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The Impact of Sustainability on the Labour Market and Employability in the Construction Industry

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Abstract: The present article analyses how the changes in the labour market are impacting employability, within the context of sustainability, with a special focus on the construction industry. This paper explores the relevance of employability in the construction industry, in an economy that is more and more oriented towards sustainable practices. The added value of the present paper resides in the proposed methodology that includes identifying and ranking the sustainability indicators that contribute to a sustainable employability model. The main objective of this research is to highlight the importance of sustainability in terms of training and preserving the specific competencies for the construction industry labour market, which is an essential sector for the transition to a green economy. The methodological innovation of the present study is that it proposes a model for the assessment of the sustainability indicators, thus offering a practical and ready-to-use framework for decision-makers in the industry. These indicators, which influence sustainability in the long term, were analysed from the viewpoint of the construction industry in Romania. This study used secondary statistical data, with a focus on the evolution of employability and of the professional training of graduates in this field of activity. The conclusion of the analysis is that a sustainable employability model should be implemented that meets the needs of the contemporary labour market and ensures an effective transition to a green economy. Implementing sustainable strategies in the construction sector facilitates the transition to responsible practices that are adapted to the current requirements of the green economy.

Keywords: employability; sustainability; indicators; human resources sustainability; green economy

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1. Introduction

The concept of employability has extended beyond the ability of obtaining a workplace. Nowadays, employability involves developing a set of flexible competencies, the capacity to adapt to change, and, essentially, an understanding of the impact of sustainability on the labour market. The traditional employability models are no longer sufficient for explaining how complex higher education graduates' needs have become. The classical employability models are challenged by the need to integrate the sustainability principles, which are meant to ensure not only personal development but also a positive impact on the environment and the community [1]. Employability refers not only to the ability of finding a workplace but also to developing flexible and adaptable competencies that are essential when we refer to integrating the sustainability principles into the labour market.

In a world with more and more limited resources and where the impact of climate change is more and more obvious, sustainability education is becoming essential for

preparing the future generations of employees to cope with the challenges posed by the green economy. This type of education is not only a supplement to traditional training, but it represents a fundamental change in the way in which we are preparing students for the future [2]. Given the above, sustainability training should become a university cross-curricular element, so that undergraduate students should become active agents of sustainable development and contribute to a fairer and more responsible economy [3].

The present study aims to identify and rank the most important sustainability factors that have an impact on employability in the construction sector. The proposed model is meant to improve the training of future professionals so that they meet the requirements of a sustainability-oriented labour market.

Integrating sustainability into human resources and educational practices is not a mere theoretical requirement but a necessary reality of modern organisations. A sustainable approach to this new concept can offer companies a competitive advantage by creating a balanced and sustainable work environment, which should contribute to the employees' wellbeing and improve their employability in the long term. Sustainable human resources practices, such as respect for the employees, opening towards external perspectives, and continuity in staff training, are fundamental to organisational success in the contemporary world [4].

When implementing sustainable employability policies, numerous tensions may appear while attempting to promote the employment process according to such innovative policies. These tensions are related to the flexibility requirements imposed by the labour market and the employees' need for stability and commitment. The previously mentioned paradoxes reflect the complexity of work relations in the contemporary economy and highlight the need for finding a balance among the economic, social, and ecological interests in order to develop efficient human resources policies [5].

The present article aims to develop an integrated approach to the job sustainability concept with a focus on the construction industry. Within the context of the paradigm changes in the workplace, initiated especially during the COVID-19 pandemic and that triggered a reorientation towards more sustainable and adaptable practices, this article will try to provide an update on the importance of employability factors, taking work sustainability into account. Thus, sustainability indicators become an integral part of the training of future professionals, highlighting the manner in which they influence employability in the long term.

Additionally, the article proposes a way of ranking the various factors that influence employability, allowing for their updating depending on the profession, with special attention paid to the specific needs of the construction sector.

This ranking will make it possible to identify the critical factors that can be valorised by educational institutions and employees in order to develop sustainable strategies meant to increase employability and to train future professionals so that they meet the current and future requirements of the construction labour market that is now heading towards sustainable and responsible practices.

The limitations of the present paper are that the analysis is restricted to the construction sector and that the needs of this sector were identified from the indirect values obtained from public sources (Eurostat). Another limitation is that the analysis refers solely to the Romanian construction market and that the sustainability indicators were analysed using publicly available data. This limitation should be considered when assessing the degree to which the proposed model can be generalised. However, the added value of the present paper is that the result can be applied to all industries, as well as to companies.

2. Literature Review

Lately, sustainable construction projects have been promoted worldwide. The global environmental impact of the construction industry development is minimised by the implementation of sustainable construction practices [6]. These form the basis of three main characteristics: social welfare, environment protection, and economic prosperity. Social

welfare, security, safety, satisfaction, and comfort are related to human resources. Even if the concerns regarding the circular economy and sustainability have to do with the impact of commercial activities on the environment, an essential element is also job sustainability, given that it is the human resource that is developing this circular economy.

Human resources management practices are essential for any company and the more so for a company working in the human resources domain. The international developers and entrepreneurs who implement such practices enjoy increased labour productivity [7]. In most countries, the construction industry has a negative impact on the environment. To minimise it, the industry has attempted to implement sustainable practices throughout its production chain. It was thus noted that there was a lack of quantitative methodologies for assessing sustainability in the civil construction industry. The social and economic aspects are referred to more rarely than the environment [8].

Although social sustainability is extremely important in the circular economy process, this is often the most vague and less explicit dimension when it comes to practice [9]. This is due to the fact that social sustainability is a delicate aspect of sustainable development, and it has always been more difficult to evaluate it [10,11].

A relevant example is the transport infrastructure, which, just like the construction industry, may pose significant barriers to social cohesion and the local economic development, often leading to isolation and the decline in communities, since the infrastructure projects may have as effects the dislocation of residents, the loss of local businesses, and the degradation of properties, fragmenting communities and limiting people's access to necessary resources. Even if initially these transportation projects were meant to improve connectivity, they had major negative effects on vulnerable communities. This has led to the need for a sustainable approach to this type of project [12].

Nevertheless, it goes without saying that in order to ensure a long-term sustainable process, the human resource should also be managed and not only the economic capital and the impact of the activity on the environment [13].

Failure to observe the social aspects in the construction sector can lead to numerous risks that may later on compromise the activity that was carried out. Therefore, it is necessary to perform a realistic analysis of the needs of the human resource in the construction sector, including training and social needs.

The interest in the research on social sustainability is lagging behind the economic and environmental indicators. Finding a consensus among all interested parties in the construction field regarding the sustainability factors has been challenging [14]. Consequently, it is appropriate to develop an integrated approach at the international level regarding these indicators. To support the implementation of social sustainability and to offer a clear reporting and assessment framework, solid regulations are needed. The Directive of the European Union is a concrete example of a legislative measure meant to standardise the reporting of sustainability and to ensure that the sustainability initiatives are consistently and transparently implemented by all companies [15].

In Europe, towards the end of 2022, the European Union published Directive (EU) 2022/2464 of the European Parliament and of the Council on reporting the corporate sustainability indicators [15]. This Directive [15] amended Regulation (EU) no. 537/2014 [16], Directive 2004/109/EC [17], Directive 2006/43/EC [18], and Directive 2013/34/EU [19]. According to this Directive, starting with the 2024 financial year, companies with over 500 employees during the financial exercise will be obligated to report the environmental-, social-, and staff-related aspects; observance of human rights; fighting corruption and bribery; and the information specified in Art. 8 of the (EU) Regulation (EU) 2020/852 (Taxonomy Regulation) [20]. Starting with 2025, companies with over 250 employees will have the same obligation.

In Romania, Directive (EU) 2022/2464 of the European Parliament and the Council on corporate sustainability reporting, known as the Corporate Sustainability Reporting Directive (CSRD) [15], was transposed into the national legislation on January 26 through the Order of the Finance Ministry no. 85/2024 ("OMF 85/2024") [21].

Both in Europe and in Romania, the concept of work sustainability refers to the work conditions and the demographic evolution. Thus, the demographic evolution is the one that provides direction for studies and analyses on work sustainability. The areas of sustainability analysed and their indicators are used to ensure that industries behave responsibly. Within this context, the following indicators are relevant for the analysed industry: work conditions, physical and mental health, the dimension of work, the work–life balance, and the social and economic conditions. Active aging in the labour market is an extremely important aspect to be analysed because of the well-known demographic decline in the European Union. In order to implement the active aging concept into the workplace sustainability framework, the workplace sustainability notion should be redefined. In addition to the previously mentioned sustainability indicators, one can also mention the social sustainability indicators. These have been given less attention compared to the economic and environmental indicators [22]. Previous efforts concerning social sustainability have focused more on theoretical interpretations than on assessing the quantification. This is due to the fact that quantifying social sustainability is considered to be a daunting task since the indicators are disparate, which makes them even more confusing [22].

Certain studies have highlighted the need to develop human capital for the efficient implementation of the Construction 4.0 technologies, especially with respect to human–machine communication, data analysis, and cyber security. This highlights the importance of training and requalifying the workforce to address the lack of competencies and to allow for a faster transition to a digitalised system [23].

Blockchain technology can play an essential role in improving safety management processes in the construction industry. Using blockchain to manage the safety data makes it possible to have accessible, transparent, and traceable data, thus creating a safe and sustainable environment for all the entities involved in a construction project. Implementing Distributed Ledger Technology (DLT) offers a trustworthy architecture that ensures access to complete and timely information regarding the safety systems, thus contributing to the protection of both workers and the public. Blockchain provides an innovative solution for managing data in a decentralised manner, consolidating the trust and cooperation among all the actors involved [24].

Using the social sustainability indicators is part of the general sustainability index, the purpose of which is to offer a balanced and holistic view of the sustainability performance at the global level [25].

It is, however, necessary to complete these social indicators with others related to human resources. Applying the human resource sustainability indicators to an economic branch may help with making informed macroeconomic decisions and fill the possible gaps at both the macro and micro levels. Thus, the indicators offer information about both the sustainability performance and the direct and indirect impact of the economic activities on human resources.

Within this context, the organisations that perform their activity in the construction field are implementing ecological practices for managing human resources in order to gain a competitive advantage [26]. As such, human resources management should focus on employees' green competencies. Lately, the ecological management of human resources has started considering green competencies as a crucial requirement for organisations so that they achieve environmental performance.

Nowadays, companies must cope with environmental challenges more than ever, and this is putting a lot of pressure on them. Organisations admit that incorporating green principles into human resources practices has the potential to allow for tackling environmental concerns. The analysis of human resources sustainability can be integrated into the need of reducing the elements with an impact on the environment, but green human resources practices within organisations are in an incipient stage [27].

In addition to this, the analysis of human resources sustainability is a complex process that assesses the extent to which an organisation is managing its human capital in a

sustainable manner, both from the viewpoint of the employees and of the organisation's long-term objectives. In other words, human resources sustainability involves an analysis of the organisation's policies, practices, and culture.

3. Materials and Methods

3.1. Description of the Proposed Methodology

This study aims to establish the main sustainability indicators related to the human resource. These indicators can be taken into consideration in the circular economy.

The stages proposed for the present methodology are the following:

Stage 1: establishing the objectives and limitations accepted within the proposed model;

Stage 2: presenting the main indicators of human resources sustainability;

Stage 3: analysing and interpreting the existent statistical data regarding human resources in the construction industry;

Stage 4: establishing the required green competencies of employees in the construction field;

Stage 5: developing a model map by comparing it with the current requirements of the construction labour market and by assessing its consistency with the trends identified in the specialised literature.

Designing an integrated employability model adapted to the construction sector and incorporating sustainability elements brings a significant added value to the training of future professionals. Such a model contributes to the development of critical skills, both technical and social, which are necessary in a labour market that is ever more oriented towards sustainable practices. Likewise, the model supports the integration and use of digital technologies in the educational process, thus facilitating the transition from education to employment. In other words, the model has an impact on how relevant the graduates are to the current requirements of the construction industry, ensuring a more solid training for the challenges of the green economy and contributing to the competitiveness of the organisations by training employees capable of implementing sustainable practices.

The main objective of the present paper is to achieve an integrated approach to the job sustainability concept.

The present model is supported by the importance of the construction sector within the Romanian economy, which has been analysed using secondary data obtained from Eurostat [28]. This analysis can lead to a limitation of the model, but the map developed in the present article can be applied to any economy, at both the macro- and microeconomic levels.

The data obtained from the previously presented sources will be analysed from the viewpoint of regression and correlation. Regression was used to identify the links between the number of employees in the industry sector at the national level and the number of employees in the construction field at the national level. To support the results even further, the regression line was drawn, and the determination coefficient was calculated.

For the analysed values, the correlation coefficient was also calculated in order to establish the strength of the link between the analysed variables:

$$r = \frac{\sum_{i=1}^{n} (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_{i=1}^{n} (x_i - \overline{x})^2 \sum_{i=1}^{n} (y_i - \overline{y})^2}} \quad (1)$$

where

$x_i si y_i$ = the values of the analysed samples;

$\overline{x} si \overline{y}$ = the average values of the analysed samples.

The main areas for analysis while developing a job sustainability map are social sustainability at the economic level, employee satisfaction, and commitment. The social sustainability indicator may meet the needs of people who are 55+, but it is not enough for the younger generations. This is why we are proposing other domains that would

complete the previous analysis and meet these needs. These domains could fall into the categories of diversity and inclusion, work–life balance, workplace health and safety, personal development, and last but not least, the environment. These domains are presented in Figure 1:

Figure 1. Analysis domains.

The figure above showcases the domains to be analysed using the proposed indicators. Each domain was allotted several indicators considered to be relevant and impactful on the analysed industry. The proposed indicators may be used in any industry since they offer a horizontal approach and can be analysed in an integrated manner.

Thus, the structure of these indicators corresponding to the analysed domains is presented in what follows.

Social Sustainability involves analysing the following four indicators:

a Unemployment rate (UR): measures the proportion of the population looking for a job.
b Income inequality (II): measures the differences in income among various social groups.
c Poverty rate (PR): indicates the proportion of the population living below the poverty threshold.
d Access to adequate housing (AAH): evaluates the proportion of the population that lives in safe and healthy accommodations.

Employee Satisfaction and Commitment involves the analysis of the following three indicators:

a Staff turnover (ST): (The number of employees who left the company in a certain time interval)/(Average number of employees during the same period) × 100
b Commitment score (CS): calculated based on the answers to commitment surveys, using preestablished measuring scales.
c Net Promoter Score (NPS): The percentage of employees who would recommend the company/The percentage of employees who would not recommend the company

Diversity and Inclusion is determined by analysing the following indicators:

a Diversity index (DI): calculated based on a matrix that compares the distribution of the various demographic groups within the company with their distribution inside the general population or on the labour market.
b Promotion rate for women/minorities (PRW/M): (Number of promoted women/minorities)/(Total number of promotions) × 100

Work-life Balance involves the analysis of the following two indicators:

a Rate of use of holiday days (RUHD): (Total number of holiday days used)/(Total number of holiday days available) × 100

b Average number of extra hours worked per employee (ANEHWE): calculated as a sum of the extra hours worked by all the employees during a certain time interval divided by the number of employees.

Workplace Health and Safety is analysed based on the following two indicators:

a Rate of work accidents (RWA): (Number of work accidents during a certain period of time/Total number of hours worked during the same period) × 100

b Costs related to work accidents (CWA): the total amount of costs associated with work accidents during a certain period of time

Professional Development is also analysed by looking at the following indicators:

a Rate of participation in training programmes (RPTP): (Number of employees who took part in training programmes)/(Total number of employees) × 100

b Average time invested in professional development per employee (ATIPDE): calculated as a sum of the total time invested by all the employees in professional development divided by the number of employees.

Environmental Impact is one of the best known domains, and when analysing job sustainability, it is defined by two indicators:

a The carbon footprint per employee (CFE): calculated by dividing the total company CO_2 emissions by the number of employees.

b Water consumption per employee (WCE): calculated by dividing the total company water consumption by the number of employees.

A normalisation on a scale from 0 to 1 is carried out for each of the above indicators, where 1 is the best possible performance and 0 the weakest. This aspect is essential to establish the contribution of each indicator to the final score, irrespective of the measurement unit or the size of the indicators' absolute values. The normalisation (N) is carried out as follows:

$$\text{Positive indicators}: \ \mathrm{N} = \frac{Indicator\ value - possible\ minimum}{possible\ maximum - possible\ minimum} \quad (2)$$

$$\text{Negative indicators}: \ \mathrm{N} = 1 - \frac{Indicator\ value - possible\ minimum}{possible\ maximum - possible\ minimum} \quad (3)$$

Considering that the previously presented indicators are part of certain analysed domains, using the job sustainability map, one can calculate the job sustainability index. Thus, the index is structured by giving a relative weighting to the various aspects of sustainability, using a weighting system applied to each category as follows:

Social sustainability–35%;
Satisfaction and commitment–20%;
Diversity and inclusion–10%;
Work–life balance–10%;
Workplace heath and safety–10%;
Professional development–5%;
Environmental impact–10%.

The weighting allotted to each domain was determined by assessing the impact of each factor on the general job sustainability. Social sustainability received 35% because it plays a crucial role in the long-term stability and resilience of the workforce, through indicators such as the unemployment rate, income inequality, and poverty rate, with direct and substantial effects on each employee and the labour market in general. An economically stable workforce is more motivated and more productive, which is why this factor is essential for the sustainable development of the construction industry. Similarly, employee satisfaction and commitment were evaluated at 20%, since they have a significant effect on the employees' productivity and turnover. High levels of satisfaction and commitment lead to a higher employee retention rate, lower costs for recruitment and training, as well as to project continuity—all this being crucial in the construction sector, where projects often

extend over long periods of time and require stable teams. The remaining domains, such as diversity and inclusion, work–life balance, and workplace health and safety, each received 10%, thus reflecting their importance in ensuring a safe and fair workplace environment. Diversity and inclusion ensure the integration of different perspectives on decision making, fostering innovation and fairness. Work–life balance is extremely important for maintaining mental health and preventing burnout, thus indirectly supporting productivity. Workplace health and safety are fundamental requirements in the construction industry, where the physical risks are high, ensuring workers' protection and safety. Professional development, with 5%, has an indirect but significant impact on increasing employability, while environmental impact was evaluated at 10%, thus reflecting how important the contribution of companies is to reducing the ecological footprint. Professional development was allotted 5% although it does not have an immediate effect on daily productivity. Investing in employees' development is a guarantee that they are prepared to cope with future challenges, especially in a rapidly evolving industry with new technologies and sustainable practices.

In spite of the fact that the environmental impact has no immediate effect on job sustainability, the contribution to the company image and the alignment with the values of employees who are concerned about the environment have a role in improving the commitment and general satisfaction of the workforce.

Then, the scores will be calculated for each category by aggregating the normalised scores of its indicators, weighted according to the relative importance of each indicator within the category:

$$\text{Category score } S_c = \sum_{i=1}^{n} N_i x P_i \quad (4)$$

where

N_i = Normalisation for each i indicator;

P_i = indicator weighting.

The final calculation of the job sustainability index is the weighted sum of the scores for each category:

$$\text{Sustainability index} = \sum_{i=1}^{n} S_c x P_c \quad (5)$$

where

S_c = score per category;

P_c =weighting per category.

Afterwards, this sum is scaled so that it can be represented on a 0 to 10 scale, for a simple and intuitive interpretation:

$$\text{Final sustainability index} = \text{sustainability index} \times 10. \quad (6)$$

The strategies for the development of a green economy and the transition from conventional economic development models to the green economy have become necessary due to the negative impact of conventional economic development models on the local and global environment.

It is therefore necessary to develop tools that are easy to use and interpret by all those involved in the economic process. Within this context, all the information presented above can be represented as a job sustainability map. This map is based on the process map of ISO 9001:2015 standard [29], as presented in Figure 2.

Creating a job sustainability map was meant to present an overview of the analysed indicators. This map is all the more so relevant as it was designed based on the processes in the ISO 9001:2015 international standard [29], which is used to analyse the activities of companies, and the proposed indicators are closely linked to these activities and implicitly to human resources.

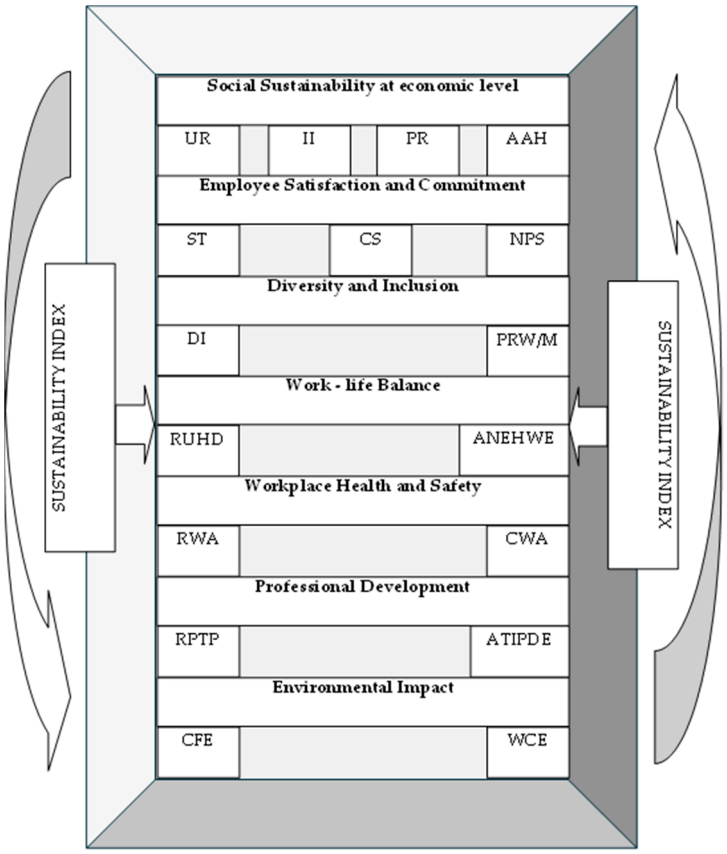

Figure 2. Job sustainability map.

3.2. Presentation of the Current Situation

In Romania, the construction industry is one of the representative industries. For the purpose of this analysis, we will consider residential and non-residential buildings, as well as the road and rail infrastructure and industrial construction.

According to Eurostat, between 2018 and 2023, the number of employees in the construction industry went up visibly, as can be seen in Table 1 [28]. The number of employees is given in thousands of people. To analyse the impact that the construction industry has on the employability rate and on higher education graduates, the present study used data supplied by Eurostat because they are the most complex and complete.

Table 1. Number of employees in the construction industry between 2018 and 2023.

2018	2019	2020	2021	2022	2023
502.1	533	552.9	595.5	605.5	646.8

As can be noticed, the number of employees in the construction industry experienced steady growth. At the national level, there were not any significant changes during the past years, as illustrated in Table 2.

Table 2. Number of employees at the national level between 2018 and 2023.

2018	2019	2020	2021	2022	2023
6447.6	6525.8	6445.5	6529.6	6607.9	6537.5

Additionally, according to Eurostat [24], between 2018 and 2022, the number of higher education graduates fluctuated, as presented in Table 3.

Table 3. Number of higher education graduates between 2018 and 2022.

2018	2019	2020	2021	2022
126,271	124,759	130,271	131,534	125,580

From the point of view of the number of graduates in the construction field, also according to Eurostat, we have the following values showcased in Table 4 [28]:

Table 4. Number of higher education graduates in the construction field between 2018 and 2022.

2018	2019	2020	2021	2022
54,366	58,798	56,922	58,542	53,056

Furthermore, in The National Records of Higher Education Qualifications (RNCIS), there is a greater number of programmes under code ISCED F 2013–0788, i.e., interdisciplinary programmes and qualifications, where undergraduate students allotted most of their time to engineering, manufacturing, and construction, code 0732–Buildings and Civil Engineering, code 0731–Architecture and Urban planning, and code 712–Technologies for the protection of the environment [30,31]. Table 5 comprises the information regarding the number of programmes included in RNCIS under code ISCED F 2013.

Table 5. Number of programmes in RNCIS under code ISCED F 2013.

ISCED 2013 F Code	0788	0732	0731	0712
No. of programmes	385	93	27	79

Among these programmes, the ones that include green or sustainability competencies are presented in Table 6.

Table 6. Number of programmes in RNCIS under code ISCED F 2013 that contain green or sustainability competencies.

ISCED 2013 F Code	0788	0732	0731	0712
No. of programmes	30	5	2	4

Integrating green competencies in universities is essential within the context of job sustainability. This is all the more so important because the construction sector is one of the most important and productive domains. The change in approach in the educational process by introducing digital games can trigger active learning, allowing students to explore various scenarios in a controlled environment. This approach may help graduates of technical universities develop useful skills and find innovative solutions for the construction industry [32].

In order to meet both the economic requirements and social development, progress in the construction field should be made by protecting the environment and promoting sustainability in the development process.

Green competencies refers to the ecological skills for the green economy. This is due to the fact that, while employees may have green competencies according to the description of green jobs, they may not necessarily use them. In this case, a green competence for green jobs is seen as a kind of "activator" of green competencies.

In Romania, green competencies involve evaluating the environmental impact of personal behaviour, adopting means of promoting biodiversity, and reducing the negative impact of consumption.

4. Results

In order to identify the degree of dependence of the construction industry, we analysed the dependence between the total number of employees in Romania and the ones in the construction industry. We carried out the same analysis for the relationship between the number of higher education graduates in the whole of Romania and the number of employees in the construction sector. To this effect, we used regression and correlation. These are two statistical concepts often used together, but with a different significance. Both deal with the relation between variables, but they offer different perspectives. Correlation measures the intensity and direction of the relation between two variables, showing how strong this is and if they vary together or in opposite directions, while regression, through the regression line, indicates the linear relationship between two variables.

Regarding the degree of dependence of employability in Romania on the number of employees in the construction industry, the regression line is presented in Figure 3.

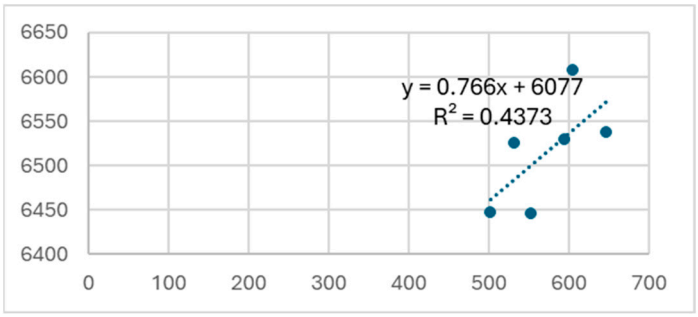

Figure 3. Regression (dependence of employability in Romania on the number of employees in the construction industry).

In this figure, one can see the degree of dependence between the number of employees at the national level and the number of employees in the construction industry. The value of the determination coefficient $R^2 = 0.4373$ indicates this degree of dependence. The value of this coefficient does not show a major dependence, because it does not come close to 1, but a significant one. In this situation, the correlation coefficient is r = 0.6613, indicating a moderately positive correlation, which shows a direct but not very strong relationship between the two variables. This means that once a variable increases, the other one also tends to go up, but not very strongly or steadily.

From the point of view of the number of higher education graduates in Romania and the number of graduates in the construction domain, we have a regression line as presented in Figure 4.

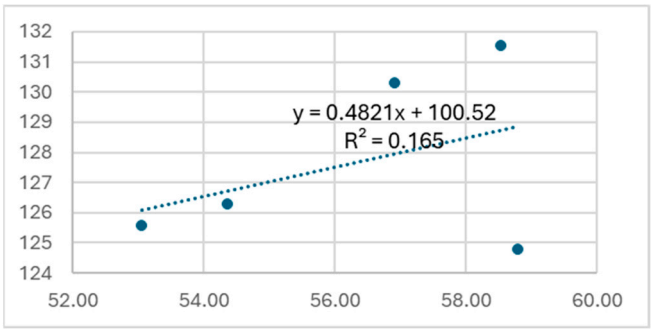

Figure 4. Regression (the number of higher education graduates in Romania and the number of graduates in the construction domain).

In Figure 4, we can notice the degree of dependence between the higher education graduates at the national level and the number of graduates in the construction industry.

The value obtained of $R^2 = 0.165$ shows this degree of dependence, which is not major, because it is close to 0. In this situation, the correlation coefficient is r = 0.406, which shows a weak positive correlation indicating a direct but not very strong relationship between the two variables. This means that once a variable increases, the other one tends to grow as well but not very strongly or steadily.

The above-mentioned model for calculating job sustainability is a tool that helps identify the strengths, weaknesses, and improvement potential of companies in terms of sustainable jobs.

Using regression and correlation allows us to better understand the complexity of the domain and how the other domains are dependent on it. It also helps one make informed decisions about managing human resources. By using these statistical methods, we can design more attractive curricula for students, which are better oriented to the requirements of the workforce in each economic field.

The model is based on the calculation of indicators with a view toward reaching a sustainable approach, and it is an initiative that was developed to help companies achieve real job sustainability. At the core of the model is the belief that job sustainability can be obtained from all the sectors of an organisation as long as a holistic vision is adopted and implemented consistently. Developing the model offers a real tool for applying sustainable practices within an organisation.

Figure 5 presents the described model in a synthetical way, offering an image of what we were trying to achieve.

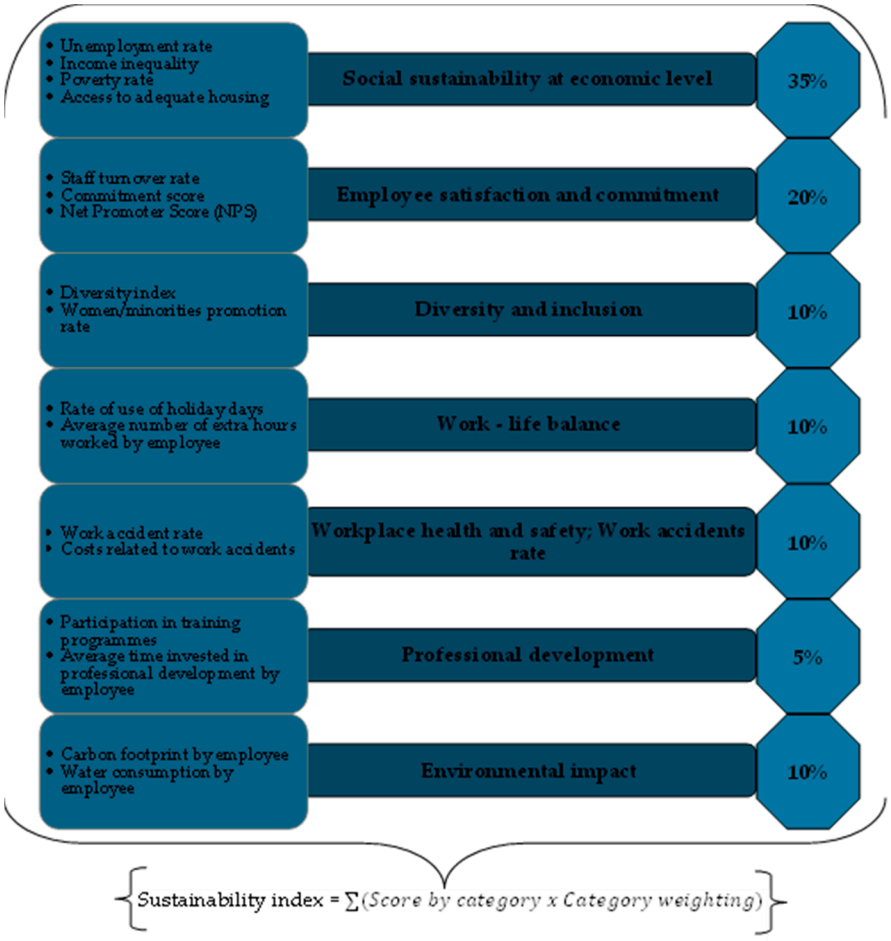

Figure 5. Model map.

5. Discussion

Labour force sustainability has become a growing priority for companies, employees, and society in general. This concept is all the more so important as it refers to the issues related to human resources management and the environment. At the same time, human resources sustainability brings major benefits to employees by improving their quality of life, increasing their morale and professional training. For a company, job sustainability has to do with improving its image, reducing costs, and enhancing innovation and competitiveness.

Numerous companies are developing their own policies to have the lowest possible impact on the environment. Their approach may include elements related to employee education with respect to sustainability, as well as implementing specific internal policies that represent the standard in the domain [33]. A constructive approach that can be applied in practice is represented by the integration of building information modelling (BIM) into human resources processes. BIM is a process that is currently being developed to manage the design, construction, operation, and maintenance of an installation, but it can also be integrated into human resources practices. It plays a significant role in architecture, engineering, construction, and exploitation. Within the organisations operating in the construction industry, it is not limited exclusively to adopting technological solutions, but it also involves adjusting the organisational culture and management strategies to facilitate their integration. The existence of a collaborative organisational culture and support from the top management are essential when it comes to adopting BIM by the industry [34].

Within this context, human resources sustainability has become a priority. Although there are several factors that may influence the way in which employees perceive their company's commitment to sustainability, no research has yet explored the way in which management can influence this perception [35]. The perception that management can influence the employees' image of the sustainability concept can be supported by the commitment of the top management of a company to job sustainability. Nowadays, the need for well-trained and sustainability-oriented employees is essential.

The aspects presented above are confirmed by the fact that the labour market is constantly changing. The need for labour force in the construction industry is high, and at this moment in Romania, more employees are needed than the higher education institutions and specialised high schools can supply. Additionally, construction engineering universities are becoming unattractive for students as they are considered to have a high degree of difficulty.

The elements of sustainability and sustainable development can be included in the university curricula, but the impact on the knowledge of future graduates does not depend only on the existence of such courses, and sometimes, the result may be unexpected because what matters more is students' interest rather than the contents of the courses [36].

Companies in the construction sector should actively include green competencies in the employees' training programmes through specific courses on energy efficiency, waste management, and the use of green technologies, so that they increase their capacity to adapt to sustainability requirements.

Most economies are affected by the low offer of qualified human resources, which represents a well-known engine of economic development and growth [23]. Introducing new technologies and concepts in the construction sector comes with more requirements in terms of the employees' knowledge and skills. This can be achieved by reviewing and redesigning the current university programmes and by the commitment of the management and professional training institutions to train and retrain the labour force.

The BIM assessment criteria vary considerably from region to region. The differences lie in how critically these criteria indicate the extent to which the necessary infrastructure and the organisational attitude toward the new technologies are vital factors for the implementation of BIM. However, their importance may be different depending on the economic and cultural context [37].

Additionally, using wearable sensors and machine-learning algorithms can significantly contribute to assessing and reducing ergonomic risks related to the manual handling of materials. The analysis based on sEMG and machine learning may detect dangerous moves with a high accuracy level, thus contributing to improving workplace health and security in the construction industry [38].

Some of the impediments that may appear in terms of sustainability, especially in the construction industry, could be eliminated by using technologies that allow the implementation of a hybrid work system, including aspects that would make it possible to incorporate the work-from-home system into the work process. Hybrid or entirely work-from-home systems have a positive impact on the environment by eliminating several negative factors [39].

Informatic systems can significantly contribute to the sustainability of hybrid jobs, offering improved access to the necessary resources to ensure employees' physical and mental health and facilitating social interaction, even in the case of remote working. Thus, using informatic systems to improve remote working sustainability by optimising the information flow and supporting the employees in managing their workload reduces the feeling of professional isolation [31].

Obviously, in the construction field, this is not possible for most of the activities included in the work process, but certain technological implementations would allow a certain staff category to work remotely [40]. Controlling the equipment through the internet using specially trained staff for this type of activity is a reality in several economic domains.

The previously presented methodology can be extended to other industries. For example, the concept of fairness in the transport industry plays an essential role in ensuring fair access to basic services, especially within the context of urbanisation. A generalised framework can be used to assess the impact of infrastructure on fairness, taking into account the accessibility and its related costs. Applying such an approach in the construction sector may help promote a fair distribution of employment resources and opportunities [41].

Although the proposed model was applied to the specific context of Romania, it can be extended and adapted to a global level. In other countries, factors such as the legal regulations, social policies, and economic conditions can influence the results significantly. For example, in countries with more advanced social policies and a higher degree of automation and use of green technologies, the professional development and environmental impact indicators may have a higher weighting. In this way, the model can be adjusted to reflect the economic and social environment specific to each country, ensuring increased relevance and adapted applicability.

6. Conclusions

The present paper aimed at developing a complex and compact model in order to identify a job sustainability indicator. One should mention that in the current economic context, using such an indicator is essential because the world economy is confronted with an acute lack of qualified staff. This need is also reflected in the previously presented statistical data, which indicate that the number of employees at the national level is decreasing and so is the number of undergraduates, in spite of the fact that Romania is in need of employees in the construction industry given its infrastructure deficit.

Factors such as the lack of adequate financing for innovations in the field of green technologies, inadequate long-term green strategies policies, and inappropriate political will are some of the weak points. In conclusion, it is imperative that decision-makers should develop strategies that will lead to a better use of human resources and should give priority to scientific and technological education in order to support green economy development.

Future research directions should focus on a joint approach allowing for assessing the long-term effects of integrating sustainability into construction practices, as well as on designing concrete policies to support the green transition in this sector.

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