THE FORMULATION OF A COMPOSITE REGIONAL DEVELOPMENT INDEX

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─Abstract ─

The measurement of a region's progress with regards to achieving its developmental potential, plays a crucial role in improving the prosperity and quality of life of local communities. This process has however proven difficult as contemporary views on measurement of regional development are presented as multi-dimensional concepts. Attempts at measuring the development process have made use of composite indices, such as the Human Development Index (HDI) and other index variations. Nonetheless, those indexes mostly fail to truly reflect the various dimensions of the development process. The primary objective of this study was to construct a composite regional development index that successfully measures all the dimensions of development in a quantitative manner. The index was designed to be able to assess regions on a national, regional and local level. The hypothesised index consisted of four dimensions (demographic, social, labour and economic) that were constructed from 17 indicators. Furthermore, the index as developed could be utilised as a tool for future analysis in measuring regional efforts and progress as well as being used to compare different economic functional regions regarding the level of socio-economic development.

Key Words: *Development index, economic development, regional development.*

JEL Classification: O10, O21, R58.

1. INTRODUCTION

Improving the standard of living and quality of life for societies has undoubtedly become one of the most important objectives across the globe (UN-HABITAT, 2013:59). The achievement of this developmental objective is complex and difficult (Cowen, 2016:3). Preceding views on the attainment of higher output as a means to its achievement have faded away on the basis of higher global inequalities and incidences of poverty, notwithstanding the presence of strong economic performances (Rokicka, 2014:11). Greater emphasis has thus been directed towards the collective improvement of social, cultural and economic aspects of areas (Pike, Rodríguez-Pose & Tomaney, 2007:1254). Economic development in this regard has been viewed as an important process which asserts an enhancement of both qualitative and quantitative features in regions contributing to higher levels of prosperity. However, as a multidimensional process, the measurement of the progress which societies have made in their developmental efforts, has proven to be difficult (Stiglitz, Sen & Fitoussi, 2009:6).

This aspect is evidently problematic, given the importance of measurement in the development process (Jacob & Šlaus, 2010:54). Measurements and assessments in relation to these important circumstances have proved imperative for the advancement of societal progress and the understanding of development itself. Nevertheless, in the evolution of its conceptualisation from narrow to broader views the measurement of development has been accompanied by the introduction of various composite indices attempting to measure progress. Indices such as the Human Development Index (HDI), the Weighted Index of Social Indicators (WISP) and the South African Development Index (SADI) have all contributed to the study field but no researchers attribute to these the ability to fully encapsulate the development process (Naudé, Rossouw & Krugell, 2009:319).

These notions and shortcomings reinforced the need for the study and the development of the index as a tool. Following a quantitative approach, the study aimed to construct a new regional development index, with the purpose of providing a more comprehensive and adequate measure towards the progress which societies have made in improving the standard of living. In its construction, the index will enable better identification of the socio-economic aspects where assistance is most needed. The index as developed would furthermore be utilised

as a tool for future analysis as well as to provide comparisons of different regions regarding the level of development.

2. LITERATURE REVIEW

2.1 Conceptualisation of economic and regional development

To understand what the development of regions encompass, it is crucial to address the concept of economic development. Feldman, Hadjimichael, Kemeny and Lanahan (2015:12) assert that doing so requires firstly, to distinguish between economic growth and development. This classification has been made by many academics (Haller, 2012:66; Thirlwall, 2006:3), who have cited the distinction on the premise of quantitative and qualitative aspects. In this context, economic growth is defined as the aggregate increase of output that concerns itself with a quantitative means of measuring progress. Based upon the models put forward by Myrdal (1957:20), Rostow (1959:3) and Solow (1956:65), it tracks progress based on the gross domestic product (GDP) per capita and on how expanding the measure equates to positive effects that trickle down to the economic and social sectors of societies (Haller, 2012:66).

Economic development in contrast is presented as a multi-dimensional concept (Todaro & Smith, 2011:16). Being fundamentally different from economic growth, it provides a comprehensive view on progress that has to some extent evolved the traditional interpretation of growth to include various social aspects (Iyer, Kitson & Toh, 2005:1016). It is defined as a process that primarily revolves around improving the standards of living of societies, which requires improvement of growth and levels of technology, the promotion of education and the reduction of poverty (Carlson, 1999:10). It necessitates a balance between social and economic dimensions of regions, aiming at both a sustainable approach to production and the improvement in the quality of life of households (Huq, Clunies-Ross & Forsyth, 2009:22).

Regional development to this extent is closely linked to the movement and the shift from traditional growth prospects to the modern views of economic and sustainable development. The earliest conceptions of regional development formed their basis mainly from the idea of the performance of industries and how these performances reflected to the creation of jobs, income and growth of the area they were situated in (McCall, 2010:1). This provided a classical approach, describing how the growth in sectors, export activities, the reduction of transactions costs and the provision of concentrated economic activity in areas all

contribute to the economic base of communities (Szajnowska-Wysocka, 2009:77). The view draws from various classical theories such as the "New Trade Theory" (Krugman, 1979:471) and Porter (1990:73) and Krugman's (1991:7) "Theory of Industry Clusters". It refers to the exogenous activities of production, stimulating the endogenous or internal spatial factors which contribute to a region's progress and improvement (Malecki, 1997:25).

However, the contributions and significance of these views have decreased moving into the 21st century (McCall, 2010:2). Modern times have been characterised by uneven spatial developments that have indicated some of the shortcomings of the classical views (Higgins & Savoie, 2009:254). This deeper awareness has primarily occurred on the backdrop of globalisation with the introduction of new territorial structures that have reshaped the socio-economic climate of communities (Rodríguez-Pose & Tijmstra, 2009:5).

Uncontrollably high levels of unemployment and poverty in regions have shown that modern processes do not function solely on quantitative increases in activity, but that greater emphasis should be accorded to social, cultural and human development within communities (Ascani, Crescenzi & Iammarino, 2012:7). Modern views therefore express the endogenous dimensions of regions as the drivers of the exogenous sector, revealing the shift from a top down approach to a bottom up approach to development, also known as local economic development (LED) (Rodríguez-Pose & Tijmstra, 2009:33). Regional development thus looks at all spheres of well-being in communities, which encompass economic, social, cultural and environmental dimensions (OECD, 2014:20).

2.2 Approaches in measuring regional economic development

2.2.1 GDP as measure of regional development

The advancement in the understanding of the concept of regional development has, to an extent, been accompanied by the progress made in measuring it (Jacob & Šlaus, 2010:53). Original attempts still in current use utilise the GDP or gross national product (GNP) as a single denominator for illustrating the progress towards development (Costanza, Hart, Posner & Talberth, 2009:3). Costanza *et al.* (2009:4) consider the use of the indicator as misdirected and misleading because it merely provides insight into the prospects of a region's growth. GDP as a single measure for development has been extensively criticised (Victor, 2010:371). Gurria (2013:4) states that its focus is purely monetary and as such offers only a limited view on the progress of society. It fails to encapsulate the satisfaction of

basic needs of a region, neglects income distribution and inadequately reflects social costs that provide a perspective on the social status of communities (Van den Bergh & Antal, 2014:3). Jacobs and Šlaus (2010:60) nonetheless aver that GDP must not be disregarded in its importance but that it must form part of a framework or index that incorporates human values into economic systems.

2.2.2 A multi-dimensional approach

The process of improving communities and their well-being therefore requires a more germane approach in measuring the modern multi-dimensional form of a people-centric development process (Horsley, Prout, Tonts & Ali, 2015:370). It draws from the capability approach of Sen (1983:153) and similar approaches adopted by Alkire (2009:31) and Nussbaum (2003:34). The direction of measurement must take into account an evaluation of an intrinsic means of a region's social welfare incorporating the dimension of 'human functionings' as well as monetary processes that add to it (Perrons, 2012:20). With this in mind many alternatives have been tabled attempting to address the shortcomings of GDP as a social welfare indicator. These have stretched from single measure replacements such as Hueting's (1980:23) Sustainable National Income (SNI) indicator to combinations of social and economic indicators presented as composite indices. Major international indices in recent times have included the Index of Sustainable Economic Welfare (ISEW) (Cobb, 1989:401), the Weighted Index of Social Indicators (WISP) (Estes, 1997:4) and the Human Development Index (HDI) (UNDP, 1990).

The most comprehensive feature amongst these indexes used to capture regional and territorial advancement is has been the HDI (Schrott, Gachter & Theurl, 2015:1). Kovacevic (2011:1) refers to the index as one that best represents development as the process of enlarging the range of choices at the disposal of individuals. It views the three major dimensions of development as knowledge, health and standards of living, measured by making use of four sub indicators (Sagar & Najam, 1998:250). Gallardo (2009:3) highlights these as life expectancy at birth (health dimension), adult literacy rate and combined enrolment rates for primary, secondary and tertiary education (knowledge dimension) and gross national income (GNI) per capita (standard of living). The index ranks countries, regions and territories from high to low, based on the level of human development within their borders (Maccari, 2014:30).

2.2.3 The composite index approach

Regardless of certain shortcomings, the construction of composite indexes in general has proven useful and as such, has been applied to a significant extent in the assessment of regional performance (Vala & Pinho, 2015:3). The option of subjectively combining indicators that resemble the social, economic, environmental and sustainable dimensions increases the possibility of producing a well-rounded perspective on the modern view of development. The OECD (2008:14) asserts that the main advantage in using these instruments lies in their ability to simplify large amounts of information that assist policy makers and researchers to identify the areas where support is needed most. However, the use of the composite measure also poses some risks. De Muro, Mazziotto and Pareto (2009:4) emphasise that subjectivity in indicator decisions, although advantageous in some ways, might also result in loss of transparency and crucial information if choices are not based on the relevant dimensions.

The judgement of the inclusion and exclusion of indicators in composite indices therefore plays an important part in the quality of a framework (OECD, 2008:44). Sánchez-Domínguez and Ruiz-Martos (2014:84) point out that the insertion of indicators needs to be carefully considered, ensuring that they provide applicable and accurate reflections of the area under consideration. Studies carried out by Bell and Morse (2003:13) and Stiglitz *et al.* (2009:144) have contributed to the construction of criteria in terms of which good and sound indicators are selected.

3. METHODOLOGY

3.1 Research design

The primary objective of the study is to construct a composite regional development index that successfully measures the dimensions of development in a quantitative manner. The hypothesised index consisted of four dimensions (demographic, social, labour and economic) that were constructed out of a total of 17 indicators. The research design adopted a quantitative approach. Quantitative scoring criteria for each indicator were developed based on an extensive literature analysis. This formed the basis for the development index.

3.2 Design of a development index

As mentioned, the index was designed using 17 indicators, as selected after an extensive literature review, grouped into four main categories: demographics, social development, labour and economics.

3.2.1 Demographics

Definitions of these follow.

Population Growth – The annual growth of a region's population. Rapid population growth as well as negative population growth have a negative impact on per capita GDP and income, and eventually on economic development (Easterlin, 1967:99). Extensive growth in populations induces higher dependency measures and consequently lowers consumption and investment spending (Dao, 2012:8), while negative growth has been associated with ageing populations and lower productivity levels (Bloom, Canning & Fink, 2010:595).

Household Size – The average household size in a region. Too-large households may be associated with lower levels of economic development, while households that are too small might have a negative impact on development. Large households are associated with lower per capita income and higher dependency rates (Deaton, 2003:147), whereas excessively small households result in a lower labour supply to areas and smaller safety nets to provide for the elderly and unemployed (Canning, Mitchell, Bloom & Kleindorfer, 1994:6).

Population Density – The number of people per square kilometre for a specific region. Higher population densities are usually related to higher levels of economic development. Compact geographical areas facilitate social interaction, increase the scope for specialisation and result in higher returns on investment for public expenditures (Klasen & Nestmann, 2006:612).

Level of Urbanisation – The percentage of people in a region residing in urban areas. Higher levels of urbanisation usually relate to higher levels of economic development (Bairoch & Braider, 1991:26). Urbanisation contributes to the provision of quality jobs, better access to health care and the creation of innovative processes that foster agglomerative activities (Shabu, 2010:31). Table 1 reflects the scoring criteria for the demographic category.

Table-1: Demographic sub-category and scoring criteria

Index Score	0	1	2	3	4	5
Population	Less than (-)	0.0 - 1.0%	1.1 - 2.0%	2.1 - 3.0%	3.1 - 3.5%	3.6 - 4.0%

Growth in % annual growth	0.0% and more than 4.0%					
Household Size (number of people in household)	Above 6.0 and below 2.5	5.0 - 6.0	4.5 - 4.9	4.0 - 4.4	3.5 - 3.9	2.5 - 3.4
Population Density (number of people/sq km)	0 – 20	21 - 50	51 – 100	101 – 150	151 - 200	200+
Level of Urbanisation in %	0% - 30%	31 - 40%	41 - 50%	51 - 60%	61 - 70%	70% +

3.2.2 Social Development

The following definitions are made use of:

HDI –The level of human development, based on educational attainment, life expectancy and standard of living expressed in an index ranging from zero to one. A unit closer to one is associated with higher levels of economic development. Ranis (2004:7) reiterates that higher levels of human development assist in higher economic mobility of populations, wider capabilities and the improvement in the standard of living.

Gini Coefficient – The equality of income dispersion amongst people in an area. It ranges from zero (perfect equality) to one (perfect inequality), with a lower value being linked to a more significant level of economic development (Kanbur, 2000:791). High levels of inequality imply uneven access to resources and lower investments in human capital, restricting individuals' participation in social and economic processes.

Poverty Levels – The percentage of people in a region earning less than $2 a day (World Bank, 2015:2). Higher percentages of poverty are associated with lower economic development levels (Todaro & Smith, 2011:248). Greater percentages of the population living in poverty not only translate to lower levels of income, but expose more individuals to unhealthy and unsafe conditions marked by lesser access to education and health care.

Literacy levels – The percentage of people in a region with basic writing and reading skills. Higher literacy levels contribute to the advancement of economic development (Reddy, 2004:122). Highly literate areas are usually associated with higher skill sets, greater social awareness, informed decision making.

Basic Infrastructure Index – The level of infrastructural development undertaken in a region. Higher levels of infrastructure provision are linked to higher

economic development levels (Calderón & Servén, 2010:14). The provision of basic infrastructure helps to create enabling environments where inputs can operate efficiently, while inducing greater social progress assisting in the provision of basic services for regions.

Informal Housing – The percentage of the housing stock of a region classified as informal settlements. Housing that is more informal is usually correlated with lower levels of economic development (World Bank, 1993:22). Livelihoods associated with these types of housing structures are associated with lack of basic services, poor health and sanitation levels and likewise indicate lack of capability in dealing with housing needs in urban areas.

Crime Index – The level of criminal incidents in a region, comprising the frequency of various criminal activities. Higher criminal activities are linked with lower levels of economic development (Hossain, 2009:59). A prevalence of criminal activities creates unstable environments and deters resource allocation to areas against the backdrop of discouraged investment. Table 2 reflects the scoring criteria for the social development sub-category.

Table-2: Social development sub-category and scoring criteria

Index Score	0	1	2	3	4	5
HDI	Less than 0.40	0.40 - 0.54	0.55 - 0.64	0.65 - 0.69	0.70 - 0.79	0.80 - 1.00
Gini Coefficient	1.00 - 0.80	0.79 - 0.70	0.69 - 0.60	0.59 - 0.40	0.39 - 0.30	Below 0.30
Poverty Levels in % of population	60% +	51 - 60%	41 - 50%	31 - 40%	21 - 30%	0 - 20%
Literacy in %	Less than 60%	60 - 74%	75 - 84%	85 - 89%	90 - 94%	95 - 100%
Infrastructure (basic index)	Less than 60%	60 - 69%	70 - 79%	80 - 89%	90 - 94%	95 - 100%
Informal Housing (% of total housing stock)	More than 30%	21 - 30%	16 - 20%	11 - 15%	6 - 10%	0 - 5%
Crime Index (composition of all major crimes)	More than 101	81 - 100	61 - 80	41 - 60	21 - 40	0 - 20

3.2.3 Labour

Economic Active Population – Percentage of a region's population who are employed or actively seeking employment. Populations with greater economic activity are associated with higher economic development levels. If more people are economically active this may be correlated with a larger supply of labour and

signify more efficient labour market performances in accessing and providing contributory employment opportunities (Hussmanns, Mehran & Verma, 1990:14).

Unemployment – The percentage of the economically active population who are not employed. Higher levels of unemployment offset economic development processes (Belle & Bullock, 2011) since these are linked with lower levels of spending and investment in areas: the transmission of productive investment towards social security, correlates with lower standards of living (lower health, crime and poverty involvement). Table 3 reflects the scoring criteria for the labour sub-category.

Table-3: Labour sub-category and scoring criteria

Index Score	0	1	2	3	4	5
Economic Active Population (% of total population)	0 - 10%	11 - 20%	21 - 30%	31 - 40%	41 - 50%	50% +
Unemployment (as % of total employed)	More than 30%	26 - 30%	16 - 25%	11 - 15%	6 - 10%	0 - 5%

3.2.4 Economics

The definitions used are as follows:

GDP Growth rate – Rate of change in a region's gross domestic product (GDP) per annum. Increases in the growth of areas is positively correlated with changes in economic development (Thirlwall, 2006:3). Higher output growth accords areas the ability to expand infrastructure, investments and create additional job opportunities.

Trade Surplus – The extent to which the value of exported goods exceeds the value of those that are imported. Greater surplus in trade is positively associated with increases in per capita GDP and consequently economic development (Draper & Freytag, 2008:22). Trade surpluses may be linked to an injection of scarce resources, additional technological knowledge and competitive production processes.

Average Household Income – The region's average income per household earned per annum. Higher levels of household income may result in higher economic development levels (Heerink, 2012:206). Larger incomes among households generally contribute to better developmental outcomes for children, increased savings and stronger social stability for families.

Tress Index – The level of diversification or concentration and specialisation among economic activities in a region: the index ranges from zero to 100 with the lower scores being associated with higher levels of diversification and higher scores indicating concentrated activities. Diversification (lower scores) is associated with higher levels of economic development (Kaulich, 2012:53). The diversification of economic activities contributes to the independence of regions and lowers their vulnerability to exogenous shocks. Table 4 reflects the scoring criteria for the economics sub-category.

Table-4: Economics sub-category and scoring criteria

Index Score	0	1	2	3	4	5
GDP Growth Rate (as a %)	0.0% and less	0.1 - 1.0%	1.1 - 2.0%	2.1 - 3.0%	3.1 – 4.0%	4.0%+
Trade Surplus (as export less import per capita)	Less than R0.00	R0.00 - R500.00	R501 - R1000	R1001 - R1500	R1501 - R2000	R2001+
Household Annual Income (total average income)	R0.00 - R50 000	R50 001 - R100 000	R100 001 - R150 000	R150 001 - R200 000	R200 001 - R250 000	R250 000 +
Tress Index	70.0+	61 – 70	51 – 60	41 - 50	21 - 40	0 - 20

4. CONCLUSION

The aim of this article was to develop a development index which could be used at national, provincial and regional levels. This included 17 quantitative variables from 4 sub-indexes. The index was formulated taking into account best practice recommendations as listed in the literature review. Aspects of importance that were included were: a comprehensive range of domains, well defined indicators, allowance being made for comparisons across regions and countries; lastly, indicators were grouped logically in sub-indexes.

The index will be refined in future by means of the possible weighting of indicators through regression models and by undertaking further comparisons of more regions globally as well as testing the index in certain regions. The implications of the research are that regions could be rapidly compared and assessed. The index also allows for quantitatively based development strategy formulation and policy development.

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