014**, *65*, 57–75. [CrossRef]
25. Osterwalder, A.Y.; Pigneur, Y.; Tucci, C.L. Clarifying Business Models: Origins, Present, and Future of the Concept. *Commun. Assoc. Inf. Syst.* **2005**, *15*, 1–40. [CrossRef]
26. Pawar, K.S.; Beltagui, A.; Riedel, J.C.K.H. The PSO Triangle: Designing Product, Service and Organisation to Create Value. *Int. J. Oper. Prod. Manag.* **2009**, *29*, 468–493. [CrossRef]
27. Hoerisch, J.; Freeman, R.E.; Schaltegger, S. Applying Stakeholder Theory in Sustainability Management Links, Similarities, Dissimilarities, and a Conceptual Framework. *Organ. Environ.* **2014**, *27*, 328–346. [CrossRef]
28. Apte, S.; Sheth, J. Developing the Sustainable Edge. *Lead. Lead.* **2017**, 48–53. [CrossRef]
29. Poponi, S.; Colantoni, A.; Cividino, S.R.; Mosconi, E.M. The Stakeholders' Perspective within the B Corp Certification for a Circular Approach. *Sustainability* **2019**, *11*, 1584. [CrossRef]
30. Iamkovaia, M.; Arcila, M.; Cardoso Martins, F.; Izquierdo, A. Sustainable Development of Coastal Food Services. *Sustainability* **2019**, *11*, 3728. [CrossRef]
31. Canh, N.T.; Liem, N.T.; Thu, P.A.; Khuong, N.V. The Impact of Innovation on the Firm Performance and Corporate Social Responsibility of Vietnamese Manufacturing Firms. *Sustainability* **2019**, *11*, 3666. [CrossRef]
32. Jasinski, D.; Meredith, J.; Kirwan, K. A Comprehensive Review of Full Cost Accounting Methods and Their Applicability to the Automotive Industry. *J. Clean. Prod.* **2015**, *108 Pt A*, 1123–1139. [CrossRef]
33. Wu, S.; Guo, J.; Shi, G.; Li, J.; Lu, C. Laboratory-Based Investigation into Stress Corrosion Cracking of Cable Bolts. *Materials* **2019**, *12*, 2146. [CrossRef] [PubMed]
34. Van Belleghem, B.; van den Heede, P.; van Tittelboom, K.; de Belie, N. Quantification of the Service Life Extension and Environmental Benefit of Chloride Exposed Self-Healing Concrete. *Materials* **2017**, *10*, 5. [CrossRef] [PubMed]
35. Ramos, T.B.; Caeiro, S. Meta-performance Evaluation of Sustainability Indicators. *Ecol. Indic.* **2010**, *10*, 157–166. [CrossRef]
36. Rezaee, Z. Corporate sustainability: Theoretical and Integrated Strategic Imperative and Pragmatic Approach. *J. Bus. Inq.* **2017**, *16*, 60–87.
37. Olugu, E.U.; Wong, K.Y.; Shaharoun, A.M. Development of Key Performance Measures for the Automobile Green Supply Chain. *Resour. Conserv. Recycl.* **2011**, *55*, 567–579. [CrossRef]
38. Steen, B. *A Systematic Approach to Environmental Priority Strategies in Product Development (EPS): Version 2000-General System Characteristics*; Centre for Environmental Assessment of Products and Material Systems: Goteborg, Sweden, 1999.
39. Arena, M.; Azzone, G.; Conte, A. A Streamlined LCA Framework to Support Early Decision Making in Vehicle Development. *J. Clean. Prod.* **2013**, *41*, 105–113. [CrossRef]
40. Benoît, C.; Norris, G.A.; Valdivia, S.; Ciroth, A.; Moberg, A.; Bos, U.; Prakash, S.; Ugaya, C.; Beck, T. The Guidelines for Social Life Cycle Assessment of Products: Just in Time! *Int. J. Life Cycle Assess.* **2010**, *15*, 156–163. [CrossRef]
41. Subic, A.; Koopmans, L. Global Green Car Learning Clusters. *Int. J. Veh. Des.* **2010**, *53*, 36–53. [CrossRef]
42. Akadiri, P.O.; Olomolaiye, P.O. Development of Sustainable Assessment Criteria for Building Materials Selection. *Eng. Constr. Archit. Manag.* **2012**, *19*, 666–687. [CrossRef]
43. Aravossis, K.G.; Kapsalis, V.C.; Kyriakopoulos, G.L.; Xouleis, T.G. Development of a Holistic Assessment Framework for Industrial Organizations. *Sustainability* **2019**, *11*, 3946. [CrossRef]
44. Motamedi, P.; Bargozin, H.; Pourafshary, P. Management of Implementation of Nanotechnology in Upstream Oil Industry: An Analytic Hierarchy Process Analysis. *J. Energy Resour. Technol.* **2018**, *140*, 052908. [CrossRef]
45. Abu-Rayash, A.; Dincer, I. Sustainability assessment of energy systems: A novel integrated model. *J. Clean. Prod.* **2019**, *212*, 1098–1116. [CrossRef]

46. Ahmadi, H.B.; Kusi-Sarpong, S.; Rezaei, J. Assessing the social sustainability of supply chains using Best Worst Method. *Resour. Conserv. Recycl.* **2017**, *126*, 99–106. [CrossRef]
47. An, D.; Xi, B.; Ren, J.; Ren, X.; Zhang, W.; Wang, Y.; Dong, L. Multi-criteria sustainability assessment of urban sludge treatment technologies: Method and case study. *Resour. Conserv. Recycl.* **2018**, *128*, 546–554. [CrossRef]
48. Andriantiatsaholiniaina, L.A.; Kouikoglou, V.S.; Phillis, Y.A. Evaluating strategies for sustainable development: Fuzzy logic reasoning and sensitivity analysis. *Ecol. Econ.* **2004**, *48*, 149–172. [CrossRef]
49. Coss, S.; Rebillard, C.; Verda, V.; Le Corre, O. Sustainability assessment of energy services using complex multi-layer system models. *J. Clean. Prod.* **2017**, *142*, 23–38. [CrossRef]
50. Svensson, G.; Ferro, C.; Høgevold, N.; Padin, C.; Varela, J.C.S.; Sarstedt, M. Framing the triple bottom line approach: Direct and mediation effects between economic, social and environmental elements. *J. Clean. Prod.* **2018**, *197*, 972–991. [CrossRef]
51. Zhao, L.; Zha, Y.; Zhuang, Y.; Liang, L. Data envelopment analysis for sustainability evaluation in China: Tackling the economic, environmental, and social dimensions. *Eur. J. Oper. Res.* **2018**, *275*, 1083–1095. [CrossRef]
52. Tan, Y.; Shuai, C.; Jiao, L.; Shen, L. An adaptive neuro-fuzzy inference system (ANFIS) approach for measuring country sustainability performance. *Environ. Impact Assess. Rev.* **2017**, *65*, 29–40. [CrossRef]
53. Mani, M.; Johansson, B.; Lyons, K.W.; Sriram, R.D.; Ameta, G. Simulation andanalysis for sustainable product development. *Int. J. Life Cycle Assess.* **2013**, *18*, 1129–1136. [CrossRef]
54. Marchese, D.; Reynolds, E.; Bates, M.E.; Morgan, H.; Clark, S.S.; Linkov, I. Resilience and sustainability: Similarities and differences in environmental management applications. *Sci. Total Environ* **2018**, *613–614*, 1275–1283. [CrossRef]
55. Mayyas, A.; Qattawi, A.; Omar, M.; Shan, D. Design for sustainability inautomotive industry: A comprehensive review. *Renew. Sustain. Energy Rev.* **2012**, *16*, 1845–1862. [CrossRef]
56. McAuley, J.W. Global sustainability and key needs in future automotive design. *Environ. Sci. Technol.* **2003**, *37*, 5414–5416. [CrossRef] [PubMed]
57. Zhu, Q.; Lujia, F.; Mayyas, A.; Omar, M.A.; Al-Hammadi, Y.; Al Saleh, S. Production energy optimization using low dynamic programming, a decisionsupport tool for sustainable manufacturing. *J. Clean. Prod.* **2015**, *105*, 178–183. [CrossRef]
58. Donaldson, T.; Preston, L.E. The stakeholder theory of the corporation. Concepts, evidence, and implications. *Acad. Manag. Rev.* **1995**, *20*, 65–91. [CrossRef]
59. Dreyer, L.C.; Hauschild, M.Z.; Schierbeck, J. Characterisation of social impactsin LCA. Part 2: Implementation in six company case studies. *Int. J. Life Cycle Assess.* **2010**, *15*, 385–402. [CrossRef]
60. Efroymson, R.A.; Dale, V.H.; Kline, K.L.; McBride, A.C.; Bielicki, J.M.; Smith, R.L.; Parish, E.S.; Schweizer, P.E.; Shaw, D.M. Environmental indicators of biofuel sustainability: What about context? *Environ. Manag.* **2013**, *51*, 291–306. [CrossRef]
61. Ekener-Petersen, E.; Moberg, A. Potential hotspots identified by social LCAe Part 2: Reflections on a study of a complex product. *Int. J. Life Cycle Assess.* **2013**, *18*, 144–154. [CrossRef]