

## Article

# Measuring Sustainable Entrepreneurship and Eco-Innovation: A Methodological Proposal for the Global Entrepreneurship Monitor (GEM)

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**Abstract:** After the UN's adoption of 17 Sustainable Development Goals in 2015, it became clear that the relationship between sustainability and entrepreneurship was an area for re-examination. Traditional measures of entrepreneurial success rested largely on economic indicators; observatories like the Global Entrepreneurship Monitor (GEM) extended them, including cultural and social indicators. There is now a real need to measure and analyze the relationship between sustainable entrepreneurship and eco-innovation and drive positive economic activity outcomes, sustainable development, and social welfare. For GEM's consideration, this paper proposes a reimagined tool by which to measure sustainable entrepreneurship and eco-innovation in businesses and assess their level of alignment with UN SDGs. Specifically, it presents a new measurement method, incorporating, but simplifying, a complex range of variables, which can be crystallized into a set of items (questions) to determine businesses' commitment to entrepreneurship sustainability—social, economic, and environmental. The results can be cross-referenced with other relevant variables, and indicators proposed by the UN, to determine what causal or explanatory relationships might or might not exist. The proposal represents a valuable extension to existing data gathering tools, and will be of use to researchers and practitioners in the field of entrepreneurship—especially as its sustainability credentials and environmental impact are in the spotlight.

**Keywords:** sustainable entrepreneurship; eco-innovation; Global Entrepreneurship Monitor (GEM); United Nations



**Citation:** Roomi, M.A.; Saiz-Alvarez, J.M.; Coduras, A. Measuring Sustainable Entrepreneurship and Eco-Innovation: A Methodological Proposal for the Global Entrepreneurship Monitor (GEM). *Sustainability* **2021**, *13*, 4056. <https://doi.org/10.3390/su13074056>

**Academic Editors:**  
Miguel-Angel Galindo-Martin,  
María-Teresa Méndez-Picazo and  
María-Soledad Castaño-Martínez

Received: 4 March 2021

Accepted: 1 April 2021

Published: 6 April 2021

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## 1. Introduction

In 2015, the General Assembly of the United Nations (UN) adopted the 2030 Agenda for Sustainable Development to promote a significant world transformation. This Agenda, following the document approved as a basis for its implementation, constitutes “a plan of action for people, planet, and prosperity.” The General Assembly recognized that “eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development” (United Nations Assembly, 2015).

The 17 Sustainable Development Goals (SDGs) and 169 targets announced at the Agenda are integrated and indivisible and balance the three dimensions of sustainable development: the economic, the social, and the environmental. The goals and targets will stimulate action over the next 15 years in areas of critical importance for humanity and the planet. One of the 17 SDGs is related to Prosperity. In this respect, the Agenda states: “We are determined to ensure that all human beings can enjoy prosperous and fulfilling

lives and that economic, social and technological progress occurs in harmony with nature” (United Nations Assembly, 2015).

Regarding the relationship between sustainability and entrepreneurship, the UN 2030 Agenda for Sustainable Development states that the focus should be on making better use of economic resources and promoting socio-economic stability and business competition by optimizing economic goods and services to attain environmental sustainability. Environmental-related skills must also meet consumers’ needs, while minimizing their impact on nature by identifying sustainable organizational processes, implementing business strategies focused on environmental preservation, and envisioning business processes that would be environmentally friendly.

Firms need a robust and stable economy as the basis for innovation and investment, on which future jobs depend. Although SDGs have favored more responsible social, institutional, and business behaviors through sustainable entrepreneurship [1], firms apply traditional economic performance measures linked to gross domestic product (GDP). This is defined as the total value of all goods and services produced by a nation during a given year and, when divided by the population, gives rise to GDP per capita. However, traditional economic indicators do not provide an adequate measure of an economy’s sustainability, nor of its environmental problems caused by energy consumption, pollution, and waste. High-income economies should finance new initiatives and technologies to reduce environmental damage, and propose new economic indicators, mainly linked to transportation, water consumption, waste production, and consumer expenditure, to measure environmental management and impact.

Sustainable entrepreneurship is consistently recognized as an important engine for economic and non-economic development, a driver of job creation, and a supplier of innovative products and services (e.g., [2–4] and many others). It is, without doubt, one of the areas requiring essential changes so it can be aligned with the UN 2030 Agenda for Sustainable Development’s goals.

In the years before the COVID-19 pandemic, entrepreneurship has been studied from traditional perspectives. This implies that issues such as the measurement and study of sustainable entrepreneurship, and the adoption of eco-innovation have not yet been appropriately incorporated into the Global Entrepreneurship Monitor (GEM) project’s information tools, measuring entrepreneurial activity and its characteristics on a larger international scope. In 2021, GEM began to insert some specific questions related to social, economic, and environmental SDGs, but there is a need for more reflection and ambitious coverage of these areas. For this reason, this paper has been written to raise a proposal for GEM’s consideration, which includes new variables capable of providing useful and more adjusted data about these components that are now essential to achieving the objectives set in the UN 2030 Agenda.

When it began in 1999, GEM’s first mission was to bridge the information gap with regard to entrepreneurial activity in economies, at the national and international levels. Today, GEM provides data by measuring the proportion of adult populations involved in different entrepreneurial activity stages: potential or intended, nascent, new or established, and discontinued. It provides vital information on many indicators, including social values related to entrepreneurship, entrepreneurial affiliations and capabilities, informal investment indicators, and contextual information where entrepreneurs operate.

Over time, GEM has developed its observatory mechanism and broadened its spectrum of analysis, extending it to gender analysis, entrepreneurial education, innovation and growth, intrapreneurship, social entrepreneurship, family businesses, and others. In general, GEM is always attentive to changes occurring in the field of entrepreneurship and, thanks to the flexibility of its data information tools, it has incorporated data related to a range of topics and has developed a specific and differential product to measure the main indicators that make up an entrepreneurial ecosystem, even at the subregional level.

The objective of our work is to propose, in this paper, an indirect approach to measure the relationship between sustainable entrepreneurship and eco-innovation by using tradi-

tional and new GEM variables. The goal is to collect updated data to search, explore, and examine the relationship between sustainable entrepreneurship and eco-innovation, and lay the foundations for positively impacting economic activity, sustainable development, and social welfare. Currently, the main obstacle to achieving this goal is the lack of large-scale information to measure the effects and impacts of sustainable entrepreneurship and eco-innovation. Our methodological proposal aims to help future public policy designers, researchers, practitioners, and other social agents by showing them how entrepreneurs promote progressive changes and how they approach and develop business opportunities. They will then be able to adjust their approach when measuring entrepreneurship and established firms that are already working, and determine to what degree they are in line with the UN objectives, or take actions to become so.

## 2. Sustainable Entrepreneurship, Eco-Innovation, and GEM

Traditionally, the mission of entrepreneurs has been to detect opportunities that will lead to business initiatives, to produce goods and services that satisfy needs and, in many cases, improve the current offer through reinvention and innovation. However, their activities do not necessarily imply that positive social values will be created or that the environment will be respected or improved as a result. Authors from the 1990s (e.g., [5–7] and others) and the beginning of the new millennium—e.g., [8–10]—stressed that market inefficiency was the result of entrepreneurial activity that generated environmental damage, often with an associated negative social impact. As there was no observatory mechanism (such as GEM), or data on entrepreneurial activity, as there is today, this literature focused mostly on entrepreneurship in industrial and highly polluting sectors.

As opposed to this vision, we argue that nowadays, different types of entrepreneurship have been identified. Entrepreneurs' primary objective can be to satisfy an unfulfilled need or improve the way in which the need is currently satisfied. Other purposes might be to create a job to provide a livelihood (necessity entrepreneurship), introduce innovations, develop new lines for established firms (corporate entrepreneurship or intrapreneurship), and others, social entrepreneurship included. Focused on two broad trends or lines of research: the study of not-for-profit organizations and the area of business ethics [11], social entrepreneurship can be defined as a sort of entrepreneurship focused on achieving socio-economic improvement to benefit the population in need by supplying them with products and services, offering employment for the disadvantaged, or implementing activities that contribute to social progress, and ethics. This explicit social, environmental, or community goal of social entrepreneurship to address societal pains [12] is also contemplated in the GEM (Global Entrepreneurship Monitor) methodology when these sorts of firms are being analyzed [13], having in mind the social and local contexts linked to entrepreneurship, and not only taking into consideration purely economic features [14]. The GEM methodology's harmonized approach of surveying the adult population worldwide has made it possible to compare data across countries. Despite this fact, social entrepreneurship is still a rare phenomenon [15].

Besides, social entrepreneurship relates to sustainable entrepreneurship but is not identical. It fosters sustainability by focusing on reducing social imbalances by offering products and services to the population in need. Derived from these social and sustainable actions, nature is positively impacted as negative externalities are reduced using more efficient productive resources as individuals have a more significant number of resources at their disposal. Consequently, individuals and firms tend to decrease their environmental pollution levels, as there is a greater social awareness of policies anchored in social entrepreneurship, being entrepreneurs the vehicle to introduce new technologies to improve firms' activity for achieving higher profits [16].

Glocalization has raised awareness of the need for greater collaboration between countries, which has led to a slight boost in social entrepreneurship in some countries, especially in developing countries. In this sense, social entrepreneurship is interested in promoting sustainable entrepreneurship to foster economic growth and development

using differentiating products and services among external stakeholders [17]. As a result, sustainable entrepreneurship focuses on finding ways to monetize future products, nature conservation, life support, and communities [18] with nature preservation and business growth. These promising and fundamental goals do not necessarily imply that positive social or environmental values are being created as a result. Awareness of the overexploitation of resources, the impact on nature of carbon dioxide (CO<sub>2</sub>), chlorofluorocarbon (CFCs), and nitrogen dioxide (NO<sub>2</sub>), among others, the evidence of climate change, and the increasing inequalities in populations have provoked a general degradation of the planet. This has led to the development of literature that addresses a new approach to developing entrepreneurial activities—that is, sustainable entrepreneurship.

Sustainable entrepreneurship refers to discovering, creating, and exploiting entrepreneurial opportunities that contribute to sustainability by generating social and environmental gains for others in society [19,20]. Economic and technological progress at any price is unsustainable, and no longer feasible; societal development and environmental impact must be considered. As a direct consequence, we are assisting in the transition to a sustainable economy. First, new and existing ventures are increasingly aware of the need to adopt sustainable practices—within their organization and their interaction with the societal and physical environments [21]. Second, the number of organizations that effectively influence sustainable development is still insufficient and needs to rise urgently. This fact inspires researchers in sustainable entrepreneurship to investigate thoroughly the positive financial and non-financial repercussions that the implementation of sustainable strategies may have.

Recently, there has been a growing interest in analyzing the causes and factors that influence sustainable entrepreneurship. Studies have been made in relation to crowd-sourcing [22], rural businesses [23], training, and motivation [24], digital technologies [25], and sustainable entrepreneurship at the bottom of the pyramid [26]. The Netherlands, United States, Germany, UK, and Spain have been the most influential countries in terms of publications on this topic, as shown by [27].

With regard to eco-innovation, the most critical factors affecting its implementation are associated with the availability of financial sources and information about innovations, cooperation with other actors, and legal regulation [28]. When eco-innovation is implemented, it increases competitiveness in international business. Therefore, there is an increase in exports and a positive bidirectional relationship between eco-innovation and exports, influenced by social performance, environmental regulation, cooperation strategies, employment level, and firm size [29].

Each dimension of sustainable entrepreneurship (economic, social, and environmental) can be enhanced significantly by monitoring eco-innovation trends and frequent communication of experiences and information with employees and among various departments, complemented with updating operating processes or developing new and eco-friendly products. Fierce competition, unpredictable customer taste, and technological change strengthen eco-organizational innovation's positive effect on a firm's social performance [30]. Finally, Bucea-Manea-țoniș et al. [31] show that working from home and comfortable working environments increase labor productivity and employees' eco-innovation.

Despite these facts, currently, there is no composite or single indicator to measure entrepreneurial sustainability at the international level. GEM, the foremost observatory on entrepreneurship in the world, did not collect data specifically related to sustainability until 2021. We argue, therefore, that sustainable entrepreneurship and eco-innovation should be enhanced as relevant topics to be assessed consistently by GEM for measurement purposes. Our proposal will be described in the next section.

### 3. Methodology

This methodology's choice is justified by the United Nations' interest in making it possible to develop mathematical models that can provide information and conclusions

about the relationships that hypothetically exist between variables that represent economic growth and sustainable economic development. There are still many limitations regarding international data availability, but not explicitly referring to variables related to entrepreneurship. In this paper, and based on Equation (1), we propose a seminal methodology to overcome these limitations and obtain data. With the data obtained, the mathematical model proposed can be tested and determined to know if its formulation is correct or must be improved.

We believe that a lot of work has been done on sustainability from a theoretical level. It is time to generate data to contrast various proposals objectively. However, without the development of information tools focused on collecting data, at least in the field of entrepreneurship, this data gap will continue in the future. For this reason, this article is a necessary preliminary step, which is justified by the need for data provision. As a result, the GEM project must implement a reasoned information tool and a feasible methodology capable of collecting valuable data. In short, we propose to measure sustainable entrepreneurial activity, from a triple social, economic, and environmental vision, with and without the eco-innovation component. This is the aim of our paper.

Mathematically, our proposal can be expressed using this sort of model or Equation (1):

$$SEA_i = a + b \times SES_i + c \times EI_i + d \times SEE_i + e_i \quad (1)$$

The terms are  $SEA_i$  (Sustainable Economic Activity);  $SES_i$  (Sustainable Entrepreneurship: social area);  $EI_i$  (Eco-innovation: economic area); and  $SEE_i$  (Sustainable Entrepreneurship: environmental area) at any country or economy (i) of the world.

From what is expected, we assume that 'b', 'c', and 'd' are positive coefficients, 'a' represents the average state of  $SEA_i$  in a country or economy when  $SES_i$ ,  $EI_i$ , and  $SEE_i$  are zero, and 'e<sub>i</sub>' represents all the factors not included in  $SES_i$ ,  $EI_i$ , and  $SEE_i$  that have an impact on the dependent variable. This rough and synthetic model reflects the previous section's arguments: sustainable entrepreneurship, defined by  $SES_i$  and  $SEE_i$ , and eco-innovation ( $EI_i$ ) contribute positively to achieving sustainable development objectives and improving social welfare. The problem with quantifying such a model is that, to date, there is no international GEM data to describe the percentage of cases of sustainable entrepreneurship and entrepreneurship with an  $EI_i$  component. Besides, there are no clear indicators for the dependent variable ( $SEA_i$ ). We show a simple model to be easily implemented in future GEM surveys. We assume that the relationship between these variables is linear—a debatable argument. Only when future data will be obtained after the implementation of our proposed model, will we be able to confirm (or not) the linearity of this relationship.

Consequently, at least for GEM, we propose measuring  $SE_i$  in its different aspects ( $SES_i$ , and  $SEE_i$ ) and  $EI_i$ , by introducing a specific set of variables in its APS information tool. To justify selecting these variables, we present a descriptive analysis in the next section on how GEM already offers key SGDs-related proxy variables.

#### 4. International Results for Selected GEM APS Traditional Variables Related to Some Aspects of Sustainable Entrepreneurship and Ecological Innovation

Considering the recent 2016–2019 period, 42 economies have participated in the GEM APS data collection for both years (2016 and 2019). This allows comparisons related to selected variables and their evolution in five years, as well as a discussion of interesting aspects of them related, albeit somewhat indirectly, to the relationship between economic sustainability and entrepreneurship. The selected variables from GEM APS are:

- (1) Total Early-stage Entrepreneurial Activity rate (TEA) over the 18–64 years population (see Table 1)
- (2) Rate of entrepreneurial intentions over the 18–64 years population. This indicator is shown divided by 3 to obtain an approximation of the annual impact of the intention to start a new business, since the original question refers to the intention in the next 3 years (see Table 1)

- (3) Rate of business closures in the last 12 months, with respect to the date of APS data collection—usually between May and July of every year (see Table 1)
- (4) Rough indicator of entrepreneurship dynamics balance, calculated as (TEA + annual intentions)—closures (see Table 1)
- (5) Rough estimated number of early-stage entrepreneurial activity in millions (see Table 1)
- (6) Sectoral distribution in 4 big categories (extractive or primary sector, transforming or secondary sector, business services-oriented sector, and consumer-oriented sector, both representing parts of the tertiary sector) within the TEA rate (see Table 2)
- (7) The average number of owners of TEA businesses (see Table 3)
- (8) TEA businesses that provide any jobs now, or expect to do so in 5 years (see Table 3)
- (9) Within TEA, the percentage of businesses with a middle or high level of exportation (see Table 3)
- (10) Within TEA, the rate of companies active in medium or high technology sectors (see Table 3)

All these variables have been selected for particular reasons. For example, TEA, measured over 18–64 years old population (which approximately is all the active population in any country), shows clearly that developing countries have higher proportions of the population involved in entrepreneurship. Additionally, it shows the weight of entrepreneurial activity over the adult population, and we can draw some conclusions about its impact. It could be correlated with GDPPC and other indicators selected by the UN as relevant to Sustainable/Unsustainable Development, such as net investment share in Gross Domestic Product (as % of GDP); the sum of exports and imports (as % of GDP); Environmentally Adjusted Net Domestic Product (EDP) per capita (in USD); and share of manufactured goods in total merchandise exports (as %). This creates a proxy variable that helps to analyze the overall impact of entrepreneurship on economies.

The ideal should be that GEM could classify TEA activities in terms of the degree of sustainability and eco-innovation component, but this does not exist yet. Table 1 shows this indicator along with entrepreneurial intentions and business closures. Working on these variables, one can build a proxy variable to see how, roughly speaking, the entrepreneurial process' result can be understood as "destructive creation."

The variables (presented in Table 2) allow us to discuss the impact of entrepreneurial activity, considering that extractive and transforming sectors are assumed to have a bigger environmental impact.

The inclusion of these variables can be justified, as the mission of entrepreneurs has been associated with the detection of opportunities, leading to business initiatives to produce goods and services that satisfy needs and, in many cases, improve the current offer through reinvention and innovation. However, entrepreneurial activities do not necessarily imply that positive social values are being created or that the outcome will result in the environment's improvement or upkeep. The weight of sectors (extractive and transforming) can be considered a proxy variable that can show a trend about the impact of entrepreneurial and established activity on the environment.

The justification for using the average number of owners (Table 3) is extracted from the work of Chang [32], who claims, "what makes the poor countries poor is not the lack of raw individual entrepreneurial energy, which they, in fact, have in abundance. It is their inability to channel the individual entrepreneurial energy into collective entrepreneurship". According to his work, people falsely believe that the cause of poverty is the lack of entrepreneurship in developing countries. In fact, these countries have plenty of entrepreneurial people who work hard to implement their necessity-based entrepreneurial ventures. In contrast, most people in wealthy countries have never been in entrepreneurial positions. They have plenty of job opportunities because of large corporations, and work in highly specialized and narrowly specified jobs, implementing someone else's entrepreneurial vision. Chang [32] concludes that people in developing countries are far more entrepreneurial than those in developed countries.

**Table 1.** Total Early-stage Entrepreneurial Activity rate (TEA), entrepreneurial intentions rate and business closures in the last year, by economy, comparing the years 2016 and 2019.

Economy	TEA		Entrepreneurial Intentions/3 *		Business Closures in the Last 12 Months		Rough Entrepreneurship Dynamics **		TEA Estimated Number of Businesses in Millions 2019 ***
	2016	2019 **	2016	2019	2016	2019	2016	2019	
Australia	14.6	10.5	5.1	5.4	2.4	3.2	17.3	12.7	1.4
Brazil	19.6	23.3	9.4	11.4	3.8	4.8	25.2	29.9	23.3
Canada	16.7	18.2	7.1	7.1	3.4	3.6	20.4	21.7	3.7
Chile	24.2	36.7	16.0	18.6	4.8	6.6	35.3	48.8	3.3
China	10.3	8.7	8.8	8.7	2.5	4.0	16.6	13.4	67.1
Colombia	27.4	22.3	17.7	14.1	5.3	4.2	39.8	32.1	5.5
Croatia	8.4	10.5	7.4	8.5	3.4	2.0	12.5	17.0	0.2
Cyprus	12.0	12.2	6.7	8.3	3.0	1.5	15.7	19.0	0.1
Ecuador	31.8	36.2	14.2	17.7	7.2	5.9	38.8	48.0	2.9
Egypt	14.3	6.7	21.8	21.0	7.3	7.0	28.8	20.7	1.9
Germany	4.6	7.6	2.7	4.2	1.1	2.2	6.2	9.6	3.3
Greece	5.7	8.2	3.1	4.8	3.8	2.0	5.0	11.0	0.4
Guatemala	20.1	25.1	13.1	17.2	2.5	4.3	30.7	38.0	1.6
India	10.6	15.0	6.6	11.6	1.7	2.9	15.5	23.7	70.8
Iran	12.8	10.7	15.6	14.1	4.7	5.2	23.7	19.6	2.9
Ireland	10.9	12.4	5.6	6.3	1.8	2.5	14.8	16.2	0.3
Israel	11.3	12.7	8.5	10.1	3.2	3.8	16.7	19.0	0.5
Italy	4.4	2.8	3.9	2.1	0.8	0.5	7.5	4.3	0.7
Korea, Rep.	6.7	14.9	9.4	11.0	0.9	1.9	15.2	24.1	4.2
Latvia	14.2	15.4	7.4	9.3	2.5	2.8	19.1	22.0	0.2
Luxembourg	9.2	10.2	6.1	6.1	2.2	2.3	13.1	14.0	0.03
Mexico	9.6	13.0	5.4	7.7	2.4	3.1	12.6	17.6	7.0
Morocco	5.6	11.4	12.4	13.8	3.0	2.4	15.0	22.8	1.3
Netherlands	11.0	10.4	3.6	4.1	2.1	1.6	12.5	12.9	1.0
North Macedonia	6.5	6.2	8.9	7.3	1.6	2.6	13.8	10.9	0.1
Panama	13.2	22.7	4.4	16.2	2.3	4.5	15.3	34.4	0.5
Poland	10.7	5.4	7.8	2.5	3.1	2.4	15.4	5.5	1.0
Portugal	8.2	12.9	5.3	8.1	1.2	1.5	12.2	19.6	0.7
Puerto Rico	10.3	13.4	8.4	10.4	2.1	1.3	16.6	22.5	0.1
Qatar	7.9	14.7	14.1	16.9	3.1	6.6	18.9	25.0	0.3
Russia	6.3	9.3	1.7	4.7	1.5	2.4	6.4	11.6	6.7
Saudi Arabia	11.4	14.0	8.6	11.9	3.5	5.1	16.5	20.8	2.0
Slovak, Rep.	9.5	13.3	4.3	6.6	3.0	2.7	10.8	17.2	0.4
Slovenia	8.0	7.8	4.8	5.5	1.3	1.4	11.5	11.9	0.1
South Africa	6.9	10.8	4.1	5.3	4.4	4.2	6.6	11.8	2.3
Spain	5.2	6.2	2.0	2.7	1.2	1.2	6.1	7.7	1.4
Sweden	7.6	8.3	3.5	5.1	2.1	2.3	9.0	11.0	0.5
Switzerland	8.2	9.8	3.6	5.0	1.3	1.2	10.6	13.6	0.5
Taiwan	8.2	8.4	9.4	5.6	1.8	1.4	15.9	12.6	1.0
Un. Arab Emirates	5.7	16.4	16.4	15.7	1.3	5.5	20.8	26.6	1.1
United Kingdom	8.8	9.3	3.8	3.3	1.6	2.5	11.0	10.1	3.2
USA	12.6	17.4	5.5	6.8	2.0	2.9	16.1	21.3	28.8

\* The rate of entrepreneurial intentions over the 18–64 years population has been divided by 3 to obtain an approximation of the annual impact of the intentions to start a new business, since the original question refers to the intentions in the next 3 years; \*\* Highlighted in dark gray are those economies that experienced a TEA or intentions, or closure or entrepreneurship dynamics' rates increment close to 5 percentage points or higher between 2016 and 2019, which can be considered statistically significant. Highlighted in light gray are those economies with a TEA or intentions, or closure or entrepreneurship dynamics' rates decrement close to 5 percentage points or higher between 2016 and 2019, which can be considered statistically significant; \*\*\* The number of TEA businesses has been estimated, raising the rate to each country's active population; Sources: Adapted from GEM (2016, 2019) and World Bank (2020).

The justification for using export level is the relationship between trade and sustainable development specifically recognized by Agenda 2030. It states that if an economy is more open to international trade, it can benefit more from the given resources. Dynamically, the economy can also benefit from innovative technologies available throughout the world. However, since prices of internationally traded goods and services do not fully reflect environmental costs and benefits, international trade might not always promote better utilization of environmental resources. Also, although the indicator captures the degree

to which an economy is integrated with the international economy, it does not show environmental effects (depletion, pollution) associated with particular material flows.

**Table 2.** TEA sectorial distribution indicators, by economy, comparing the years 2016 and 2019.

Economy	TEA * Extractive		TEA Transforming		TEA Business Services		TEA Consumer-Oriented		2019 Income Level **
	2016	2019	2016	2019	2016	2019	2016	2019	
Australia	6.9	5.2	24.8	25.5	27.4	26.7	40.9	42.6	High
Brazil	2.1	0.8	24.0	22.9	5.0	7.6	69.0	68.7	Middle
Canada	2.0	6.1	18.7	15.0	30.9	23.5	48.4	55.5	High
Chile	3.5	5.5	23.2	24.0	19.9	19.9	53.5	50.7	High
China	6.3	1.8	18.6	13.2	12.5	11.1	62.7	74.0	Middle
Colombia	0.7	0.9	22.3	19.2	9.8	13.2	67.2	66.7	Middle
Croatia	16.3	10.3	28.5	23.0	20.9	33.1	34.3	33.6	High
Cyprus	3.5	2.7	22.0	23.2	22.0	23.9	52.5	50.2	High
Ecuador	6.9	5.9	11.7	17.5	6.5	8.1	74.9	68.5	Middle
Egypt	13.5	8.7	33.9	44.4	6.7	2.8	45.9	44.2	Low
Germany	1.2	3.8	19.1	10.5	25.0	26.2	54.6	59.5	High
Greece	7.7	6.4	16.6	27.0	17.6	18.1	58.1	48.5	High
Guatemala	1.8	2.5	13.3	20.8	3.4	9.1	81.4	67.6	Middle
India	1.4	5.3	14.9	21.8	7.0	3.3	76.7	69.7	Low
Iran	7.5	6.3	30.8	22.1	19.3	26.9	42.5	44.7	Middle
Ireland	2.7	4.1	17.8	18.3	25.2	28.6	54.3	49.1	High
Israel	0.5	0.4	12.4	15.5	37.4	27.3	49.7	56.8	High
Italy	14.0	8.9	23.8	19.0	26.6	20.9	35.6	51.2	High
Korea, Rep.	1.6	3.4	24.3	24.3	18.7	17.0	55.3	55.4	High
Latvia	15.5	7.7	36.3	35.8	12.8	23.9	35.4	32.7	High
Luxembourg	1.4	6.7	17.9	15.7	32.8	40.1	47.9	37.6	High
Mexico	0.5	1.1	15.1	15.6	7.4	6.0	76.9	77.3	Middle
Morocco	2.1	0.5	34.7	27.5	3.4	5.1	59.8	66.9	Low
Netherlands	2.9	3.5	20.5	19.9	27.9	33.5	48.8	43.1	High
North Macedonia	14.7	17.5	33.8	35.4	10.2	14.3	41.3	32.8	Middle
Panama	5.3	2.9	28.1	28.2	7.0	10.1	59.7	58.8	High
Poland	2.4	4.9	28.6	28.0	33.3	21.5	35.7	45.7	High
Portugal	11.3	3.5	20.2	20.5	18.7	25.2	49.9	50.7	High
Puerto Rico	0.0	3.7	22.6	11.7	15.4	11.5	62.0	73.2	High
Qatar	1.0	0.9	26.5	17.7	29.0	26.1	43.5	55.4	High
Russia	5.7	3.4	37.4	37.0	8.5	9.4	48.4	50.2	Middle
Saudi Arabia	0.2	0.9	16.2	18.2	4.8	8.9	78.8	71.9	High
Slovak, Rep.	3.4	3.2	24.9	15.9	24.9	27.4	46.9	53.5	High
Slovenia	3.1	2.5	29.4	29.0	27.8	33.9	39.7	34.6	High
South Africa	2.9	4.2	25.3	27.7	14.6	9.7	57.2	58.5	Middle
Spain	4.1	4.7	16.2	20.5	25.1	33.6	54.7	41.2	High
Sweden	6.6	9.1	13.9	19.2	37.7	29.0	41.8	42.7	High
Switzerland	5.9	2.0	13.6	10.3	36.4	29.8	44.1	57.9	High
Taiwan	1.8	0.5	28.4	24.6	13.9	19.2	55.9	55.7	High
Un. Arab Emirates	0.9	0.3	39.6	31.6	14.2	25.8	45.3	42.2	High
United Kingdom	1.5	0.2	20.1	18.5	34.7	35.5	43.7	45.8	High
USA	3.8	3.6	20.4	22.4	33.6	32.0	42.2	42.0	High

\* All rates represent the proportion of early-stage entrepreneurial businesses in each sector within the Total Early-stage Entrepreneurial Activity rate (TEA) in 2016 and 2019. Highlighted in dark gray are some significant increments, and in light gray some significant decrements for extractive and transforming sectors; \*\* Country income group following WEF's Global Competitiveness Report 2019 reduced to 3 categories; Source: Adapted from GEM (2016, 2019) and WEF's Global Competitiveness Report (2019).

**Table 3.** TEA businesses: average number of owners; participation in providing job positions or expectations; with medium or high level of exportation and active in medium or high technology sectors, by economy, comparing the years 2016 and 2019.

Economy	Average Number of Owners of TEA Businesses *		TEA Businesses That Provide Any Jobs Now or Expect to Do So in 5 Years *		% Within TEA: Businesses with the Level of Exportation > 25% *		% Within TEA: Active in Technology Sectors (High or Medium) *		2019 Income Level **
	2016	2019	2016	2019	2016	2019	2016	2019	
Australia	1.9	1.7	10.8	8.4	14.9	13.0	11.1	10.4	High
Brazil	1.3	1.4	8.6	14.3	0.3	0.6	1.2	2.8	Middle
Canada	2.1	1.9	10.7	12.2	35.3	26.7	10.6	4.6	High
Chile	2.0	1.7	20.2	32.6	13.2	1.7	6.2	7.9	High
China	2.4	1.7	7.9	5.4	7.7	4.7	1.8	4.0	Middle
Colombia	1.9	1.7	25.3	21.5	12.1	4.1	4.8	3.9	Middle
Croatia	1.7	1.7	6.6	8.3	38.6	24.9	8.2	7.4	High
Cyprus	1.9	1.9	9.6	10.6	27.1	19.8	4.9	5.8	High
Ecuador	1.6	1.7	18.7	31.8	0.8	1.9	2.2	3.0	Middle
Egypt	2.5	2.9	9.9	5.8	8.9	10.1	1.1	2.2	Low
Germany	1.7	2.1	3.3	5.5	21.5	18.5	8.9	10.3	High
Greece	1.7	1.9	4.2	7.5	31.1	18.6	7.0	4.4	High
Guatemala	1.6	1.6	6.9	20.3	0.0	1.3	0.2	3.5	Middle
India	1.4	1.6	8.5	10.2	9.8	0.8	0.3	0.8	Low
Iran	4.2	2.2	9.1	9.0	3.6	5.2	8.4	10.2	Middle
Ireland	2.0	2.0	9.0	9.8	25.4	24.3	8.6	9.2	High
Israel	1.7	2.3	7.1	7.6	27.6	17.3	10.1	7.7	High
Italy	1.9	1.8	2.9	2.3	29.2	13.7	9.1	4.9	High
Korea, Rep.	1.6	1.4	5.8	13.1	16.7	3.3	6.7	10.4	High
Latvia	1.8	1.7	10.3	12.4	27.2	20.5	3.4	9.0	High
Luxembourg	2.0	2.6	5.4	8.0	30.2	32.6	9.6	11.0	High
Mexico	1.5	1.8	6.4	11.1	10.0	4.1	2.7	2.0	Middle
Morocco	1.5	1.7	4.4	9.4	2.7	1.9	3.8	1.5	Low
Netherlands	1.5	1.8	6.5	7.3	11.3	12.2	7.6	4.7	High
North Macedonia	1.5	1.8	5.7	4.8	15.8	20.9	5.5	3.8	Middle
Panama	1.4	1.9	8.2	21.5	18.7	6.2	0.8	2.6	High
Poland	1.5	1.3	8.1	4.2	13.8	3.6	9.8	3.3	High
Portugal	1.8	2.0	6.2	9.0	30.3	20.5	5.8	4.4	High
Puerto Rico	2.0	1.8	8.5	11.6	20.3	19.6	2.0	1.9	High
Qatar	2.3	2.5	7.1	11.9	28.1	13.0	3.6	6.1	High
Russia	1.5	1.6	4.6	8.4	0.7	4.1	3.3	2.4	Middle
Saudi Arabia	2.0	1.9	8.3	13.6	48.7	26.0	0.8	1.3	High
Slovak, Rep.	1.9	1.8	6.3	10.2	16.2	16.2	9.0	9.0	High
Slovenia	1.9	1.8	6.1	5.8	29.1	22.8	11.3	10.7	High
South Africa	1.9	2.2	6.9	10.8	25.4	10.3	1.8	2.3	Middle
Spain	2.2	1.5	3.0	4.1	10.5	7.1	7.5	9.6	High
Sweden	1.7	2.1	4.2	4.6	19.8	28.6	10.9	8.9	High
Switzerland	2.0	2.0	5.8	7.8	33.2	26.6	13.9	9.7	High
Taiwan	2.5	2.4	7.5	7.1	19.9	8.6	10.8	7.6	High
Un. Arab Emirates	2.4	2.6	4.4	14.8	71.7	26.1	0.0	5.1	High
United Kingdom	5.1	1.6	6.2	6.0	18.9	19.7	13.0	2.5	High
USA	1.8	2.1	10.2	13.7	10.2	6.8	9.6	6.7	High

\* Highlighted in dark gray are those economies that experienced a significant increment between 2016 and 2019 in any of these indicators and, highlighted in light gray, are those economies that experienced a significant decrement between 2016 and 2019, which can be considered statistically significant; \*\* Country income group following WEF's Global Competitiveness Report 2019 reduced to 3 categories; Source: Adapted from GEM (2016, 2019) and WEF's Global Competitiveness Report (2019).

The discussion on all these variables and their relationship with sustainability is presented in Section 5.

## 5. Discussion

The TEA dispersion is notable among countries with cases of low activity, such as the majority of developed European countries present in the sample, which do not reach 10%, compared with Latin American countries, which show rates greater than 20%. However, by raising the TEA to the countries' active population, it is noted that the impact, in terms of the estimated number of active businesses in the early-stage phase, is clearly concentrated in countries such as India, China, the United States, and Brazil. Relatively

speaking, then, in terms of sustainable entrepreneurship, these countries have to tackle a more complex process than others, where the lesser weight of this activity means that effective sustainability measures can be adopted more quickly.

Data shown in Table 1 support this assumption. On the one hand, the TEA evolution between 2016 and 2019 indicates that only 26.1% of the economies experienced significant growth (around 5% or higher). Consequently, the negative impact of increased entrepreneurial activity on sustainability could be relatively moderate. On the other hand, the entrepreneurial process is a cycle in which new activities arise while others are destroyed or disappear from the market. Therefore, observations about the rate of entrepreneurial intention and the rate of business closures estimate how business dynamics are evolving and the changes' potential magnitude. For the available sample of countries, the data show that, in five years, only around 7% of countries show significant increases (of about 5% or more) in the intention rate.

Given that these countries are Guatemala, Panama, and India, the impact in terms of possible business creation among all 42 economies is discrete and concentrated in Asian countries. The same can be said for the rate of a business closure. During the five years, it has remained fairly stable in every economy, with only a significant increase in the United Arab Emirates. Calculations using a rough indicator of entrepreneurial dynamics as (TEA + Intentions—Closures) suggest that 45% of these economies show a positive balance or relatively significant increment after five years, while around 17% show a negative balance; the rest have remained fairly stable. Based on these data, an intuitive suggestion would be that entrepreneurial activity grew moderately until the pandemic, following a natural process of “creative destruction”, which does not allow an unexpectedly large increase in these 42 economies. Even some countries with large populations, such as China or Australia, show an entrepreneurial dynamics' balance between negative and stable after these five years, as shown in Table 1. On the other hand, in India, an emerging and key country in, for example, the pharmaceuticals sector, there is an intense increase in entrepreneurial dynamics.

The data in Table 2 allow us to approach another aspect of the impact of entrepreneurial activity on sustainability. It shows the distribution of activity across four large sectors: the extractive or primary; the transformer or secondary; and the tertiary, further divided into business services and consumer services. If we take into account that the secondary and primary sectors are traditionally considered as most directly harmful to the environment, we can see that in most countries, the greatest weight of entrepreneurial activity is concentrated in the tertiary sector. Consequently, the impact of entrepreneurial activity on the environment can be considered discrete since, among the 42 economies in the sample, in 2019, only two (smaller) economies had a proportion of early-stage activities in the extractive sector exceeding 10%. Undertaking in this sector is not generally available to most potential entrepreneurs due to the specific knowledge and level of investment required and the difficulty of competing with large or established companies. A similar situation exists in the secondary sector, although the development of small businesses, including technology-oriented ventures, is more affordable.

It should be noted that we refer to entrepreneurial activity, and not to activity undertaken by established or big corporations. In general, a country requires a weight of 20–25% of the secondary sector if the economy is not to be excessively dependent on foreign goods. As shown in Table 2, this sector's weight in terms of entrepreneurial activity is lower than 20% in almost 43% of the economies and, in many of them, decreased between 2016 and 2019. In short, the data on the sectorial distribution of entrepreneurial activity suggest that, although a certain impact on the environment can be attributed to it, it is not comparable with that produced by large corporations. In fact, Table 3 shows the data that reflect the dimension of entrepreneurial activities, which is small or very small in more than 95% of cases; this will be discussed below.

In Table 3, looking at the average number of owners of early-stage entrepreneurial activities, it is clear that most have been funded by one or two persons. The number of

firms that have employees is relatively small, and most are micro-businesses. Developed countries have more entrepreneurial activity, and it is usually necessity-based [32]. The characteristics of entrepreneurial activities (based in the services sector with a low-level of technology) have been maintained for many years. Recently there have been expectations that this will begin to change, thanks to the SDGs' pursuit. Changes will take time, however. There is a need for education—in many areas, including entrepreneurship and technology—and for investment or funding. A change in mindset is also required and, above all, mechanisms to reduce necessity-based entrepreneurship are needed. Most countries in the sample are developed countries, and entrepreneurial businesses are small in size; the situation for companies started in developing countries can only be imagined. GEM confirms this fact in multiple national reports. Due to their situation, many countries cannot regularly participate in the observatory, so it has not been possible to input their data for 2016 and 2019.

Consequently, in terms of size (dimension), entrepreneurial activity in the social, economic, and environmental spheres has an impact that can be significant when considered as a whole, but its characteristics are different from those of large corporations and public entities. In the social sphere, it is true to say that if there were no entrepreneurs, it would be extremely difficult for large corporations and the public sector alone to be able to provide sufficient employment for the population.

A similar situation exists in terms of export data and participation in technology-based sectors. The proportions are discrete, and in part, this is due to the greater weight of entrepreneurship in the tertiary sector. Therefore, if the SDGs' achievement requires greater diversification of entrepreneurial activity and greater participation in exports, innovation, and technological development, this is the moment to design plans to be carried out in line with sustainable and environmentally friendly formulas.

In summary, the selected variables and their results presented in Tables 1–3 show two, first, that until 2019 the GEM observatory had not implemented mechanisms specifically focused on measuring sustainability and economic innovation—something that must now be incorporated into its set of tools. Secondly, the data on variables that have a certain indirect relationship with these issues suggest that the impact of entrepreneurship in the social, economic, and environmental areas is different from the impact large corporations have, and possibly smaller and more indirect, due to the small size of most of the businesses and their greater contribution to the tertiary sector.

In the next section, we present a logical proposal for the GEM observatory. It concerns how data could be collected to estimate sustainable entrepreneurship and eco-innovation indicators, which could also act as explanatory variables of the mathematical model presented in Section 3.

## 6. Proposal for GEM APS

As a result of adopting the 2030 Agenda, a standardized tool has been developed to allow companies to prepare a detailed report on their sustainability. This tool is called The Global Standards for Sustainability Reporting (GRI). The GRI Standards create a homogeneous language for organizations—large or small, private or public—so they can report on their sustainability consistently and credibly. The tool, which has been already translated into 12 languages, allows for comparable global measurements because the Standards are designed as an easy-to-use modular set of Key Performance Indicators (KPIs), which serve to interpret the way a company operates and to determine whether they are acting in the right way to achieve their objectives. The report first provides a set of Universal Standards and continues with a group of Selected Topic Standards on the organization's material topics—economic, environmental, or social. The sustainability report provides an inclusive picture of material topics, their related impacts, and how they are managed [33].

From the point of view of the GEM observatory, the existence of this set of indicators (KPIs) is a reference and a source of inspiration but, as it is composed of more than 100

variables that can be used to prepare a company's sustainability report, it is not possible to insert all of them into a survey. Therefore, the proposal suggested to GEM to estimate the general commitment of new, growing, and established businesses to sustainability and eco-innovation (see Table 4) is synthetic and composed of a selected set of items. They form constructs (able to be summarized using Principal Component Analysis) of the fundamental aspects of entrepreneurship sustainability—social, economic, and environmental.

**Table 4.** Set of items suggested to GEM for estimating the general commitment of early-stage and established businesses to sustainability and eco-innovation.

To what extent do you agree with the following statements? Scale: 1 = strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree, 97 = Do not know, 98 = refused, 99 = not applicable	
Answer with regard to the business you are starting/you have recently started/you currently own and manage . . . (use whatever corresponds, depending on whether the business is not yet operational/has been operational up to 3 months/has been operational for more than 3 months)	
1.	You are perfectly aware of the 17 United Nations Sustainable Development Goals—the 2030 agenda for sustainable development—published in 2015
2.	Your first aim in developing this business considers (or will consider) significantly other motives—e.g., making a social contribution, than the conventional solely money-driven approach (social)
3.	Your business is (or will) be funded as an entrepreneurial opportunity that contributes to sustainability by generating social and environmental gains for others in society (social)
4.	You and/or your employees work (or will work), applying good ethics, following responsible labor and procurement practices, and respecting human rights (social)
5.	You and/or your employees regularly participate (or will participate) in volunteer activities or community programs (social)
6.	Job creation and implementation of social benefit programs for workers are (or will be) among your priorities (social)
7.	Your stakeholders and community recognize (or will recognize) that your strategy is aligned with implementing good practices related to Corporate Social Responsibility (CSR) (social)
8.	You are developing (or will develop) innovative processes to reduce harm to the environment (economy, eco-innovation)
9.	You are introducing (or will introduce) new technologies that are not harmful to the environment (economy, eco-innovation)
10.	You consult (or will consult) with an internal or external sustainability or environmental manager/expert (economy, eco-innovation)
11.	You are using (or will use) the least quantity of natural resources in the production process or service provision (economy, eco-innovation)
12.	You elaborate (or will elaborate), regularly and consistently, a standard report on business sustainability, measuring Key Performance Indicators (economy, eco-innovation)
13.	You know and control (or will know and control) your level of energy efficiency and will minimize its impact (adopting machinery or devices and lighting that make an efficient energy consumption) (environment respect)
14.	You control (or will control) the water consumption to minimize its impact (environment respect)
15.	You control (or will control) emissions and carbon footprint to minimize their environmental impact (environment respect)
16.	In your business, you carry out (or will carry out) recycling and material reuse actions on an ongoing basis (environment respect)

The data collected based on these variables can be cross-referenced with data used to describe business features, such as the number of owners, employees, sector, motivation, entrepreneurs' gender, age, education, income, and many others. As a result, entrepreneurs and researchers will be able to analyze the influence of social and environmental sustainability and eco-innovation. It is also essential to bear in mind that this block of items can be synthesized, through an Analysis of Principal Components, into three latent variables that represent the aspects of sustainability and eco-innovation in terms of their three essential areas: social, economic, and environmental. The resulting variables will be continuous and quantitative and can play a role in exploring relationships with other variables, internal and external to GEM, such as indicators selected by the United Nations. Most importantly, they can act as explanatory variables in the mathematical model presented in Section 3. If this type of proposal were adopted, it would enable further progress in the study of sustainability in the field of entrepreneurship at a global level. This objective is now a priority.

## 7. Conclusions

The proposal is, in brief, for an innovative tool that recognizes new realities in the world of entrepreneurship, particularly in the light of the UN's adoption of the 17 Sustainable Development Goals in 2015 and the Bank World data [34]. There are, indeed, multiple articles related to entrepreneurship on a practical level [13,16,17,35,36]. Still, our paper's objective is different, as we propose a seminal methodology to gather international GEM data by measuring the combination of SE<sub>i</sub> in its various aspects (SE<sub>S</sub><sub>i</sub> and SE<sub>E</sub><sub>i</sub>) and EI<sub>i</sub>, by introducing a specific set of variables in its APS information tool.

Previous analytical tools used to measure entrepreneurial activity have successfully provided and analyzed data in defined areas. GEM has been at the forefront, always flexible in adapting its tools and methods to changing needs. Now there is a clear need to provide a measure of commitment to sustainable entrepreneurship and eco-innovation. This paper proposes a way to achieve this goal by introducing new sets of variables into the data gathering process. The resulting information will be of great value to other stakeholders in this area. It will, most importantly, be instrumental in entrepreneurial activity having a more positive impact on the economic, social, and environmental spheres of sustainable development.

As practical implications, our proposed model gathered international GEM data related to describe the percentage of cases of sustainable entrepreneurship and entrepreneurship with an EI<sub>i</sub> component complemented with the inclusion of indicators on the dependent variable (SEA<sub>i</sub>). We suggest a set of items for estimating the general commitment of early-stage and established businesses to sustainability and eco-innovation to be easily implemented in future GEM surveys. Our study helps in understanding the magnitude and impact of sustainable entrepreneurship aligned with the SDGs and facilitates the design of regulations and public policies, both to promote business sustainability (social, economic, and environmental), as well as to increase the quality of entrepreneurship.

The main weakness of the results of our proposal is that GEM focuses on entrepreneurs located in all countries, but developing countries are usually less represented, which impedes the obtention of a representative sample of the global entrepreneurial situation. A second weakness is that our suggestions deal with aspects related to sustainability and eco-innovation, only in terms born from their three essential areas: social, economic, and environmental, and not behavioral ones. Psychological traits can be incorporated in future proposals.

**Author Contributions:** Conceptualization, A.C. and M.A.R.; methodology and data validation, A.C.; formal analysis, A.C., M.A.R., and J.M.S.-A.; investigation, J.M.S.-A., A.C., and M.A.R.; writing—original draft preparation, A.C., J.M.S.-A., and M.A.R.; writing—review and editing, J.M.S.-A., M.A.R., and A.C.; supervision, A.C. All authors have read and agreed to the published version of the manuscript. The authors acknowledge the reviewers for their comments on the previous drafts of this paper.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** GEM data sources publicly and openly available at <http://www.gemconsortium.org>. Accessed date: 5 April 2021

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

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