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Management, Cooperatives and Sustainability: A New Methodological Proposal for a Holistic Analysis

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Abstract: This article examines how the advent of the new globalisation and climate change requires us to transform the scientific paradigm of economics and, therefore, poses new challenges for analysis. In particular, it suggests the need for the incorporation of holistic and qualitative tools in order to improve management and economic and business impacts beyond the monetary aspect. Cooperatives are a good starting point because the social economy incorporates these features in its foundations.

Keywords: ecological economy (Q57); environmental impact assessment (Q51)

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1. Introduction: Theoretical Approaches

This research proposes new metrics on order to improve and expand the knowledge available about management and economic and business impacts. The paper seeks to reflect on the excessive weight of the mathematical approach in the economic sciences. Normally, economic science uses chrematistic profile indicators. In a context of latent threats, the consequences of climate change and the negative externalities being generated are in many cases very evident, and the economy must reorient its thinking towards more open, holistic approaches with trans-disciplinary collaborations. In this way, we also identify exogenous and endogenous variables that modify the behaviour of companies: technology, globalisation, geopolitics, climate change, economic development and management. This contribution is not strictly empirical, but there is a perspective that researchers are currently developing from microeconomic analysis. We think it is relevant to expose the theoretical and methodological principles that will govern the field research.

The methodology adopted is as follows:

The basic premise is: strategic planning requires instruments that allow us to understand the general and specific framework in which the company is inserted. There are very interesting tools for this purpose. Specifically for the external context, one of the most widely used is PESTEL, which analyses political, economic, social, technological, environmental, and legal factors that can influence the company in the short, medium, and long term. For the specific study of the sector in which the company operates, the identification of the characteristics of customers, suppliers and competitors is essential. Finally, to know the competitive capacity of the company when framing itself in an external context, it is necessary to evaluate the internal factors of the organisation, which include the capacities, skills and resources linked to productive activity, finances, marketing, and human resources. The aggregate analysis of the macro and internal level is used to develop the strategic and business proposal. This is one of the central factors that develops the methodology we present here.

Two phenomena that condition all these business analytical tools and are having an enormous influence on the future of the planet and society as a whole are: the new globalisation and climate change. At the business level, these two elements are going to establish new analytical frameworks at the macro and internal levels referred to above. Therefore, the need for new metrics that broaden the capacity of understanding is essential;

that is, new metrics that go beyond the traditional tools of economic science, which are often too isolated from other related disciplines and very much oriented towards an eminently quantitative aspect.

1. *The new globalisation.* A new geostrategic correlation is developing that has a direct bearing on geopolitics and geoeconomics. This translation is of vital importance for understanding the new frame of reference through which globalisation is evolving and which basically focuses on the configuration of new poles of activity generation on a planetary scale and on the role that traditional actors and developing regions are taking on. By way of summary, we identify six key movements that explain the new globalisation [1–5]:
    1. Europe, which is seeking to grow eastwards, is doing so with certain difficulties, stemming from the convergence between the new member states and the more established ones. In relational terms, the south (Spain in particular) can act as a strategic link between the North African coast and the European Union.
    2. An Asian space in full expansion, with two clear dominators: China and India.
    3. A third area is Latin America, with a diffused economic leadership between Mexico and Brazil.
    4. Fourthly, sub-Saharan Africa, separated from North Africa. An area rich in resources but devoid of political, social, and tribal cohesion, with perennial wars. It has become, within its extreme social poverty, a fundamental target for new capitalist expansions.
    5. The upheaval caused by Russia's attitude to the war initiated by Putin in Ukraine. Especially regarding its status as a nuclear power with imperialist pretensions towards the easternmost part of Europe and territories rich in natural and geostrategic resources.
    6. Finally, the sixth major economic area is the United States, a nuclear power in crisis, questioned in the new dynamism of globalisation but still with latent capabilities in the different fields of scientific and applied knowledge.

Thus, in a convulsive context such as the one described, the new globalisation will lead to a certain regionalisation, and companies, which today operate in open scenarios, will have to adapt to protectionist temptations. The institutionalist schools of thought linked to business economics emphasise how the scenario shapes the strategic behaviour of organisations [6,7]. It is precisely in these coordinates that the most consolidated companies, together with small and medium-sized enterprises and cooperatives, face new challenges or the reorientation of those already known.

2. *Climate change* is a transcendental phenomenon that we consider in our analysis. The literature and international organisations agree that climate change is the most far-reaching challenge facing humanity. In this context, we believe that cooperatives and other forms of social economy enterprises have a significant role to play in tackling this challenge. Their idiosyncrasies and understanding of production and management make them key players in building a sustainable development model. There is sufficient evidence to support the view that the climate issue is going to become the most influential and determining economic axis, and the one that will end up conditioning the strategies of companies that want to adapt to these externalities in order to try to correct them [8]. Hence the relevance of establishing new methodologies and metrics (already explored in regional and macroeconomic studies) to complement business analysis [9]. The aspects that we have described lead us to seek the concretion of the business analysis. In this sense, we think that cooperatives constitute an organisational model that has positive factors in different fields: the social aspect; complicity of leaders and workers; agreed objectives in many cases; concern for adapting to very competitive markets, but under ethical precepts that, in general, are social; concern about environmental externalities; transparent accountability. For these reasons, it has been considered appropriate to focus the analysis on this business

typology, in contrast to other organisation models. Cooperatives and Social Economy companies focus their business model on people, social responsibility and trying to incorporate in all phases of their activity values such as participation, transparency, democracy, solidarity, social cohesion, and the promotion of responsible consumption. Therefore, a characteristic element of the social economy is its ability to promote social transformation from the business model itself.

Following this premise, this article is structured in five sections. After the introduction, Section 2.1 focuses on identifying the issues at stake and the position that cooperatives can take. Section 2.2 analyses the environmental aspect and its possible impact on the business world. Section 2.3 details the importance of constructing new calculation metrics to help the analysis and strategic design of businesses and co-operatives in the face of the new challenges. Section 2.4 emphasises theoretical proposals based on known experiences. Section 3 attempts to apply the results derived from the four preceding sections to the co-operative universe.

2. Theoretical Background Section

2.1. Cooperatives in the Face of New Challenges

The current stage of globalisation has thrown up six major general challenges that co-operatives (and all other enterprises) will have to face, as shown in Figure 1. The challenges stem from the problems, conditioning factors, and new scenarios that the "new" globalisation is incubating.

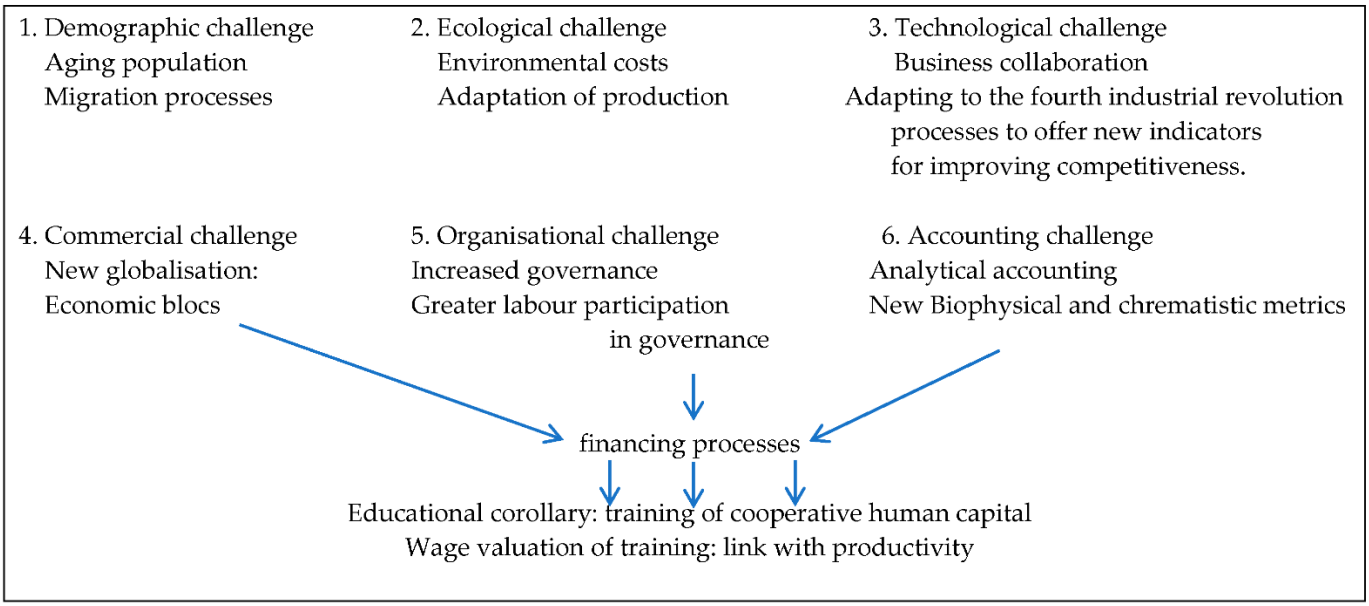

Figure 1. Major challenges for the first decades of the 21st century. Source: own elaboration.

One of the defining variables of the new scenario is the emergence of new powers. There is an abundance of new literature illustrating this factor, with a strong focus on the greater Asian region and China [10–13]. Although none of them question the region's increasing strategic, political, and economic importance and value, most agree that the development is not homogeneous. In the continuous and accelerated progress of the last twenty years of the legendary Cathay, significant internal speeds and levels of development can be seen, with territories and sectors in crisis with archaic instruments coexisting with dynamic regions, subject to modern and advanced technology. Although most of the authors point to the fragility of the official Chinese data, they agree in pointing out that, in aggregate terms, economic growth rates and technological momentum are notably higher than in other developing areas and there is an accelerated convergence (although still at a distance) with the richest ones. A synthetic fact that illustrates the relevance of

China is that in 2020 the country became the sixth exporting power in the world; this is a significant fact derived from the high capacity to attract foreign capital and companies that seek lower relative wages and a lax relaxation in legislation, such as those concerning the environmental and ecological sphere [14–16].

In this new stage of economic globalisation, characterised by business relocation and firm bets on state-of-the-art technologies, China appears, according to Lemoine [17], as "the factory of the world", a characterisation reminiscent of the British pioneers of the first industrial revolution. Businesses in general, and co-operatives in particular, cannot lose sight of this blunt reality.

Of the six challenges identified for this new stage of globalisation, the most decisive is the ecological challenge [18–21]. Although this challenge is closely interrelated with the other five, the environmental coordinates represent the global framework in which economic activity takes place, including for co-operatives. Climate change, as an inherent element of the environmental challenge, is incorporated into the business world either voluntarily (through a process of raising awareness of management decisions) or forcibly (because not tackling the issue may entail higher costs in the medium term). In either case, what seems unquestionable is that the climate variable will force a redefinition of organisational aspects and, above all, of economic metrics, which will have to create new variables and indicators to complement the conventional ones.

Figure 1 shows the major challenges for the first decades of the 21st century. It shows a virtuous circle that culminates in the training of human capital, which must have the relevant skills for the change that has already begun to take place. It is also a tool for the reduction of inequalities [22]. Cooperatives have a notable advantage in this respect, as they have the intrinsic possibility of linking wage improvements with productivity growth.

In the Figure 1, the PESTEL tool has great analytical potential; the different political, economic, social, technological, ecological, and legal factors are listed in the form of the six synthesised challenges. Here, we seek to provide greater precision to the theoretical and practical tool, with a more precise exposition of the elements to be considered.

2.2. The Enterprise Faced with New Challenges: The Environmental Emphasis

The viability of cooperatives in the environment described in the previous section is a central issue in the social economy [23]. On the emancipatory role of cooperatives in the sphere of production, it has been argued that these organisations can constitute a transformative force insofar as they reflect structural possibilities of social and democratic production. In recent decades of intensified globalisation, the need has arisen to think about the insertion of cooperatives in a much more competitive and interconnected context. In other words, how to maintain cooperative values and keep the cooperative alive. There is an abundance of literature dealing with this challenge, especially in areas related to technology, organisation, governance, innovation, or access to markets [24–26]. Despite this, the environmental challenge (which until relatively recently was not a central issue) is becoming a level of concern that goes beyond the traditional positioning of environmentalist social collectives, and has been transferred to financial institutions, companies, and co-operatives. The environmental problem affects humanity as a whole. Consumption and production patterns and the technological pattern have been the variables indicated as key to understanding the deterioration and diagnosis of the situation, and it is from this scenario that the need to define and implement environmental control measures arises [27]. Cooperatives are characterised by the search for productive, social, environmental, and economic management that reflect the values and principles of cooperatives, and therefore represent an interesting source of business innovation that is extremely valuable for tackling the environmental problem [28].

In many organisations, the environmental issue is seen as a long-term problem. In this respect, it is imperative to create management plans to improve the operational processes of enterprises and, more specifically, of cooperatives. The aim of this article is to move towards business management that intrinsically assumes sustainability, seeking references

in organisations that have obtained concrete results through effective management within their environmental operations. Currently, there are international standards that regulate this type of strategy, such as ISO 14000, which establishes the steps to promote an administrative system that guides companies to minimise their environmental impact. A study of contemporary business practice shows that the preservation, conservation, and protection of the environment requires a clear policy and a firm commitment on the part of the company, given that for many years it has become a determining element of its competitiveness, beyond the ethical and legal interpretation that can be made of the issue. Companies around the world have incorporated environmental management systems in an integrated way in their management models, which allows them to generate a better position in the market [29,30].

It must be said, however, that it may happen that some of the approaches that incorporate corporate social responsibility factors linked to the environment are epidermal and precisely obey a marketing strategy on the part of companies [31–33]. However, it is no less true that many of them take on the ecological crossroads as a problem and, at the same time, as a challenge that can provide added value. On this point, the work that is being developed more in the macroeconomic sphere, spurred on by different institutions—with specific proposals for economic measurement—is influencing companies in the microeconomic sphere. Cooperatives are no strangers to this trend. This directly infers the need to be aware of other forms of metrics in order to address this issue.

2.3. Insufficient Metrics: A New Economic Paradigm to Develop

GDP is not enough. Why is it not enough? It is not enough because it is incomplete as a tool to measure the global consequences of economic growth. Economic science considers it to be the best indicator to deduce economic evolution, without thinking about the biophysical variables that allow this growth; introducing a chrematistic vision that leaves out of the analysis not minor aspects of what is intended to be inferred. This, moreover, directly affects the business world and, of course, the world of cooperatives. There is no doubt that we are dealing with a powerful, explanatory indicator—GDP, which is extremely useful. Above all, in the genesis of its formation, Simon Kuznets devised it in the 1930s in the wake of the Great Depression and the urgency of measuring the development of economies which, it was believed, were adjusting almost automatically under the rules of the gold standard. These guidelines were shown to be innocuous because they solved two problems: unemployment and economic growth. In that context, it was urgent to have a precise metric to better diagnose. In the current context, the strictly monetary measure of economic growth is insufficient in the face of new challenges such as those derived from change, and when the objective is focused on detecting and mitigating the impacts (or negative externalities) produced by this growth on specific aspects: production, consumption, environment. Especially when these consequences directly affect physical, biological, and natural contexts. The reformulation of metrics in economics is an increasingly central issue. Entities such as central banks are moving decisively to incorporate new analytical variables, especially environmental ones, as a consequence of climate change [34–36].

The concept that is emerging with force is therefore natural capital [37–40]: the extraordinary wealth of the biosphere, attacked by the economic techno sphere, sponsored by a certain no sphere: the latter being inspired by Newtonian physics.

The elaboration of new metrics requires the construction of interdisciplinary frameworks, from economics with biology, theoretical physics, chemistry, sociology, psychology, and history, in order to establish indicators that are the result of a broad, holistic compendium of knowledge. The construction of new metrics must incorporate phenomena that have always existed but were systematically ignored by conventional economics [41–45]. There is a debate between ecological economics and neoclassical environmental economics, especially because of the tendency of the neoclassical school to reduce to prices that which

has an intrinsic value outside the market. Value and price are the variables subject to methodological consideration [46].

Nothing can be obtained from nothing. The law of entropy—which is the second law of thermodynamics, defined by Carnot in 1824, together with the contributions of Joule and Kelvin—teaches us that the rule of biological life and its economic continuation is much more rigorous. In terms of entropy, the cost of any economic activity is greater than the product. Activity leads to a deficit, as the economic process transforms useful natural resources (low entropy) into waste (high entropy). The continued extraction of natural resources is key, since it is the element that in the long run will determine—already determines—the fate of humanity. The economic process is solidly based on a material basis that is subject to certain restrictions. The free energy that can be harnessed comes from two different sources: on the one hand, the amount of energy in the earth's mineral deposits; on the other hand, the solar radiation intercepted by the earth. The technology is focused on mastering the earth's endowment almost completely, so that in theory it could use all of it in a given space of time. However, it has no control over the flow of solar radiation, present or future.

Likewise, only the Earth provides low-entropy materials for production, and solar radiation is the primary source of all life on the planet, which begins with photosynthesis. Finally, terrestrial resources are insignificant compared to the Sun. Active solar life, i.e., the period in which the Earth will receive a significant influx of solar energy, will last at least 5 billion years. However, the Earth's total resources can produce only the equivalent of a few days of sunlight—a huge economic challenge. Faced with this intellectual challenge, which stems from a different auscultation of reality, inferred by the perceptible consequences of climate change, it is imperative to decipher what measures should be used and what indicators should be constructed to complement and, above all, strongly qualify the chrematistic variables of a GDP that say nothing about the environmental aggression that feeds it. The following considerations are noted below.

2.4. Some Theoretical Proposals

Over the last few decades, the debate on sustainability has been consolidated, and a whole series of concepts and methodologies have been developed to measure the impact of the human species on the biosphere [40,47–50]. This has led to the necessary modification of the SNAs (Systems of National Accounting) to integrate the economic and ecological dimensions, through the SEEAs (System of Environmental-Economic Accounting). After an initial stage in which the methodology and implementation of economic–ecological accounting remained mainly in the academic sphere, public administrations and their statistical services began to transfer a large part of their methods to the accounting corpus and have published environmental statistical information [51,52]. However, this methodological change has not occurred in the same way everywhere. Thus, in the European Union (EU), Eurostat has developed an important theoretical-methodological work and has made advances in economic–ecological accounting. However, not all EU member states have transferred these developments and improvements to their statistical systems to the same extent; we can highlight the examples of Austria or Sweden for the quality of their environmental statistics.

The concept of social metabolism has been central to the formulation of environmental economic accounts. Social metabolism conceptualises the relationship between society and nature in terms of the flows of materials and energy used by economic systems. Part of these flows accumulate in the form of physical stocks; another part, when used, is returned to ecosystems in the form of waste of different types (solid, gaseous, liquid) [53,54]. Following multiple accounting applications emanating from this concept, various institutions have transferred the concept of metabolism to build economic-ecological accounting systems. Thus, the United Nations Environment Programme (UNEP) launched the International Resource Panel in 2007, and Eurostat has developed a whole series of indicators in accordance with this conceptual framework [55]. In 2001, Eurostat published for the first time

an official methodology for material flow accounting in the European Union. Since then, this guideline has been improved and Member States have been publishing the results of Material Flows Accounting (EW-MFA, Economy-Wide Material Flow Accounting, Eurostat, 2017). In Spain, it is worth highlighting the collective effort carried out within the Basic Statistics of Socioeconomic Metabolism research project, led by Óscar Carpintero, which ended with the calculation of material flows of Spanish Autonomous Communities [56]. This work highlighted the methodological deficiencies and problems in the accounting of material flows carried out by the INE.

The objective of Material Flow Accounting is to analyse and evaluate the use of resources in a given economy in order to find out the quantity, origin, and typology of resources and how they have been used. This indicator is essential to guide the economy towards an efficient and sustainable use of resources in a global context of deterioration and depletion of the material base of some resources, as well as to steer the economy towards a more sustainable model based on a fund-flow (renewable) system, instead of the current stock-flow (non-renewable) model. According to Eurostat, we can say that the general purpose of EW-MFA is to describe the interaction of the domestic economy with the natural environment and the rest of the global economy in terms of material flows (excluding water and air). EW-MFA is a statistical framework conceptually integrated into environmental–economic accounting and compatible with national accounts concepts, principles, and classifications, allowing for a wide range of integrated analyses of environmental, energy, or economic aspects through the economic–ecological perspective. The WFC should be understood as an accounting system, expressed in biophysical units, which brings together information from different sources that, after being processed, allows for the construction of a series of indicators.

The research agenda on the construction of new indicators is broad. The bibliography is already beginning to be very relevant [40,49,57]. Some very recent specific proposals have been presented for the Balearic Islands and Catalan economies, respectively (in the latter case, the indicators have been reduced according to the available sources). In the case of the Balearic Islands, ten indicators have been processed, chosen for the period 2000–2015; most of them have also been used for the Catalan example. This can be extended to the national level. The series is short, but it has the potential to embrace a period of economic expansion, the Great Recession, and a few years of the beginning of the recovery. The model uses ten variables: Energy consumption (in tonnes of oil equivalent); 3. Production of municipal solid waste (MSW, in tonnes); 4. CO_2 emissions (in kilotons); 5. Gini index; 6. GDP deflated to 2010 values; 7. GDP per capita deflated to 2010 values; 8 water consumption, Gini Index and wage indicators. Their reciprocal relationship is characterised—always taking into account the demographic evolution—by the following:

- They do not present insurmountable methodological difficulties for data collection and subsequent calculation, so that they can be perfectly assumed as a scorecard by policy makers. The quality and profusion of statistical services will mark the research route to be followed.
- They mix magnitudes of a chrematistic nature (GDP, GDP per capita, for example) with others of a more specific biophysical nature (MSW production, energy, and water consumption), illustrative of the externalities of growth.
- They do not neglect the social side of the growth process by incorporating data on inequality (Gini index) and consumption capabilities (through wage indicators).
- They help to identify the ecological externalities of economic growth.
- They provide a different reading of the growth process since they specify and systematise dispersed variables that do not usually appear in the regular diagnoses of public administrations.

Econometric analysis makes it possible to carry out mathematical regressions that offer direct inter-relationships between GDP and biophysical variables; they measure on the basis of which biophysical magnitudes the eventual growth is based. The ultimate goal is to form a synthetic indicator—similar to the United Nations HDI—that facilitates a better

understanding of the nature of economic growth, bringing together these ten indicators (or others that are convincingly provided) into a single one. The central idea is to advance the notion that new metrics are needed to understand economic growth holistically.

This is being understood by the institutions. The UN Statistical Commission agreed on a set of 232 indicators that were finally adopted by the UN General Assembly in July 2017 (Resolution 71/313), although the list has been expanding over time. To monitor these goals and targets, official statistical agencies have started to collect indicators. Of these, some are available, and others are in the process of methodological development or practical implementation in the different countries. The United Nations also compiles at the global level the statistical monitoring of the goals of the 2030 Agenda. In the Government of Spain, the Sustainable Development Goals are the responsibility of the Ministry of Social Rights and Agenda 2030, with a Secretary of State for Agenda 2030. For the statistical monitoring of the Sustainable Development Goals, the INE has a space for indicators associated with the SDGs [58,59].

As the same list of sustainable development indicators of the 2030 Agenda shows, for each major goal there are several indicators that capture different dimensions of this aspect. The indicators often have different units of measurement, and even for those that have the same units, the reference values and pathways can be very different. These two aspects, the multitude of dimensions necessary to capture a phenomenon such as sustainable development and the diversity of metrics for each of the dimensions, make it advisable to develop composite indicators that aggregate all these dimensions into one. Likewise, aggregation in a single index facilitates comparison both of different countries or regions and over time; this is a strategic objective in this horizon of new metrics applied in the world of economy and business.

As recognised by the OECD, these synthetic measures are increasingly recognised as a useful tool for policy analysis and public communication [60]. The number of existing composite indicators around the world is growing year by year. These variables provide simple comparisons between countries or areas that can be used to illustrate complex and sometimes elusive issues in broad areas such as the environment, the economy, society, or sustainability. Moreover, composite indicators are often easier for the general public to interpret, rather than detecting common trends across many different indicators, though they have also proved useful for comparing country performance. A number of sustainability indicators have been proposed at the international level, including, in terms of their impact and quality, the following:

1. Prescott-Allen's Ecosystem Wellbeing Index [61], which measures ecosystem diversity, ecosystem quality, and quality of life, covering 180 countries for the time period (1997–1999), using 51 variables.
2. Environmental Performance Index, Yale University, which has two dimensions, environmental health and ecosystem vitality, 24 variables, covering 180 countries and the years 2014–2016.
3. Environment and Gender Index, International Union for Conservation of Nature (IUCN), of the United Nations [62], which measures gender equality and women's empowerment in the environmental field.
4. Environmental Vulnerability Index, which measures the vulnerability of the natural environment to future natural and anthropogenic shocks. It covers 234 countries for the period 2000–2003 and is based on 50 indicators.
5. Sustainable Society Index, which measures the level of sustainability of a country and monitors it, aggregating three dimensions: human well-being, environmental well-being, and economic well-being; it is based on 21 variables, covers 154 countries and the time period is 2006–2018.

It is relevant to reiterate once again that this whole set of data, arguments and new perspectives for economic and social analysis should be relevant for the business world. Research directions are now much more open in this field—and with the microeconomic connection—than they were relatively recently. It was therefore essential to provide these

basic ideas in order to adequately frame the reflections and contributions made in this field, where co-operative enterprises become an essential actor in bringing this whole battery of indicators into a much more specific and defined sphere.

3. Results and Discussion

Indicators for Cooperatives

Successful enterprises have a clear orientation towards reinforcing the strategic level, largely supported by information systems that allow them to establish parameters that measure the effectiveness of their business [63–66]. These parameters, known as management indicators, facilitate the measurement of achievements and the fulfilment of the mission and objectives of the organisation in its different areas. Management indicators have become the quickest and most reliable way to measure a company's management, financial, operational, and administrative activities in a timely and objective manner. Results, business control, and employee performance are measured in order to know exactly where the company is heading. Social economy organisations, such as cooperatives, which are committed to building a participatory, democratic, and solidarity-based economy, do not escape from this reality. In order to continue to consolidate their position in the markets, they need to implement a "cognitive model", not only as a tool for participatory strategic planning, but also as an instrument for the cohesion of their members and of the cooperative. Each cooperative will have to find its mix of communication practices, educational activities, research functions, units, and policies to support the cognitive processes of the organisation.

Every organisation wants to measure its results over a given period of time. In this process, it is essential to have the relevant tools, which can be of different characteristics and natures [67]. Among them, a prominent one is the application of financial indicators. These have been classified according to their functionality and use, as there are some that are widely used at the corporate level. An additional group responds to the dynamics of value-based management, which explains the creation of value within the entity and its impact on different stakeholders. Financial indicators detail developments between two or more variables, taken from historical information from the financial statements. The result allows an assessment of the organisation's performance in terms of operations, investments, and different sources of funding. Some indicators are expressed in percentage and others in nominal terms, and are used for comparison purposes. Similarly, the generation of value is defined as part of a profit that is obtained by discounting operating and non-operating costs and expenses, taxes, and the opportunity cost of capital that is used to estimate, among others:

- Company profitability
- Company valuation
- Compensation related to the labour market

These financial tools make it possible to monitor the expected results in the company, with the aim of designing sufficient strategies to improve or achieve better performance. The importance of using these tools lies in the interpretation of the results once the appropriate model or mathematical formula has been applied. The scope of application for traditional or value-inducing indicators is related to business dynamics oriented towards the basic financial purpose of any organisation. This basic financial purpose is profit maximisation and profit generation in the context of profit-oriented organisations. However, in order to respond to the constant change in which enterprises and their different types find themselves, it is worth mentioning that there are also indicators designed especially for entities belonging to the social economy, such as cooperatives. For the co-operative sector, it is necessary to identify the indicators that enable the measurement of value generation, as not all of them may be able to do so. It is necessary to identify:

- The variables that respond most efficiently to the dynamics comparable with for-profit entities, in which the magnitudes are extracted from the information contained in the financial statements; for example: net profit, level of assets, equity, factors that relate

to the contributions made by their members and, on these bases, offer products and services that generate a cooperative surplus.

- From a renewed and alternative point of view, it is necessary to specify those indicators that link up with more holistic horizons, not strictly limited to the most chrematistic theses. The descriptions provided in previous sections help to guide these choices, hence the crucial importance of this framework. The importance is that choosing the right indicators should also facilitate the ability to compare with other co-operatives and/or different enterprises. In other words, in addition to the results with a more conventional profile, others of a quite different nature must also be included. Among the former, the following should be highlighted, oriented towards compliance with the established production plan:
    - Productivity
    - Total economic results
    - Sales
    - Liquidity
    - The cost of sales
    - The costs of the production process
    - Quality parameters, if applicable

    As for the latter, and depending on what has been explained in previous parts of the text, the following can be considered:
    - The physical results of production (necessary indicator for the preceding block)
    - Greenhouse gas emissions of the cooperative
    - The energy intensity of production
    - The economic circularity strategy, measured in terms of proximity parameters
    - Waste production
    - The measure of recycling
    - The connection of the co-operative with other complementary, positive situational incomes
    - The percentage of women with the same wage level as men
    - The deviation, if any, in relation to the SMI.

This programme does not circumvent the traditional, historical, trajectory formulations that each cooperative has had in the course of its evolution, but it incorporates other control mechanisms, which round off a sort of managerial ecosystem, simplified in Figure 2, of which the main objective is to detail specific aspects now commented on. It should be noted in this respect that the key purpose is precisely to generate value in production and commercial activity. This value addition is linked, in a partial but tangible way, to the promotion of a new management pattern, oriented towards the environmentalisation of the company. The hypothetical indicators set out in this chapter go in this direction, which does not shy away from either the market economy or the methodologies of conventional economics but adds the bio-economical conception of business activity and the need to obtain new metrics that make the production process more comprehensible, while at the same time generating granular elements of a cognitive nature in the cooperative's staff. The notion is that the new demands of business administration, in terms of measuring economic activity, do not obey any fashion or any strictly subjective concern, but form part of an obligation of solidarity towards the environmental challenge.

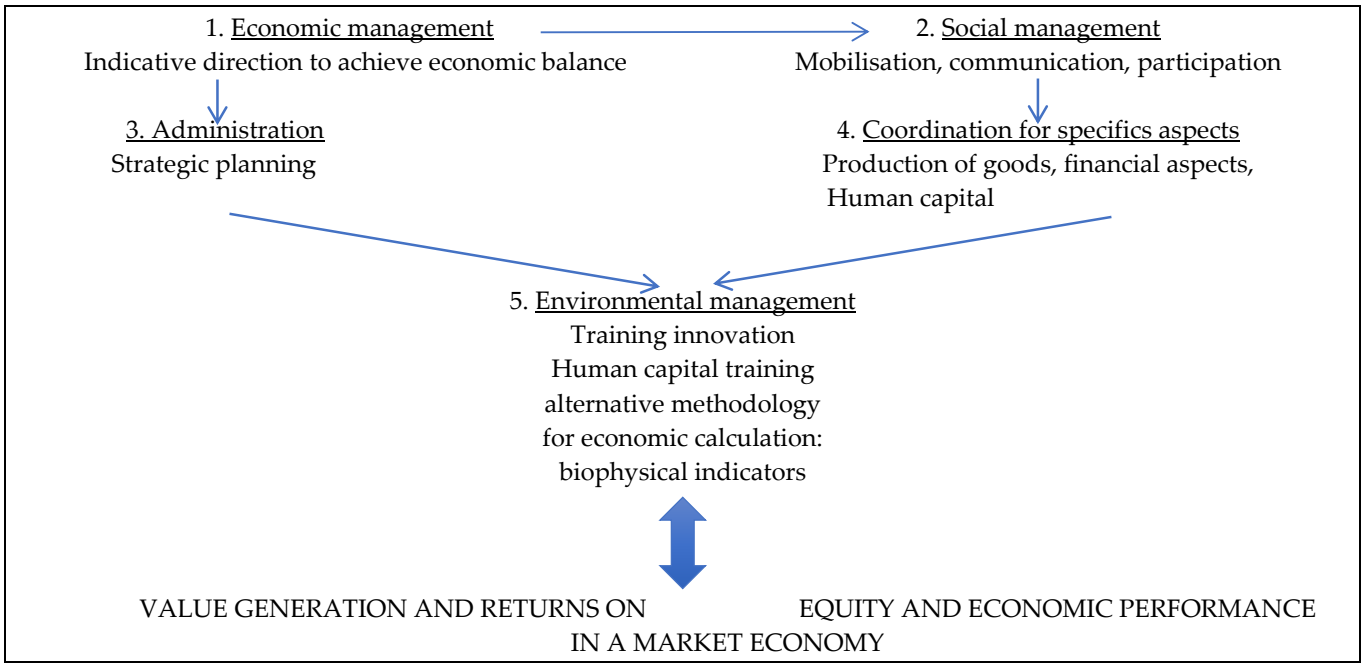

Figure 2. Managerial factors in the cooperative sphere. Source: own elaboration.

The United Nations states that co-operatives employ 280 million people worldwide (10% of the world's working population). Moreover, more than 12% of the world's population are members of one of the 3 million co-operatives in the world. Furthermore, the 300 largest cooperatives and mutuals generate a turnover of almost 2035 billion dollars. On the basis of these figures, we are aware that cooperatives in many sectors are fighting against climate change (https://www.cepes.es/nota-prensa/635_cepes-recuerda-fortaleza-cooperativas-favor-sostenibilidad-contra-cambio-climate-change, accessed on 18 June 2022), for example:

- In agriculture and fisheries, by reviewing energy use and emissions
- To consumers, by seeking to reduce carbon footprints in shops, nested activities, and those of suppliers. We are actively working to disseminate education to members and consumers
- In housing, with the use of sustainable building materials and green building design.
- In the financial sector, with co-operative banks and credit unions, incentivising investments in energy efficient technologies
- In the energy sector, with the aim of providing clean and sustainable energy such as wind, solar and biofuels

The economic structures of the countries or regions where cooperatives are structured are important in this respect, with the environmental challenge as a frontier in the deployment of economic activities. An attempt has been made to outline this in Figure 3, of which the essential purpose is to facilitate—as in the set of diagrams that are exposed in this work—a better understanding of the theoretical exposition.

To simplify, the productive spheres—extractive and manufacturing/industrial sectors—and services make up a broad mosaic of examples in cooperative enterprises. The scheme is rather limited, but it allows us to underline, once again, the relevance of partnerships between enterprises and cooperatives in tackling the challenge of climate change.

We stress the central issue of obtaining different metrics, based on more generalist models, to be applied in the world of cooperatives, based on clear principles: working from the perspective of economic "missions" (i.e., acting with a clear objective to which central efforts are channelled) and linking them with economic circularity, in the sense of reducing transaction costs—from the most neoclassical viewpoint—and, above all, with the prospect of reducing the distance between producers and consumers (this is not easy in

the case of cooperatives in emerging countries or in highly precarious situations, producers of primary commodities).

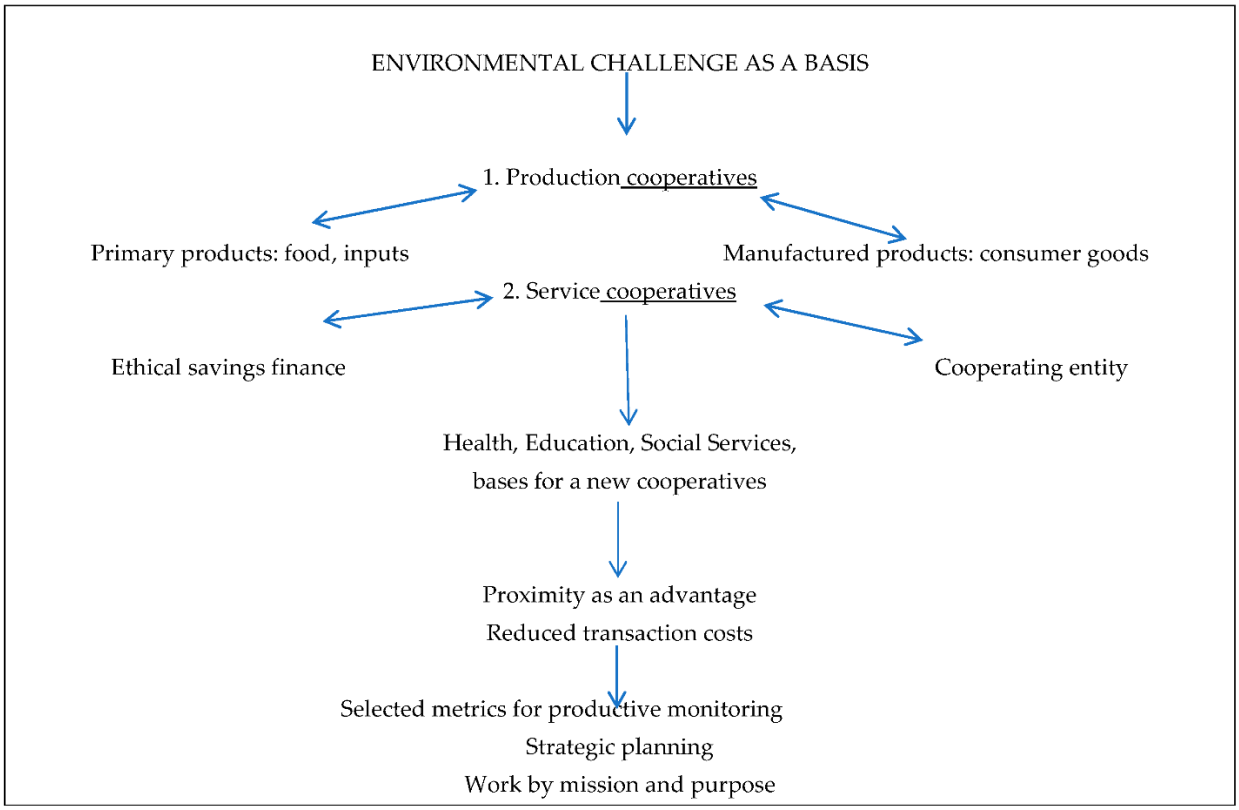

Figure 3. Cooperatives, environment, and economic circularity. Source: own elaboration.

4. Conclusions

Analytical tools are born or are transformed over time. Each context requires new tools that help us to understand it. The current scenario has emerged as a disruptive phase of contemporary history. The tectonic shifts of globalisation and geopolitics, together with the fourth industrial revolution and the challenge of climate change, represent variables profound enough to understand that economic metrics must be rethought. The complexity that surrounds us cannot (and should not) be explained on the basis of strictly chrematistic quantitative indicators. We must go further. Hence the construction of new ways of measuring economic and business activity—new ways that seek interdependence with other disciplines. An interrelation which, in turn, must serve as the spearhead of a general rethinking of economic science. Connectivity with other disciplines of the social sciences or other branches of knowledge is vital to obtain more reliable sources of analysis that allow us to build a proactive framework at the service of material, human, and environmental well-being.

Obviously, there are limitations to achieving the purpose presented in the Introduction of this work. We list the ones we consider most important:

(a) The lack of statistical regularity to obtain the necessary indicators, which have been pointed out in the investigation. This affects both the macroeconomic and microeconomic spheres. There is no tradition of descriptive statistics that addresses environmental problems. At this point, the researcher must literally dive into different databases to obtain those that meet the essential requirements. The most important of them is homogeneity, that is, the ability to make contrasts with other countries in the macro sphere and companies in the micro sphere.

(b) The applicability of mathematical models to the panel of data obtained: econometric methods of causality, development of regressions with comparisons between indicators, etc.
(c) In the microeconomic context, access to business data. There are many reluctances on the part of managers of companies to provide figures and magnitudes of their daily operations. This is an important entry barrier that the researcher must overcome with other resources (consultations, for example, of information of a commercial nature deposited in commercial registries, where companies must communicate specific results).

However, and despite the difficulties mentioned, the research has obtained results that we believe are important:

(a) The justification of cooperatives as economic analysis laboratories, in which indicators that have already been verified in regional economies are adopted and must be adapted to the microeconomic sphere.
(b) The fixing of those indicators that affect determining aspects in the operation of the companies. Not only the income statement, but also the waste they generate, the specific parameters of the circular economy they develop, the energy intensity they consume, and the emissions they cause are crucial elements that, increasingly, are going to be incorporated, with great force, into the analysis of the economy.
(c) The linking of the two previous points with a broader context: the new globalisation and climate change, with specific challenges that have been detailed and commented on in the previous pages.

These new metrics must also assess the impact of business, especially in terms of sustainability. Cooperatives represent a paradigmatic model of management and business conception that is very much in line with the new conception of the economy proposed here. Social economy enterprises understand production as a means of satisfying human and planetary needs. For this reason, the new metrics can find in co-operatives a conceptual nexus that is very similar. They must also introduce new tools to monitor and visualise their transformative capacity. The construction of a sustainable, inclusive, and innovative economy requires organisations that carry these elements in their very conception, and there is no doubt that cooperatives have it. In this article, we have reviewed how the advent of a structural change derived from climate change, globalisation, and new productive forms transforms the scientific paradigm of the economy. Consequently, it poses very important challenges for analysis. We have raised the need to articulate new behavioural functions and new metrics of the economy. In fact, and as has already happened in other phases of the history of the economy, the economy of the knowledge needs to articulate a new scientific paradigm that explains with more fidelity the economic reality. This new scientific paradigm is based on the inter-relation with other disciplines and on overcoming the fixation of the monetary unit as a measure. Cooperatives and the social economy are a good starting point because they include an interpretation of the economy that goes beyond the financial aspect and incorporates qualitative analysis and environmental and social impact.

We think, therefore, that this work, which poses a theoretical challenge, may also be useful for other researchers who have wondered about other ways to face current challenges with different forms of measurement in the field of social sciences.

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