# THE MULTIPLE CRITERA ASSESSMENT OF SOCIAL RESPONSIBILITY IN ORGANIZATIONS

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## Abstract

The assessment of social responsibility (SR) in organizations requires a hierarchy of requisitely holistic factors and indicators. This paper introduces the development of measuring instrument for this multidimensional problem. Differently from using factor analysis based on principal component analysis extraction method, it presents the use of exploratory factor analysis (EFA) to develop the multiple criteria model for the assessment of SR. It also discusses several approaches for the weights determination: because considering factor loadings of the indicators obtained via EFA does not tend to differentiate between the levels of importance, the SMARTER method based on ordinal scale was used in criteria weighting. It proposes the solutions for measuring local alternatives' values with respect to indicators by using value functions. Application possibilities of the results of the multiple criteria assessment of SR are illustrated and discussed via a real-life case of organizations in Slovenia.

**Key words:** *Exploratory factor analysis, Multiple criteria model, Social responsibility, Weighting*

## 1. INTRODUCTION

In recent decades, social responsibility (SR) has become an important part of activities carried out by organizations, which are aware that the way they behave in relation to society and environment influences their success and is possible source of competitive advantage. Fundamentally, SR refers to a company´s ability to provide benefits to society (Swanson, 1999). The so called triple bottom line in SR includes the consideration of economic, social and environmental dimensions in the formulation of

corporate guidelines (Menz, 2010). The main factors of SR can be defined by following the European Union (EU) understanding of it: SR is aimed to reach beyond charity to diminish or prevent power-holders abuses/misuse of their co-workers, other business partners, broader society, and natural environment, beyond official requirements on a voluntary basis (EU, 2001). EU (2002) defines SR of companies as a concept, through which companies voluntarily integrate social and environmental issues in their business activities and in their interactions with various stakeholder groups.

The assessment of SR in organizations requires a hierarchy of relevant, requisitely holistic factors and indicators. This paper presents the development of measuring instrument for this multidimensional problem and the use of exploratory factor analysis (EFA) to explore the multiple criteria model for the assessment of SR. The innovative aspect of this paper is therefore the use of EFA – as distinguished from the factor analysis based on principal component analysis extraction method – to develop the multiple criteria model for the assessment of SR which enables overcoming the separate assessment by single attributes. It also brings solutions for criteria weighting and for measuring local alternatives' values with respect to indicators in the assessment of SR.

In the multiple criteria assessment of SR, a complex problem that consists of a goal, criteria (dimensions, constructs or factors), very often some levels of sub-criteria (the criteria on the lowest criteria level are called attributes), and alternatives, is structured in a hierarchical model. When assessing the SR with respect to multiple criteria, the importance of criteria should be determined. Because considering factor loadings of the indicators obtained via EFA does not tend to differentiate between the levels of importance, the SMARTER method (Edwards and Barron, 1994) was used in criteria weighting: starting with the most important criterion, we rank the attributes in order of importance for criteria changes from their worst level to their best level. The weights were obtained by the centroid method (Solymosi and Dombi, 1986). By using the means about SR regarding natural environment, relationships with employees, relationships with broader social environment, customer relationships and leadership, the local values of alternatives – different groups of organizations in Slovenia -- were measured by using value functions. The additive model was used to obtain the level of SR – the aggregate value of SR measure.

The organization of this paper is as follows. The second section presents the selected methodological particularities used to develop the multiple criteria model for the assessment of SR. The development of the measuring instrument and the multiple criteria model, as well as the assessment of SR in organizations is presented and illustrated via a practical application in organizations in Slovenia in the third and the fourth section. The last section discusses application possibilities of the results of the multiple criteria assessment of SR in organizations.

## 2. METHODOLOGY USED TO DEVELOP THE MULTIPLE CRITERIA MODEL

### 2.1. Factor analysis based on principal component analysis versus exploratory factor analysis

DeCoster (1998) pointed out that EFA is often confused with principal component analysis (PCA), although there are differences between the two analyses (DeCoster, 1998):

- EFA assumes that the measured responses are based on the underlying factors while in PCA the principal components are based on the measured responses.
- EFA assumes that the variance in the measured variables can be decomposed into that accounted for by common factors and that accounted for by unique factors while the principal components contain both common and unique variance.
- The purpose of PCA is data reduction: to derive a relatively small number of components that can account for the variability found in a relatively large number of measures; the primary objectives of an EFA are to determine the number of common factors influencing a set of measures and the strength of the relationship between each factor and each observed measure.

Factor analysis based on PCA extraction method has already been used to reduce a large number of variables to a smaller number of factors for modelling purposes and to determine which sets of items should be grouped together in the multiple criteria model (Begičević, Divjak and Hunjak, 2007). Differently from this, EFA was primarily used in our survey about SR to explore the SR model, to determine the number of constructs (i.e. factors, the first level criteria) influencing the set of measures (i.e. indicators, the second level criteria or attributes) of SR, and to determine the strength of the relationship between each factor and each observed indicator. It was therefore used to select the "best" indicators of each factor.

### 2.2. Criteria weighting

When assessing the SR with respect to multiple criteria, the importance of criteria should be determined. We wanted to achieve diversification between the criteria's importance[1]. The factor loadings of the indicators obtained via EFA can be used to obtain the weights with normalization. However, when considering factor loadings of the indicators obtained via EFA does not tend to

[1] Namely, the calculation methodology of Kinder, Lydenberg and Domini, one of the world first rating agencies, specializing on the analysis and assessment of corporate social performance that takes multidimensionality of SR into account, has already been criticized because almost all factors have the same weight (Menz, 2010). Different criteria do not have the same importance across all industries, in all economic, business, social and environmental situations.

differentiate between the levels of importance, we suggest that the SMARTER method is used in criteria weighting.

Edwards and Barron (1994) presented the SMARTER method, which only uses the ranking of criteria to derive weights. The idea is to use the centroid method of Solymosi and Dombi (1986) so that the weight of a criterion ranked to be $j$-th, $w_j$, is:

$$w_j = \frac{1}{m}\sum_{k=1}^{m}\frac{1}{k}, \tag{1}$$

where $m$ is the number of criteria. The centroid method minimizes maximum error by identifying the centroid of all possible weights maintaining the rank order of importance of criteria. The SMARTER method is thus based on an ordinal scale and is considered as an improved version of the Simple Multi-Attribute Rating Technique (SMART) (Edwards, 1977), based on an interval scale. In the SMARTER method a decision maker is asked to rank the criteria in the order of importance for the criteria changes from their worst level to the best level. Starting from the most important criterion, the decision maker ranks the criteria in the order of importance.

## 2.3. Measuring local and global alternatives' values

When alternatives are organizations or even groups of them, data about SR in each organization or group of them can be obtained as the mean of the respondents' data for each attribute. Since the measurement scale used in this survey (see section 3.1) is the interval one and since higher the agreement with the statements, better the SR, the local alternatives' values with respect to the attributes can be obtained by using the direct method or by increasing value functions.

A value function can be defined as a mathematical representation of human judgements, because it translates the performances of the alternatives into a value score, which represents the degree to which a decision objective is matched (Beinat, 1997). Therefore, a value function maps the data of alternatives with respect to each attribute to the local value of alternatives. According to own authors' experience, Web-HIPRE (Helsinki University of Technology, 2005) is especially applicable for measuring the alternatives' values with respect to each attribute by value functions. Using Web-HIPRE, we can create linear, piece-wise linear or exponential value functions. The lower and upper bounds of value functions should be determined for each attribute: the lower bound is less than or equal to the lowest datum at the considered attribute, and the upper bound is greater than or equal to the highest datum at the considered attribute.

The additive model was used to obtain the level of SR – the aggregate value of SR measure in several groups of organizations. Since the criteria in our model (Table 2) are structured in two levels, the alternatives' values with respect to the first level criteria were obtained by:

$$v_j(X_i) = \sum_{s=1}^{p_j} w_{js} v_{js}(X_i), \text{ for each } i = 1, 2, \ldots, n, \tag{2}$$

where $v_j(X_i)$ is the value of the $i^{th}$ alternative with respect to the $j^{th}$ criterion, $p_j$ is the number of the $j^{th}$ criterion sub-criteria, $w_{js}$ is the weight of the $s^{th}$ attribute of the $j^{th}$ criterion, and $v_{js}(X_i)$ is the local value of the $i^{th}$ alternative with respect to the $s^{th}$ attribute of the $j^{th}$ criterion. The aggregate alternatives' values were obtained by (Čančer, 2011):

$$v(X_i) = \sum_{j=1}^{m} w_j \left( \sum_{s=1}^{p_j} w_{js} v_{js}(X_i) \right), \text{ for each } i = 1, 2, \ldots, n, \tag{3}$$

where $v(X_i)$ is the value of the $i^{th}$ alternative and $w_j$ is the weight of the $j^{th}$ criterion.

## 3. EMPIRICAL SURVEY: SOCIAL RESPONSIBILITY OF ORGANIZATIONS IN SLOVENIA

### 3.1. Data collection

Considering theoretical foundations of SR and the answers obtained with the in-depth interviews, conducted firstly with five academics in Slovenia and secondly with senior managers in organizations, the original questionnaire about SR in organizations was built. It was tested and validated in the preliminary survey, in which 150 students were enrolled. Following the results of the preliminary survey, some modifications of layout, wording, and number of questions were made. The final questionnaire consists of 31 Likert-type statements designed for managers to express their opinions about SR. The 7-level Likert scale was used: from 1 – absolutely not agree to 7 – completely agree. Then we surveyed organizations in Slovenia.

2409 organizations were randomly selected from the organizations in Slovenia. During the period from April 2011 until June 2011, 320 fulfilled questionnaires were gathered from managers, representing a response rate of 13.3% (Šarotar Žižek, 2012).

## 3.2. Results of exploratory factor analysis

*Table 1: The results of exploratory factor analysis for social responsibility in organizations in Slovenia.*

| Statement | Cronbach's alpha | Communa-lity | Factor loadings | | | | |
|---|---|---|---|---|---|---|---|
| We comprehend social responsibility as fairness without abuses in relationships with employees, business and other partners and the limits, prescribed by law. | 0.871 | 0.811 | 0.864 | | | | |
| We are careful and fair to our employees, so we do not have experiences with their dissatisfaction (strikes and bad work). | | 0.747 | 0.828 | | | | |
| Corporate social responsibility to employees is based on care for pleasure, creativity and safety at work, which exceeds the level prescribed by law. | | 0.747 | 0.822 | | | | |
| We encourage employees to strengthen tolerance and harmony in the workplace. | | 0.622 | 0.690 | | | | |
| Socially responsible business is part of the policy, strategy and tactics (daily practice) of our organization. | 0.879 | 0.815 | | 0.864 | | | |
| On the basis of the strategy of social responsibility, organization equivalently treats the environment, community, business partners, employees, managers and owners. | | 0.833 | | 0.826 | | | |
| The organization has a social responsibility defined in its vision and / or in the mission and both are regularly exercises in daily practice. | | 0.807 | | 0.809 | | | |
| We assure scholarships and employ lawyers. | 0.746 | 0.706 | | | 0.812 | | |
| We co-operate with schools in our community in different ways. | | 0.653 | | | 0.780 | | |
| We give and implement initiatives that can contribute to the development and welfare of the community in which we work. | | 0.638 | | | 0.703 | | |
| We are members of the associations of interests that are characterized by socially responsible activity. | | 0.478 | | | 0.605 | | |
| The produced wastes are recycled to the greatest possible measure. | 0.786 | 0.837 | | | | 0.867 | |
| We reduce the amount of waste and packaging, we clean our sewage, in the chimneys we have modern efficient filters, etc. | | 0.799 | | | | 0.805 | |
| Ingredients on the products are labeled correctly and fairly. | 0.618 | 0.782 | | | | | 0.864 |
| We raise awareness of our customers about sustainable / safe use of our products (services). | | 0.666 | | | | | 0.715 |
| Kaiser-Meyer-Olkin measure: 0. 867<br>Cumulative percentage of explained variance: 72.937% | | | | | | | |

Source: Results were obtained by SPSS using the data collected in the described survey (see section 3.1)

When processing the obtained data, we tested the dimensionality of the constructs of SR. For this purpose, we utilized EFA. The EFA results are shown in Table 1. The value of Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy presented in Table 1 indicates that factor analysis is appropriate, since KMO > 0.5 (KMO = 0.867). Table 1 shows that the five constructs, named as factors in Table 2, explain the most variance for all variables, namely 72.937 %. Furthermore, Table 1 shows that all communalities that express the variance in observed indicators accounted for by common factors are greater than 0.4. The indicators are accordingly weighted on individual factors. This is also proved by factor loadings, which are all greater than 0.6 (only two of them are lower than 0.7). Table 1 illustrates a very clean factor structure in which convergent and discriminant validity are evident by the high loadings within factors, and no cross-loadings between factors. The Cronbach's alpha coefficients show adequate reliability for all five constructs – they are all greater than 0.6.[2]

In this solution from the initial 31, we kept 15 indicators that are thus best influenced by the constructs, as presented in Tables 1 and 2.

## 4. THE MULTIPLE CRITERIA MODEL: DEVELOPMENT AND APPLICATION

Within the EFA we got five constructs, namely: relationships with employees, leadership, relationships with broader social environment, natural environment, and customer relationships (Table 2). Table 2 presents the sets of indicators that are influenced by the constructs, and thus presents the structure of the multiple criteria model for the assessment of SR in organizations. In the multiple criteria decision aiding terminology, constructs are considered as factors (the first level criteria), while statements (measures) are considered as indicators (the second level criteria or attributes).

In Table 2, the criteria are ranked considering the independent SR expert viewpoint based on theoretical foundations and own professional experience by using the SMARTER method, and the weights were obtained by (1), as written in section 2.2.

The hierarchy structure completed with weights that is presented in Table 2 was applied for the assessment of SR in groups of organizations. An organization was classified in the proper group with respect to the number of its employees. Thus we obtained six alternatives: $X_1$ – the group of organizations that employ 10-19 employees[3], $X_2$ – the group of organizations that employ 20-99 employees, $X_3$ – the group of organizations that employ 100-299 employees, $X_4$ – the group of

[2] Recommendations for EFA can be found in e.g. (Costello and Osborne, 2005; Hair, Black, Babin and Anderson, 2010).

[3] From the population of organizations in Slovenia we excluded the ones with less than 10 employees. Namely, it was presumed that SR has not been developed in organizations that employ less than 10 employees.

organizations that employ 300-499 employees, $X_5$ – the group of organizations that employ 500-999 employees, $X_6$ – the group of organizations that employ 1000-4999 employees.

*Table 2: The ranks and the weights based on theoretical foundations and professional experience.*

| Factor | | | Indicator | | |
|---|---|---|---|---|---|
| **Name** | **Rank** | **Weight** | **Name** | **Rank** | **Weight** |
| Relationships with employees | 2. | 0.257 | We comprehend social responsibility as fairness without abuses in relationships with employees, business and other partners and the limits, prescribed by law. | 3. | 0.146 |
| | | | We are careful and fair to our employees, so we do not have experiences with their dissatisfaction (strikes and bad work). | 2. | 0.271 |
| | | | Corporate social responsibility to employees is based on care for pleasure, creativity and safety at work, which exceeds the level prescribed by law. | 1. | 0.521 |
| | | | We encourage employees to strengthen tolerance and harmony in the workplace. | 4. | 0.063 |
| Leaderships | 1. | 0.457 | Socially responsible business is part of the policy, strategy and tactics (daily practice) of our organization. | 2. | 0.278 |
| | | | On the basis of the strategy of social responsibility, organization equivalently treats the environment, community, business partners, employees, managers and owners. | 1. | 0.611 |
| | | | The organization has a social responsibility defined in its vision and / or in the mission and both are regularly exercises in daily practice. | 3. | 0.111 |
| Relationships with broader social environment | 5. | 0.040 | We assure scholarships and employ lawyers. | 4. | 0.063 |
| | | | We co-operate with schools in our community in different ways. | 3. | 0.146 |
| | | | We give and implement initiatives that can contribute to the development and welfare of the community in which we work. | 2. | 0.271 |
| | | | We are members of the associations of interests that are characterized by socially responsible activity. | 1. | 0.521 |
| Natural environment | 3. | 0.157 | The produced wastes are recycled to the greatest possible measure. | 2. | 0.25 |
| | | | We reduce the amount of waste and packaging, we clean our sewage, in the chimneys we have modern efficient filters, etc. | 1. | 0.75 |
| Customer relationships | 4. | 0.090 | Ingredients are labeled correctly and fairly on the products. | 1. | 0.75 |
| | | | We raise awareness of our customers about sustainable / safe use of our products (services). | 2. | 0.25 |

Source: Expert opinions for ranks; the weights were obtained by Web-HIPRE

Considering the means of the respondents' answers about the statements regarding SR, the local values of alternatives – different groups of organizations in Slovenia -- were measured by using value functions. The lower and upper bounds of value functions were determined for each attribute: to differentiate between the values of alternatives, the lower bound is equal to the lowest mean at the considered attribute, and the upper bound is equal to the highest mean at the considered attribute.

Table 3 presents the alternatives' values with respect to each factor obtained by (2) and the aggregate alternatives' values obtained by (3).

*Table 3: The alternatives' values – the social responsibility measures in groups of organizations in Slovenia.*

| | $X_1$ | $X_2$ | $X_3$ | $X_4$ | $X_5$ | $X_6$ |
|---|---|---|---|---|---|---|
| $v_1(X_i)$ | 0.592 | 0.578 | 0.405 | 0.303 | 0.038 | 1.000 |
| $v_2(X_i)$ | 0.091 | 0.426 | 0.305 | 0.190 | 0.543 | 1.000 |
| $v_3(X_i)$ | 0.000 | 0.304 | 0.509 | 0.269 | 0.729 | 1.000 |
| $v_4(X_i)$ | 0.146 | 0.000 | 0.071 | 0.477 | 0.466 | 1.000 |
| $v_5(X_i)$ | 0.077 | 0.160 | 0.542 | 0.611 | 0.108 | 0.975 |
| $v(X_i)$ | 0.224 | 0.370 | 0.323 | 0.305 | 0.370 | 0.998 |
| Rank | 6. | 2. | 4. | 5. | 2. | 1. |

Note: $v_1(X_i)$ – the $i^{th}$ alternative's value with respect to 'relationships with employees', $v_2(X_i)$ – the $i^{th}$ alternative's value with respect to 'leadership', $v_3(X_i)$ – the $i^{th}$ alternative's value with respect to 'relationships with broader social environment', $v_4(X_i)$ – the $i^{th}$ alternative's value with respect to 'natural environment', $v_5(X_i)$ – the $i^{th}$ alternative's value with respect to 'customer relationships', $v(X_i)$ – the $i^{th}$ alternative's aggregate value – the social responsibility measure, $X_1$ – the group of organizations that employ 10-19 employees, $X_2$ – the group of organizations that employ 20-99 employees, $X_3$ – the group of organizations that employ 100-299 employees, $X_4$ – the group of organizations that employ 300-499 employees, $X_5$ – the group of organizations that employ 500-999 employees, $X_6$ – the group of organizations that employ 1000-4999 employees

In the presented practical application of measuring SR in organizations it can be concluded that alternative $X_6$ – the group of organizations that employ the largest number of employees -- has the highest aggregate value (Table 3)[4]. Because among all alternatives $X_6$ has also the highest value with respect to each factor, this group of organizations can be treated as a benchmark. Moreover, it is almost the ideal solution because it has the highest possible values with respect to $m - 1$ factors.

It is followed by two groups of organizations employing 20-99 ($X_2$) and 500-999 employees($X_5$) – equal aggregate values have been obtained for the above mentioned groups (Table 3). The lowest aggregate value is achieved by $X_1$ – the group of organizations that employ 10-19 employees. Its only key success factor is relationships with employees, although $v_1(X_1) < v_1(X_6)$. Studying the local values of $X_1$ with respect to each factor (Table 3) and comparing them with the ones of the benchmark $X_6$ we can plan possible actions to improve SR in $X_1$.

## 5. CONCLUSIONS

Differently from using factor analysis based on PCA extraction method, this paper presents the use of the EFA to develop the multiple criteria model for the assessment of SR. In model building, it

[4] Organizations that employ a large number of employees are characterized by a better developed system of communication, human resource management, marketing etc., and SR than other organizations.

provides the set of indicators that best describe the factors in the multidimensional problem – the assessment of SR in organizations. The use of the SMARTER method based on ordinal scale and the centroid method for the calculation of weights turned out to be appropriate for differentiating among criteria's importance. When measuring local values of alternatives – groups of organizations, the lower bound should be equal to the lowest mean at the considered attribute, and the upper bound to the highest mean at the considered attribute if we want to differentiate between local values of alternatives.

The presented practical application illustrates that the model developed for the multiple criteria assessment of SR in organizations can enable us to benchmark the SR performance of organizations. Further application possibilities address comparisons of other types of organizations (e.g. regarding market type, industry). Based on interdisciplinary theoretical foundations and professional experience, the described research methodology provides a good example for the assessment of SR in organizations; when adapted, it can be applied to organizations in other national economies.

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