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ASSESSMENT OF SOCIAL DEVELOPMENT IN SLOVAKIA IN THE CONTEXT OF HUMAN RESOURCES

Dana Jašková

Faculty of Social and Economic Relations, Alexander Dubček University of Trenčín, Trenčín, Slovakia

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Abstract
Human resources are a primary source for development of a country. The importance of social policies and human resources for social development is a matter of particular consideration in today's globalizing society. Social development, human capital, human resources are factors that are related. The problem of the country's social development is a topical issue throughout the European Union. When analyzing the development of social development of the country, several concepts and methods are applied in practice. The aim of the article is to compare the development of social development in Slovakia using a composite indicator. Composite indicators as a tool for ranking objects are becoming more and more popular. The article describes various methods of its construction, their advantages and disadvantages. The construction of this aggregate indicator is based on the application of more complex and multidimensional statistical methods. The result of the statistical survey is a finding of steady growth of social development in Slovakia. The close negative dependence between social development and unemployment is illustrated.

Key words
Human resources, social development, composite indicator

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JEL classification: J24, C52, R23

Introduction

The economic growth and social development are complementary and close relationship constraints. The quality of life of the citizen is the result of the development in the ociety. In order to build an advanced society, it is necessary to ensure the interconnection of three basic pillars. The first pillar is the development of production, the second is the scientific and technological progress and the third is the social development of individual. The functions and tasks of social development are very important in the development of society. Social development is the satisfaction of the basic, reproductive and developmental needs of individuals. It is measurable and comparable using various indicators.

Development generally means higher quality and better standard of living in a defined area. Development has both qualitative and quantitative character. Development can be understood as a process of certain changes, which subsequently increases the efficiency and effectiveness of the use of exogenous and endogenous resources (Habánik et al., 2014).

Many different interpretations are provided for social development in practical and theoretical terms, often resulting from different levels of discrimination. This level is chosen by individual authors to determine and define the structure of the category. The social development of society proceeds as a continuous process, which is influenced by a complex of factors of different nature (social, economic and demographic) (Stanek, 2008). Social development is the development of social activities that contribute to meeting the material needs of people (nutrition, housing, clothing, care and health of the so-called need for population reproduction), social needs of people and social security. Social development is closely linked to the development of the social system, especially society as a whole. Social development has a broad dimension and is also influenced by various social processes. The most important factors influencing social development are - needs of individuals and the society, way of life and human development, reproductive process. The social infrastructure in form of health care, education, sport, culture and art promote a sustainable social and economic development of the region and contribute to improvement of citizens' quality of life (Serkova et al., 2018).

Human resources are the cornerstone of the country's development. Human resources, human capital are inherent factors that influence social development. Social development is closely linked to the efficient use of human resources capacity (Koišová et al., 2018).

The social development of the country is closely linked to unemployment. Unemployment, as a result of labour market imbalances, is not only an economic problem but also a social one. Unemployment is also an important political indicator. The social consequences of unemployment are the following: increasing social tensions, disrupted social reconciliation, decreasing standard of living, declining social awareness and cultural standards of the population, marginalizing layers of unemployed. The consequences of unemployment have negative effects on the overall economy of the country as well as have negative impact on the individual and his family.

The ESDE document (2018) examines the impact of demographic trends in the EU countries on intergenerational equity and subsequently analyses the key issues of employment and social development. According to the document, the recent work and social trends are positive. The economic growth affects the employment and contributes to improvement of the social situation. The EU is increasingly moving towards its 75% employment target for 2020. The unemployment rate has fallen in each member state, the social situation is gradually improving. Higher incomes from work combined with social transfers increased the disposable incomes. According to the latest available data, 5,6 million people are at risk of poverty or social exclusion. The tendency has improved since 2012. The income inequality has been very stable in recent years. (ESDE, 2018)

The social development in Slovakia is evaluated by using an aggregate indicator known as the Composite Indicator (CI). A detailed methodology for its construction was published by the OECD in 2008 (OECD, 2008). The OECD's Handbook on Constructing Composite Indicators (Nardo et al., 2005) describes different methodologies that can be applied to combine varied information into a QoL index and the difficulties associated with each part of the process.

Saisana et al. (2005) describe seven steps in which uncertainties arise in construction of the composite indicator: selection of sub-indicators, data selection, data editing, data normalization, weighting scheme, weight's values and composite indicator formula. Ideally, weights should reflect the different importance that individuals associate with each of the underlying dimensions of QoL; however, importance varies and it is controversial to determine empirically an appropriate set of weights.

A composite indicator is an indicator that is constructed from several sub-indicators, which are often non-directional, have different levels and variability and exhibit different degrees of interdependence in pairs. Sub-indicators assess the region from various, often ambiguous, perspectives. The composite indicator, constructed from these sub-indicators should allow a more comprehensive, coherent and synthesizing view of the level of the region (Minařík, 2013). Composite indicators comparing regional performance are increasingly recognized as a useful tool in policy analysis and public communication. The number of CIs in existence around the world is growing. Bandura (2008) cites more than 160 composite indicators.

Despite the growing interest, composite indicators represent a controversial issue. The lack of a standard methodology for calculation and, in particular, the presence of subjectivity involved in the method of construction, contributes to increase of distrust (Booysen, 2002). This raises questions: What is the overall phenomenon of the aggregated indicator? What sub-indicators should be included? How they should be merged? How to deal with the missing data?

Aggregation fulfils an important purpose of object comparison. The development of landscape can be monitored using a composite indicator. It summarizes and completes the view of such multi-faceted phenomena as human development, social inclusion, knowledge economy and competitiveness. However, the summarizing process inevitably leads to a loss of basic information. Micklewright (2001) warns about the danger caused by absence of a good composite index. The excessive public attention can again focus on one or several dimensions, thereby abolishing the original intention to render a multidimensional phenomenon. In fact, this could endanger the credibility of evaluation of regions.

The aim of the article is to construct a composite indicator that captures important aspects of Slovakia's social development in the period 2000-2017.

Theoretical background

The assessment of social development of the region is diverse, taking into account the purpose pursued, the choice of method and its correct application, and selection of indicators for their evaluation. A key role is played by the way they are integrated into a single indicator and the subsequent correct interpretation of the results (Michálek, 2014). The indicator represents a special subset of the statistical results. It is a statistical tool that monitors the nature and level of phenomena and processes, as well as monitors their development. This implies certain characteristics of the indicator:

- significant, relevant, understandable,
- transparent,
- analytical,
- complete,
- credible,
- internally comparable, externally comparable,

- intertemporal (Michálek, 2014).

These requirements must be respected when selecting the appropriate indicators. The number of indicators should be neither small (distorted real situation) nor too large (loss of clarity and transparency of interpretation). Indicators must be regularly measured and officially published. Some institutions may be mentioned (OECD, EUROSTAT, ŠAÚ SR), documents (National Strategy of Regional Development of the Slovak Republic, Europe 2020 Strategy) and authors (Kutcherauer, 2010; Sloboda, 2006; Michálek, 2014; Nardo et al., 2005) who are scientifically involved in selecting the appropriate indicators.

An integrated approach to issue is required when assessing the social development of a country. This is related to the construction of the composite indicator (CI). There are currently several ways to calculate it. One of the most modern approaches is the construction of the so-called ′Benefit of the doubt′ composite indicator (Rogge, 2012; Cherchye et al., 2007). Its construction is using DEA models (Verschelde, Rogge, 2012).

The construction of *CI* composite indicator can be described by the following steps:

1. Determining the theoretical framework
2. Selection and combination of individual sub-indicators, assessment of their material significance and statistical characteristics normalization and aggregation of original indicators, determination of their weights (scoring method, standard variable method, distance from fictitious object)
3. Add missing data
4. Multi-criteria analysis
5. Normalization
6. Assign weights to a pointer
7. Aggregation
8. Uncertainty analysis
9. Return to original data
10. Linking the constructed composite indicator to the original indicators
11. Visualization of results.

Summary indicators have both advantages and disadvantages. The following table briefly summarizes the positive and negative aspects of the aggregate indicators.

Table 1 Advantages and disadvantages of summary indicator

Advantages	*CI* can be used to summarize the complex phenomenon and thus to facilitate decision making.
	CI may be easier to interpret than the set of indicators used to construct it. It simplifies the comparison of individual regions on the basis of complex measures.
	CI may be of interest to the public by allowing easy comparison of the performance of a given region over time with other regions.
	CI can help simplify the set of indicators while adding new information.
Disadvantages	*CI* may lead to incorrect and non-robust conclusions if it is not properly constructed or interpreted.
	The possibility of a simple interpretation of *CI* may lead to simplified conclusions. *CI* should be used together with input indicators to more sophisticated conclusions.
	The construction of *CI* involves several decision phases.
	Using weights can be a source of different opinions.
	The use of *CI* increases the amount of data required because it is necessary to collect data for all input indicators. Missing data reduces the quality of statistical analyses.

Source: Saisana and Tarantola, 2002

Methods for the compilation of aggregate indicators include direct aggregation techniques, methods used for data purification, their modification, statistical processing and control of the results obtained and their presentation. A well-designed aggregate indicator should always include trends as well as contradictory developments of individual components and factors. When constructing the composite indicator, it is important to proceed from the correct definition of the measured characteristics, also from the knowledge of the essential links of the problem (Hrach, Mihola, 2006). Advantages and disadvantages associated with the creation of summary indicators can be divided according to Hrach and Mihola (2006) into non-mathematical (subjective) and mathematical (objective). Subjective advantages make it possible to summarize complex or multidimensional data, they can be more easily compared to each other, whether between individual objects or to track developments over time. Subjective disadvantage might be detected in case of inappropriate construction misinterpretation. They can lead to erroneous conclusions and strongly influenced by the choice of sub-indicators used or by the weighting. One of the objective advantages is that aggregate indicators reduce the number of variables. Objective disadvantages include the fact that it is impossible to do without knowing the values of all the variables included in calculation.

In mathematical terms, it is necessary to keep in mind the aggregate indicators that are generally valid for all mathematical models. These indicators can never perfectly describe the reality as a whole, they only testify to the part that has been described by the data, and the telling level is always due to the methods used to process the data (Hrach, Mihola, 2006).

Material and methods

Methods of construction of the aggregate indicator can be divided into statistical-analytical methods, which are focusing on selection of sub-indicators and statistical-descriptive methods, allowing the calculation of the aggregate indicator. The essence of analytical methods is to verify the validity of hypotheses about the significance of individual variables and the suitability of the model in terms of their mutual relations. These methods can be classified as exploratory or extrapolation methods of data analysis.

One-dimensional statistical methods are based on the calculation of basic statistical characteristics, as well as on graphical and tabular representation of data. The basic statistical characteristics provide information on the properties of the population in terms of revealing variability, degree of symmetry and skewness, the normality of distribution, also revealing outliers and suspects in the selection. The identification of outliers is the first impulse to doubt whether the data originates from a normal distribution. This assumption is important, but is often not critical to all methods. Partially, normality can be assessed using a probability graph. Exact tests are used for calculation (Shapiro-Wilk, Kolmogorov-Smirnov).

Multivariate methods do not have predefined hypotheses that would lead to a decision to accept or not. These methods depend on the experience of analysts, expertise and knowledge of the subject matter. When constructing aggregate indicators, these methods serve to find the optimal number of key indicators. These are Cluster analysis, Correlation analysis, and Principal component analysis. The methods of multivariate statistical analysis provide us with solutions to the following tasks:

- reduce excessive number of variables,
- multidimensional classification, which allows rules to be set according to which objects are assigned to one of several groups,

- object typology, ordering or hierarchical sorting into relatively equal groups and ordering of these groups according to selected criteria.

The statistical-descriptive methods allow the computation of the aggregate indicator using aggregation techniques and an analytical-hierarchical process, which is based on different ways of determining weights for individual indicators when aggregating them. The starting point of all these methods is the matrix of entities (municipality, region, state) and their sub indicators. The aggregate indicator may be developed in the form of weighted and unweighted. In the form of unweighted, each indicator of equal weight enters the calculation of the CI aggregate. In the weighted form, weights are assigned to individual sub-indicators according to the selected method. (OECD, 2008)
Throughout this section, we will use the following formula:

y_i^t: value of indicator i in Slovakia at time t, where $i = 1, \dots, n$.

I_i^t: normalized indicator value i at time t.

$w_{v,i}$: the weight associated with the indicator i where $v = 1, \dots, V$ is the method of determining the weight of the indicator,

CI^t: the value of composite indicator at time t.

The following methods can be used to normalize input indicators: Normalisation based on interval scales, Standardisation z-scores, Min-Max, Distance to reference, Indicators above or below the mean, Methods for cyclical indicators and Percentage of annual differences over consecutive years.

We can define the weight in the context of composite indicator creation as a value that expresses the relative importance of the indicator in comparison with others. Determination of the weights of the indicators involved in the composite indicator can be accomplished by several methods. They can be divided into two groups. The first group consists of subjective decisions. This includes the following methods:

- Expert decision, according to which weights are assigned to individual indicators based on the judgment of selected experts. It is a subjective method and recommended to apply for a number of indicators less than 10 (Hrach, Mihola, 2006).
- Scoring method, where the importance of the indicator is determined on the basis of the number of points awarded ranging from 0 to 100 (the more significant the criterion, the more points are assigned to it). The sum of the points assigned to all criteria is 100. The standard weights are then calculated as a ratio of the points assigned to j-pointer and the sum of all points.

The disadvantage of these weighting methods is a high degree of subjectivity, which is based on personal perception of preferences.

The second group consists of methods that are based on an accurate (objective) assessment of the weights of the original indicators. The following 7 methods are used to construct the composite indicator ($v = 1, \dots, 7$):

1. Equal weighting (EW)
2. Principal component analysis (PCA)
3. Benefit of the doubt (BOD)
4. Unobserved components models (UCM)
5. Budget allocation process (BAP)
6. Analytic hierarchy process (AHP)
7. Conjoint analysis (CA)

There is no uniform approach for aggregating individual indicators into one aggregate indicator. Saisana and Tarantola (2002) list several basic types of aggregation techniques that they consider as representative of the basic methods of aggregation. These methods are divided according to the way of inclusion of sub-indicators in the calculation into linear, geometric and multicriterial. Aggregation methods also vary. While the linear aggregation method is useful when all individual indicators have the same measurement unit, provided that some mathematical properties are respected. Geometric aggregations are better suited if the modeller wants some degree of non-compensability between individual indicators or dimensions. The MCA method is recommended when highly different dimensions are aggregated in the composite, as in the case of environmental indices that include physical, social and economic data. The following table shows the compatibility between different methods of aggregation and weighting:

Table 2 Compatibility between different methods

Weighing methods	**Aggregation methods**		
	Linear	*Geometric*	*Multicriterial*
EW	yes	yes	yes
PCA/FA	yes	yes	yes
BOD	yes (Min-Max normalization)	No	No
UCM	yes	No	No
BAP	yes	yes	yes
AHP	yes	yes	No
CA	yes	yes	No

Source: OECD, 2008

Results and discussion

Social development is characterized by some selected official indicators. The selection of suitable indicators in this analysis is based on defined indicators of sustainable development. Sustainable development means a targeted, long-term, comprehensive and synergistic process that affects conditions and all aspects of life (cultural, social, economic, environmental and institutional). At the meeting on 18 April 1996 in New York, the United Nations Commission on Sustainable Development approved sustainable development indicators. 125 indicators from Slovakia were suitable for the whole set. The National Sustainable Development Strategy of the Slovak Republic, adopted in 2001, includes the main dimensions of sustainable development. Taking into account the specifics of Slovakia, 21 relevant indicators of sustainable development have been shown. The set of indicators consists of the environmental, economic, social and institutional pillar. The indicators from social pillar were chosen to assess the development of social development in Slovakia. Table 3 provides a detailed overview of the indicators under consideration together with their links to sustainable development (SD):

Table 3 Indicators of social development

SD issues	The theme of SD	SD indicators
Health state of population, factors influencing health state of population	Life expectancy at birth	Life expectancy at birth (males, females)
	Population with access to public sewerage and safe drinking water	Share on population supplied by water from public water-supply system
		Share on population connected up to public sewage system
	Fertility	Fertility
Demographic development	Demographic change	Development of basic demographic indicators
Urbanization trends	Population migration and urbanization trends	Population migration
Land footage	Build-up areas	Surface area
Transportation	Consequences of transport	Accident frequency

Source: Enviroportal.sk

For further analysis, three indicators were processed from demographic data: Mean age of mother at birth, Increase of the population and Health facilities. Life expectancy at birth was studied separately for women and men. Thus, 11 indicators entered the analysis.

The input data underwent a statistical analysis. Data consistency and multi correlation were excluded from the analysis. Given different unit of data examined, they were normalized by the Min-Max method according to the following:

$$I_i^t = \frac{y_{i,t} - y_{min}}{y_{max} - y_{min}}$$

in case of positive scope and in case of negative scope of the indicator according to the relationship

$$I_i^t = \frac{y_{max} - y_{i,t}}{y_{max} - y_{min}}$$

where x_{max} is a maximal value of i-th indicator and x_{min} is minimal value of i-th indicator for the period under review $T = 12$. The first EW method was used to determine the weights of individual indicators. Using equal weighting method, the equal weight is calculated for each indicator:

$$w_{1,i} = \frac{1}{Q}$$

where $Q$is number of indicators. There is a risk that pillar with more indicators will have a higher influence in the composite indicator. There is only one pillar in our case. The main strength of the method is the simplicity.

The principle of using the above method was that the values of indicator *i* were also compared for the monitored period 2000 - 2017. The worst year was marked with value 0, while the value was 1 in the best year. For most indicators, the worst year was 2000, and the best year 2017. Indicator y_5-Fertility provided the worst performance in 2002, indicator y_7-Increase of the population in 2001 and indicator y_{11}-Accident frequency performed badly in 2006. On the

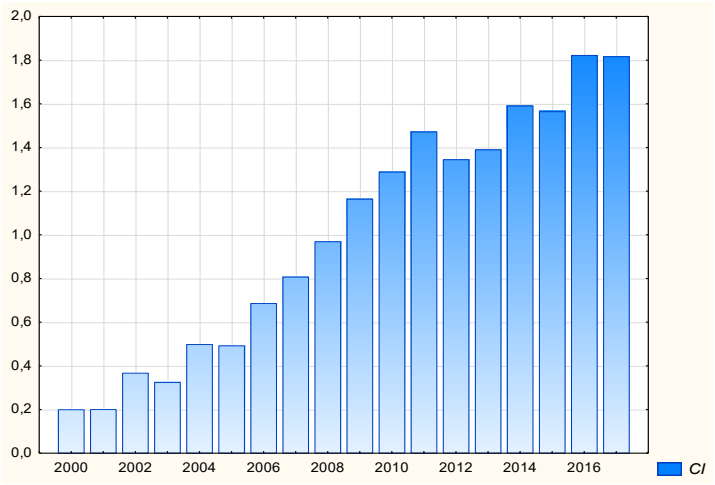
other hand, y_7 showed the best values in 2011, while indicator y_8-Health facilities reached the lowest value in 2012.

Subsequently, a composite indicator was calculated for each reference year, *t* using a linear aggregation method based on the following:

$$CI^t = \frac{\sum_{i=1}^{n} I_i^t \,.\, w_{1,i}}{\frac{\sum_{i=1}^{n}\sum_{t=1}^{T} I_{i.}^t w_{1,i}}{T}},$$

The average of *CI* value is 1. The lower the value is; the worse evaluation is achieved. The development of composite indicator following social development is clearly illustrated by the following bar graph.

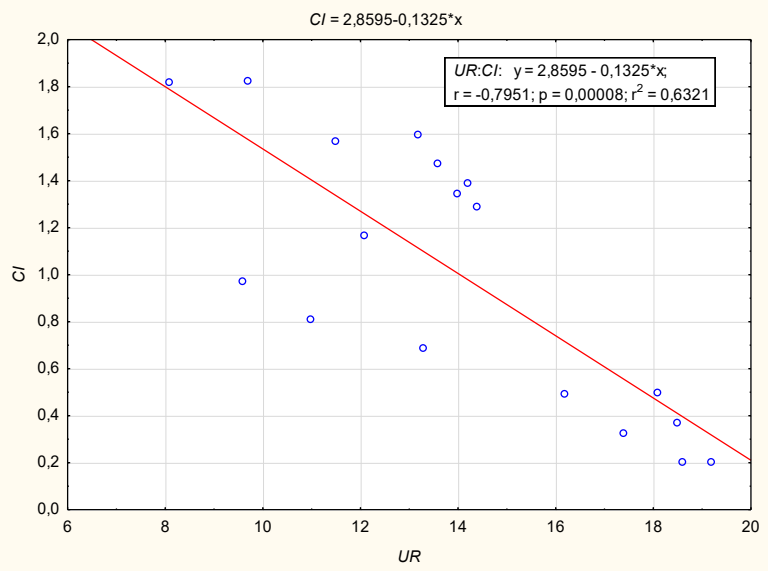
Figure 1 Progress of CI social development in SR



Source: own processing

The figure clearly shows the increase of social development in Slovakia. A slight decline can be detected between 2002 and 2003. Therefore, $CI^{2003} < CI^{2002}$. During this period, a decrease of population migration indicator was recorded. Another significant decrease was recorded between 2011 and 2013, when $CI^{2011} < CI^{2012} < CI^{2011}$. In this period, the following indicators decreased significantly: Fertility, Increase of the population and Migration of population. A slight decrease also occurred between 2014 - 2015. The following indicators showed decline as well: Natural increase, Population migration. It can be assessed that fluctuation in social development was caused by fluctuations in demographic indicators. This is a general problem for all developed countries of the European Union.

Subsequently, the relationship between social development and unemployment was analysed. The following graph shows the interdependence between the Composite indicator *CI* of social development in Slovakia and the Unemployment rate *UR*.



The degree of tightness of the relationship under investigation is quantified by a correlation coefficient $r = -0{,}7951$. Probability value $p = 0{,}00008$ indicates a statistically significant negative correlation relationship between *CI* and *UR*. Thus, with declining unemployment rates, social development in Slovakia is increasing. The GDP growth in the UN 2030 Agenda is no longer considered a key indicator of the development of society. It is recommended to focus on a set of indicators that measure quality of life. Four integrated development programs are preferred with 77 indicators for monitoring and analysis recommended. Priority is given to indicators of the quality of life and human resources development. Some of them are related to employment or unemployment.

Conclusion

Sustainable development is a comprehensive set of strategies that enable economic tools and technologies to meet peoples' social needs, while fully respecting the environmental limits. Sustainable development is a way of development that meets the needs of the present without compromising future generations. Social development is an important pillar of sustainable development. Social development indicators and their analysis enable a quantitative assessment of the country's social development. The correct interpretation of the indicators under review constitutes an integral part of the evaluation of regional policy. It provides space for planning improvements in the development of the country.

The article evaluates the social development of Slovakia using selected indicators of social development. The composite indicator is used to comprehensively evaluate the position of the country in the social area in the period under review. The relationship between the social development of the region and an important indicator of human resources is also examined. The relationship between the composite indicator and the unemployment rate is also reported. A statistically significant negative relationship was demonstrated.

This approach characterizes Slovakia as a country with a continuous increase in social development.

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Author contact

RNDr. Dana Jašková, PhD., Alexander Dubček University of Trenčín, Faculty of Social and Economic Relations, Department of Economy and Economics, Študentská 3, 911 50 Trenčín, Slovakia. Email: *dana.jaskova@tnuni.sk*

ORCID: *https://orcid.org/ 0000-0002-7250-9207*