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Procedures Designing Composite Progressive Indicators

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Abstract The contemporary manuscript proposes eight (8) procedures to prescribe concepts and define ways to composite progressive indicators (CPI). Composite appraising supportive progress (CASP) is processed using proper defined indicators as per apt methods. The emphasis is on CPI to express its unification with CASP. Huge range of authors papers is contributed to obtain and estimate the best procedures guiding CPI to progressive economy. The imposed conceptions of CPI are aspects, goals, criteria, categorization and principles with pressure-state-response (PSR) framework. The characterized means to compulsory CPI are design process, framework model and top-down and bottom-up approaches to assess CASP.

Keywords: *sustainable development, sustainability assessment, sustainability indicators, composite indicators, design process, indicators' categorization and principles, Pressure State Response (PSR)*

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1. Introduction

Seeing its commence in the World Conservation Strategy [1], sustainable development is progressively augmented status in presuming, writing and debating since 1990s [2]. Sustainability appears when the present requirements are in control to cover the aptitude of prospect generations and convene their own requests [3]. Sustainable development is aspiring human-centeredness to progress the worth of humanity and respecting nature's aptitude to supply resources and services for life-sustenance. In this stance, sustainable development represents progressing the significance of human life while surviving within the carrying capacity of sustaining ecosystems [4].

Previous attitudes cope with sustainability having rather contradictory accents on these assorted requests [5,7,8], which in turn guide to disparities in types of indicators used to compute the achievements of these sustainability labours. Indicators can be more valuable systematic apparatus than obtainable records, helping in appraisals of tendencies, assisting knowledgeable perseverations, realizing motivations of statistics and supplying inputs into policy procedures [9]. Indicators facilitate communities recognizing imperative exchanges in decision making that have effects on sustainable development in the way to composite appraising supportive progress (CASP) [10].

An attractive proceeding is proposed in the composite appraisal of supportive progress to the management of indicators through several steps as: aspects, goals, criteria, categories as per principles, design process, framework model, top-down & bottom-up approaches, Pressure-State-Response (PSR) frameworks and composite indicators.

2. Review of Sustainability Indicators' Procedures

Eight (8) procedures of sustainability indicators are presented in Table 1 & Table 2. These steps are used to support in policy making, guiding CASP metrics and pursuing sustainable development [12]. More specifically, some descriptions of these indicators procedures are existing in Section 3.

The main purpose of this article is to retrieve proposals, based on authors' review of eight chosen procedures, which have been chosen on the subsequent basis:

1. Hundreds of articles with the keywords of sustainable development indicators and sustainability indicators are counted;
2. A table of authors and indicators acts is created;
3. The most repeated steps on indicators are chosen;
4. Indicators including "sustainability" are selected;
5. A table of eight (8) approaches (Table 1 & Table 2) is constructed as per the aforementioned works.

Table 1. Eight Procedures Defining Composite Indicators

No	Appearance of Procedures per Authors' Papers	
	Procedures	**Authors' Papers**
1.	Aspects and Goals	[11-48]
2.	Criteria	[11,12,49-56]
3.	Categorization and Principles	[11,12,41,57-71]
4.	Design Process	[11,12,72,73,74,75,76]
5.	Framework Model	[11,12,77,78,79,80,81]
6.	Top-Down and Bottom-Up Approaches	[12,82-88]
7.	Pressure State Response (PSR)	[12,42,44,60,89-100]
8.	Composite Progressive Indicators	[11,12,101-108]

The attention is given to eight (8) procedures, which play an important role to the sustainable development and guide to the appraisal of composite indicator. The details of indicators' procedures are in process to support their roles in the progressive economy [12].

3. Discussions on Sustainability Indicators

3.1. Aspects and Goals

3.1.1. Aspects

A wide quantity of reports specify an indicator as [24]:

- A proxy; A sign;
- A parameter; A variable;
- A measuring instrument; A fraction; A counting measure; A value; A measure;
- An index; An empirical model; A meter.

3.1.2. Goals

Three (3) aspirations of the decision-making procedures are raised as [14,15,16]:

(1) Managing the identification of ecology, economy and society towards sustainable future progress, i.e. what are the reasons?

(2) Describing ways to assess the sustainability procedures, i.e. what are the determination spaces?

(3) Retrieving strategies for the management enhancements expected by progressive economy, i.e. how goals can be determined?

3.2. Criteria

Many supplementary prescripts are produced to make steady on values of selected countable as [51-56]:

(1) Responsive;
(2) Asserting;
(3) Imprecise;
(4) Strong;
(5) Revising;
(6) Countable;
(7) Interpretable.

3.3. Categorization and Principles

European specified indicators are accompanied as [61]:

- Shaping biodiversity components states;
- Promoting proper use;
- Conserving biodiversity;
- Integrating ecosystems, goods and services;
- Shepherding resource use;
- Serving in the programs.

Four (4) progressively required principles are as [65]:

(1) Natural world is the topic to systematic augmenting compressions of substances excerpted from the Earth's crust in the sustainable society.

(2) Compressions of stuffs are generated by society.

(3) Nature are preserved by society.

(4) Human requests are met globularly in a sustainable society.

Pathways of the indicators are processed per three (3) types [66,67]:

(1) Augmenting perceptive as practices;

(2) Communicating decision-making as prospect persistence;

(3) Gouging progress toward known targets as environmental consistencies.

3.4. Design Process

An overall process for generating the set of indicators is regarded towards the progressive economy as [73]:

- Beginning the participant designation stage;
- Carrying on imaging;
- Categorizing a correct framework;
- Assigning the progressive characteristics;
- Reporting an iterative series of ways for the prospect generation;
- Assorting the apposite indicators;
- Estimating selected indicators.

3.5. Framework Model

A progressive indicator system encompasses the categorization of strategy views, frameworks, shapes, criteria, indicators and objectives. The conceptive model shows the central procedure stressing on the progressive indicator systems. The current approach is on the peer-reviewed papers; on the worthy support from the indicator patterns; on the producing message of the indicators; on the improving decision making proceedings [76,77].

The indicators persist recognizable, protected and lawful guaranteeing the connectedness of the sustainability progress and determining three (3) requirements [78,79]:

- Acquiring understandable and easy frameworks;
- Purveying the advantages from the indicators within the process;
- Generating an access to many known indicators.

3.6. Top-Down & Bottom-Up Approaches

Two (2) procedural approaches of sustainability approximation carry four (4) basic steps of the Blue Print report [86,87]. Additionally, the connections of the top-down (↓) and bottom-up (↑) approaches in the integrative percept of the progressive economy [88].

3.7. Pressure State Response (PSR) Framework

Indicators are in an pertinent framework with the growth of their usefulness [44]. A driving force-pressure-state-impact-response (DPSIR) indicator framework is an ascendant framework for setting systems of the progressive indicators [89,90,91,92,93]. The framework presumes cause–effect connection between conspiring elements of society, economic and environmental systems [94]. Five (5) types of indicators are as [42]:

(1) Driving force indicators concerning to human activities, procedures and prototypes as an impact on the sustainable development.

(2) Pressure indicators concerning to human activities as a direct result on the characteristic matter.

(3) State indicators representing the noteworthy variations as a result of the earlier exposed pressures.

(4) Impact indicators awarding the ensue of the impact on the people, economy and ecosystems.

(5) Response indicators expressing the acts engrossed by the society in the response to the variations in the SD state.

The present book accents on the Pressure–State–Response (PSR) methodology is generated [95] and further proposed by [17,86,96,97,99,100] to assort the indicators according to the "stress – response" exemplary.

3.8. Composite Composition

Progression of sustainable development references on system engaging five (5) steps [101]:

(1) Associating the scope of the progressively referenced system;

(2) Generating a framework to compromise on the system components;

(3) Destining criterion, principles, latent indicators and reference values;

(4) Assigning the group of indicators and reference values;

(5) Determining the ways of aggregations and images.

Composite indicators are as the stitchery of diverse indicators under sensory and preset methodology [102].

4. Results

An interesting approach is provided to demonstrate eight (8) procedures designing progressive indicators. Number of papers are counted to reveal the authors' contribution to each metric as accessible in Table 2 and Figure 1.

Table 2. Counted authors papers contributions per each procedure

Section	Appearance of Procedures per Authors' Papers	
	Procedures	**Papers**
3.1	Aspects and Goals (AG)	38
3.2	Criteria (C)	10
3.3	Categorization and Principles (CP)	18
3.4	Design Process (DP)	7
3.5	Framework Model (FM)	7
3.6	Top-Down and Bottom-Up Approaches (TDBUA)	8
3.7	Pressure State Response (PSR)	16
3.8	Composite Progressive Indicators (CPI)	10

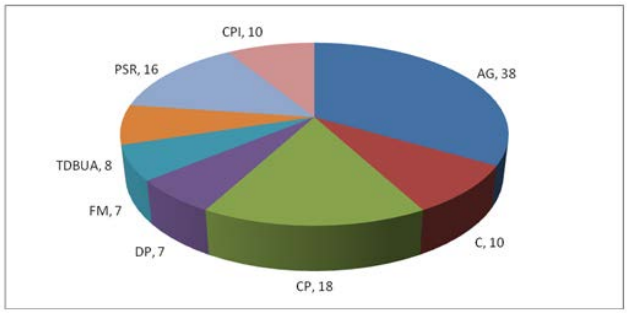

Figure 1. Eight (8) procedures designing progressive indicators

Eight (8) procedures are illustrated in Figure 2 increasing in the numbers per authors papers and emphasizing on the composite progressive indicators (CPI).

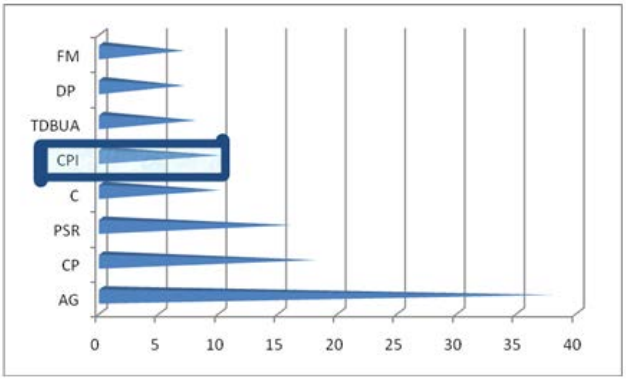

Figure 2. Increasing order of prescribed eight (8) procedures

CPI is in the middle of two (2) ways while describing and defining indicators such as:

(1) Prescription of aspects per their goals, categorization per their principles and criteria (Figure 3);

(2) Identification of framework model, design process and top-down and bottom-up approaches (Figure 4).

Only Pressure–State–Response Framework belong to high rate presentation of first group. The main purpose of PSR is the categorization of prescribed indicators [95]. The key concept of PSR being a part of first group is because of its categorization.

5. Actualization

As CPI is exactly situated on the borders of two (2) methods, CPI is considered to be the key concept of the current paper. The intention of CPI is on the path to progress composite indicators. An approach is given to describe indicators (Figure 3) as:

α. Representation of more ten authors papers per each indicator procedure;

β. Illustration of data impacts per each indicator procedure;

γ. Approval of major impacts of authors active papers as higher products in categorized indicator procedures;

δ. Depiction of each preferred indicator procedures as being more progressive;

ε. Realization of manuscript approving path to progress indicator procedures [12].

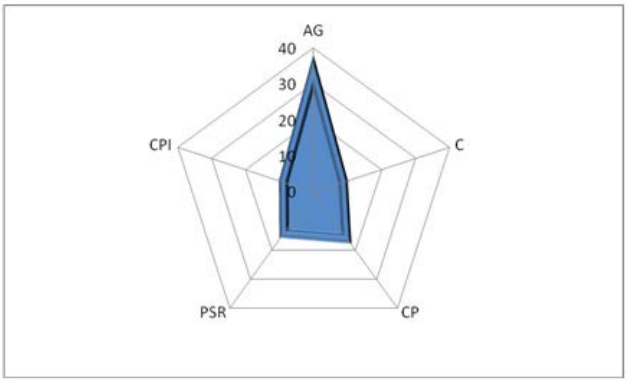

Figure 3. Five (5) procedures designing aspects of indicators

Another approach is provided to define ways of indicators representation (Figure 4) as:

α. Representation of up ten authors papers per each indicator procedure;

β. Illustration of methodological impacts per each indicator procedure;

γ. Approval of minor impacts of authors active papers as higher products in categorized indicator procedures;

δ. Depiction of each preferred indicator procedures as being more progressive;

ε. Addition of CPI as a step combining ways of progressive indicators procedures [12].

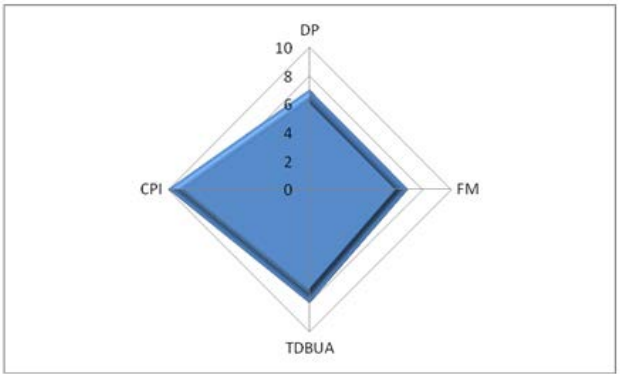

Figure 4. Four procedures designing approaches of indicators

CPI is defined as an aggregation of different indicators as per Figure 3 with a well-progressed methodology as per Figure 4 [102].

6. Conclusion

An interesting approach is provided as the premium supervision of indicators through several steps, the strong emphasis on sustainable development and the composite appraisal of supportive progress as:

(1) Creating aspects for generation of initialized data;
(2) Defining goals for utilization of created aspects;
(3) Prescribing criteria for defined goals;
(4) bCategorizing though principles the prescribed criteria;
(5) Designing the process in the categorized principles;
(6) Modelling the framework in the designed process;
(7) Applying top-down and bottom-up approaches in the modelled frameworks;
(8) Using pressure-state-response (PSR) frameworks in the applied approaches;
(9) Constructing the composite indicators in the appraisals of supportive progresses.

CPI is identified as an assortment of diverse indicators as per Figure 3 by ways of a well-progressed methodology as per Figure 4 [102].

CPI is the construction of described aspects and defined ways of indicators procedures such as:

- Prescription of aspects per their goals, categorization per their principles and criteria (Figure 3);
- Identification of framework model, design process and top-down and bottom-up approaches (Figure 4).

The current paper heightens on the significance of CPI escorting indicators and appraising supportive progress [12]. CPI progression requires the subsequent steps:

α. Preparation of features:
- Aspects;
- Goals;
- Criteria;
- Categories;
- Principles;
- PSR;

β. Identification of ways:
- Design Process;
- Framework Model;
- Top-Down and Bottom Up Approaches.

Composite progressive indicators are projected to be the core of the present paper guiding the sustainable development in the way of the composite appraising supportive progress (CASP) according to eight (8) approved procedures [12].

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