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Identifying major policy challenges and policy interventions via expert methods

Application of the Delphi and AHP methods in preparation of the Partnership Agreement for the Slovak Republic in period 2021-2027

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Abstract: This paper presents the application of expert decision methods for the formulation and prioritization of the long-term economic, social and environmental policies in the Slovak Republic. The Partnership Agreement for the Slovak Republic (PA) is an underlying strategy for investments from the European Structural and Investment Funds (ESIF) in the period 2021-2027. Policies implemented under the PA will allocate €13.4b on four policy objectives. This paper concentrates on the policy objective 4 ‘Social development’. The authors co-operated with the Deputy Prime Minister Office and assembled panels of top Slovak experts on social and economic issues. The Delphi and Analytical hierarchy process (AHP) methods were combined for analyzing major development challenges and eliciting policy priorities. The methods combined the bottom-up and top-down approaches to policy making. Nine potential policy measures in three policy areas emerged from the Delphi exercise. The AHP exercise applied three criteria (relevance, urgency and feasibility) to rank the above-mentioned measures within three policy areas. As for the Policy Area 1 (Labour market, employment, training and institutions) the measure 4.1.1 ‘Improving access to employment and modernizing institutions and services on labour market’ clearly dominated over the measure 4.1.2 ‘Supporting a better work-life balance’. The measure 4.2.2 ‘Equal access to quality and inclusive education’ emerged substantially more important than measures 4.2.1 ‘Improving the quality and effectiveness of education and training systems’ and 4.2.3 ‘Support to life-long learning’ in the Policy Area 2 ‘Education and skills’. Finally, measures 4.3.2 ‘Supporting social and economic integration of marginalized Roma communities’ and 4.3.3 ‘Ensuring equal access to

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healthcare including primary care’ received the highest ranks in the Policy Area 3 ‘Health and social services’.

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Introduction – Case for the expert methods in planning and policy

The European Semester is a cycle of economic and fiscal policy coordination within the EU. The European Semester promotes coordination in structural reforms, fiscal policies and macroeconomic imbalances. The structural reforms focus on promoting growth and employment. The European Commission (EC) produces annual assessments of progress on structural reforms, prevention and correction of macroeconomic imbalances, and the results of in-depth reviews under Regulation (EU) No 1176/2011. The assessments point to major strengths and weaknesses, as well as opportunities and threats for the development of the EU Member Countries. The 2019 European Semester Report for the Slovak Republic (ESRSR) contained Annex D on ‘Investment Guidance on Cohesion Policy Funding 2021-2027 for Slovakia’. The ‘Investment Guidance’ suggested the major areas of policy intervention to be specified in the ‘Partnership Agreement (PA) for the Slovak Republic in the period 2021-2027. The Partnership Agreement is an underlying document for the distribution of €13.4b from the European Investment and Structural Funds (ESIF). Policies implemented under the PA will allocate these funds in four policy areas: (1) research and innovation; (2) environment and climate; (3) mobility (transport) and connectivity (ICT) and (4) social development.

The Slovak Government wanted to ensure the best possible match between policy interventions suggested by the ‘Investment Guidance’ on the one hand and the development challenges of the Slovak Republic on the other hand. The policy interventions for the PA should respect, in principle, the results of the ESRSR and the National Reform Programme, but also foster development priorities considered important by the citizens and the government of Slovakia. The authors of this paper advised the Slovak Government on matters of social and economic policies. In 2019, the Deputy Prime Minister Office approached the authors and commissioned the elaboration of the Partnership Agreement (PA) document.

Preparation of the PA document had to comply with several conditions:

- ensuring broad participation of key policy stakeholders in drafting PA priorities, as required by regulation on European Commission Delegated Regulation (EU) No 240/2014;
- identifying major development challenges and suggesting the most appropriate interventions for addressing the challenges;
- matching and harmonizing Slovakia’s development challenges and policy priorities with policy intervention fields suggested by the ‘Investment Guidance’ of the European Commission.

This paper concentrates on identifying the major development challenges, and prioritizing policy measures suggested for the policy objective 4 of the PA: ‘A more social Europe – Implementing the European Pillar of Social Rights’.

Application of the Delphi and AHP methods

The authors considered the complexity of the task and suggested a combination of the bottom-up and top-down approach for drafting the PA document. The bottom-up approach is related to the inclusion of representatives of all key stakeholders for identifying development challenges and suggesting policy interventions to address the challenges. The top-down approach relates to a dialogue with the central government ministries. The dialogue is aimed at (i) matching policy measures suggested by stakeholders with those suggested by the ‘Investment Guidance’; (ii) drafting sets of policy measures for each policy objective of the PA, and (iii) prioritizing policy measures on the criteria of importance, urgency and feasibility. The Delphi method was used to (a) identify major development challenges and (b), to create a list of prospective policy interventions to address the development challenges. The Analytical Hierarchy Process (AHP) was used to rank prospective policy measures on set of qualitative criteria (Figure 1).

The combination of the Delphi and AHP is not uncommon in policy practices. Integration of the two methods enhances the logic of proposed policy interventions and the validity of the policy exercise. Combination of the Delphi and AHP methods enables decision-makers to determine policy priorities more objectively and efficiently (Kim et al 2013: 948). The hierarchy of development problems is constructed as follows: complex problems are subdivided to partial issues and are then evaluated case-by-case (Ferreira et al. 2010; Yang et al. 2010, Kabir and Hasin 2013; Alipor et al. 2016, Delbari et al. 2016). The combination of Delphi and AHP also was applied in Cohesion funding in the EU Member countries (Schmid et al. 2010; Niinikoski et al. 2017).

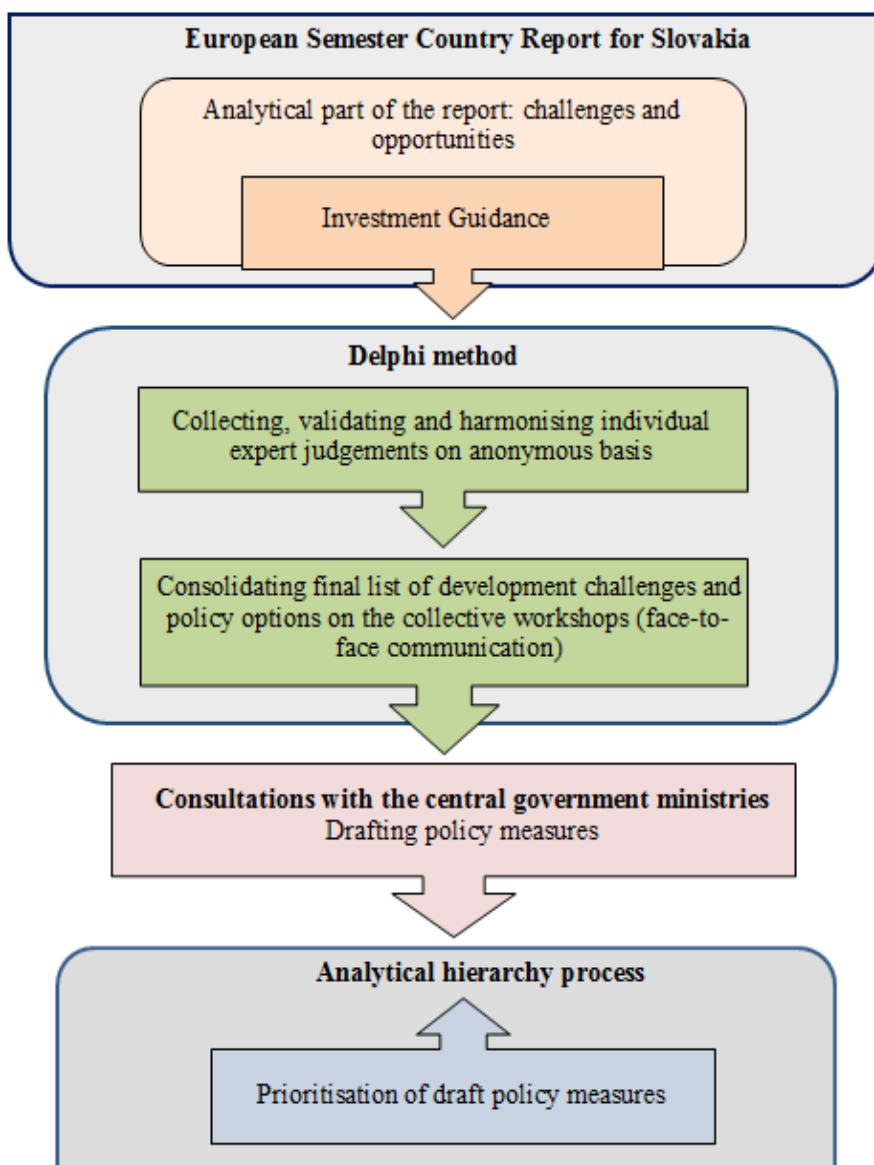
The Delphi method

The aim of the Delphi method is ‘structuring group communication as to deal with complex problems’, or ‘collecting and aggregating informed judgement from a group of experts on specific questions and issues’ (Hasson and Keeney, 2011: 1696). Van Zolingen and Klaasen (2003) discussed diverse types of the Delphi method, with regard to the method applicability, validity and reliability. The *classical Delphi* method aims at bringing together opinions by experts in specific fields. The basic principles of the classical Delphi include:

- The anonymity of experts: Experts do not know their colleagues. Each expert formulates his / her opinion anonymously. The opinion is free from pressure or influence by other members of the expert panel.
- Iteration and controlled feedback: Individual opinions are presented to all members of the Delphi panel. Each panellist may judge the feedback by other experts and reassess his original opinion. Several iterations provide continuous feedback and improve the potential for consensus

- Quantitative evaluation and consensus-building: Opinions by individual panellists are processed by simple statistical methods (mean, median) and presented to the panel in the next round of the expertise. Consecutive rounds of the Delphi exercise generate the highest possible consensus among experts.

Figure 1. Top-down and bottom-up process for identification of policy priorities



Goals of the *Policy Delphi* are rather different from those by the Classical Delphi. The main goal of the Policy Delphi is to encourage structured public dialogue in order to generate policy alternatives. An opinion survey and generation of diverse policy options is more important than consensus by experts. Members of the expert panel may express their opinions anonymously in initial stages of the Delphi exercise. Still, they also may hold a group meeting in the final stages of the Delphi. The Delphi method applies qualitative reasoning and assessment. It can be implemented in situations where no precise quantitative methods are applicable, but where the problem can benefit from subjective judgements on a collective basis (Hanafin 2004). The Delphi is also the best option when a large pool of experts provides the judgement and group meetings are not feasible.

Contributions by diverse participants, individuals' feedback about group opinions, option to reassess one's views and the gradual emergence of consensus are the major strengths of the Delphi method. The Delphi structure enhances the positive attributes of an interacting group (collecting knowledge from diverse fields) and downplays negative ones (social, personal and political clashes) (Rowe and Wright 1999: 354).

The authors suggested using the two-step Delphi technique:

- (a) Collecting, validating and harmonizing individual expert judgements on anonymous basis
- (b) Consolidation of final list of development challenges and policy options on the collective workshops (face-to-face communication)

There is no general agreement on the optimal group size in the Delphi method. Some authors suggest groups of 5 to 20 experts (Rowe and Wright 2001: 141), but groups with hundreds of experts also have been used (McMillan et al. 2016: 659). Group size may reflect the complexity of the topic and diversity of viewpoints by panellists. The panel also may benefit from the inclusion of experts with multiple specialities (Habibi et al. 2014: 10). Higher numbers of participants are needed for complex problems. Diversity of expertise increases with a number of participants. Large groups, however, may be difficult to manage. Consensus also is more difficult to reach when the numbers of participants are high.

Some 327 experts were invited to participate in the Delphi exercise, of which 93 in the policy objective 4 of the PA: More social Europe – Implementing the European Pillar of Social Rights. Some 33 experts (out of 93 invited) provided valid replies in the policy objective 4 (Table 1). Composition of the expert panel was consulted with the Deputy Prime Minister Office. Panel members included high-ranking government officials from the relevant ministries (Ministries of Education, Health, Economy, Labour and Social Affairs), representatives of the trade unions, industry and employer associations, local and regional governments, top academics in relevant scientific fields, and members of the non-governmental organizations.

The public sector accounted for the strongest participation in the panel (22 experts). Officials responsible for strategic planning and experts of analytical units from the central government ministries and agencies provided 17 out of total 33 experts. Four experts represented regional governments. One expert represented the Slovak Academy

of Sciences. The public sector experts specialized in design and implementation of education, health and social policies. The economic and social partners represented the Slovak Teachers Chamber, the Slovak Association of Cities and Villages; private providers of health care, and consultancy companies in the field of economic and social development. The NGO experts represented bodies active in the inclusion of marginalized Roma communities, and support to seniors, disabled and other vulnerable social groups.

The structure of the expert panel reflected both the scope of the policy objective and the regulation of the EC on Partnership Agreement⁶. Participation in the exercise was by invitation only.

Table 1. Sample size and structure of experts in the Delphi and AHP exercises for policy objective 4 of the PA

Sector:	Public sector	Econ. and social partners	NGOs	Total
<i>Delphi method</i>				
Invited	58	23	12	93
Responded	22	5	6	33
<i>Analytical hierarchical process</i>				
Invited	34	2	0	36
Responded	17	0	0	17

Source: authors' survey

Notes: public sector includes academia; Econ. and social partners includes business sector.

Step one of the Delphi exercise was implemented via an online software tool. All participants were anonymous. The experts should identify three major development challenges in the policy objective 4, and suggest the best policy solutions to address the challenges. Development challenges and policy solutions were ranked on a scale, 3 – the top challenge / key policy intervention, 2 – significant challenge / important policy intervention, and 1 – challenge/policy intervention. Two rounds of the Delphi exercise were conducted in May 2019.

Step two of the Delphi exercise was performed via a collective meeting of panel members with the authors and representatives of the Deputy Prime Minister Office. Panel members were informed about exercise results. Panellists provided their final opinions about the list of development challenges and policy priorities. The challenges and potential policy solutions fell into three policy areas. The final results of the Delphi exercise for policy objective 4 are reported in Table 2.

⁶ EC (2014): Commission Delegated Regulation (EU) No 240/2014 of 7 January 2014 on the European code of conduct on partnership in the framework of the European Structural and Investment Funds

Table 2. Results of the Delphi exercise in policy objective 4

Development challenges identified by participants	Activities/measures proposed		
	1st priority	2nd priority	3rd priority
<i>Area 1: Labour market, employment, training and institutions</i>			
<ul style="list-style-type: none"> • Insufficient integration of vulnerable and disadvantaged groups in the labour market • High unemployment of disadvantaged and vulnerable groups • Long-term unemployment of young, low-skilled people • Slow adaptation of elderly workers to technology change 	<ul style="list-style-type: none"> • Support and development of social economy and social enterprises • Support to the link education system and the labour market • Addressing the lifelong learning system • Support of new programmes, working methods, practices 	<ul style="list-style-type: none"> • Reduction of long-term unemployment of disadvantaged and vulnerable groups • Development of regions with the highest long-term unemployment • Introduction of tutoring at work • Inclusion of job-seekers with disabilities to labour market • Training programmes for elderly workers, aimed at IT and language skills. 	<ul style="list-style-type: none"> • Support to the flexible form of employment • Introduction of professional counselling/guidance • Support to re-qualification • Increasing labour mobility via support to mobility of labour
<i>Area 2: Education and skills</i>			
<ul style="list-style-type: none"> • Access to inclusive and good quality education • Declining quality of education and vocational training • Insufficient pre-school education of children from socially disadvantaged communities • Rapid technology change is not reflected in the skills of employees 	<ul style="list-style-type: none"> • Support for (assistant) teachers • Intensive cooperation between private and public institutions • Building additional capacities of kindergartens and elementary schools • Support to in-house life-long learning with employers. 	<ul style="list-style-type: none"> • Reduction of early school leaving • Education in line with changing market needs • Increased accessibility of pre-school education • Improving skills of low-skills employees via long-term training. 	<ul style="list-style-type: none"> • Support to early intervention services • Support peer-to-peer learning among schools and teachers • Terminate segregation of Roma children into special schools
<i>Area 3: Health and social services</i>			
<ul style="list-style-type: none"> • High-quality health care • Inclusion of communities from socially disadvantaged areas • Lack of professional capacities in the area of the social and legal protection of children • Population ageing 	<ul style="list-style-type: none"> • Support mobile and outpatient health services • Support for marginalized Roma communities – employment, education, health, water, waste, housing • Extending network of care facilities 	<ul style="list-style-type: none"> • Support modernization of health facilities equipment • Construction of utility networks, access to drinking water • Deinstitutionalization of children, seniors, handicapped people • Introduction of long-term social-health care programmes 	<ul style="list-style-type: none"> • Ensure human resources in health and social care sectors • Introduction of rental housing • Training of staff in the area of the social and legal protection of children

Source: authors' survey

The analytical hierarchy process for prioritizing policy measures

Policy alternatives

The authors discussed the results of the Delphi exercise with relevant ministries and representatives of the Deputy Prime Minister Office. Results of the exercise were incorporated in drafts of the policy measures. A total of 239 policy measures were drafted by the central government ministries, of which 77 are in the policy objective 4. There were many overlaps in policy measures drafted by the different ministries. The authors further co-operated with the policymakers and agreed on the aggregation of 239 policy measures to 46 ones (of which nine in the policy objective 4 (see Table 3 for list of policy measures and results of AHP evaluation). The grouping followed the logic of the 2019 ERSR. The three policy areas and nine policy measures reflected the structure of the 'Investment Guidance' (Annex D of the PA). List of the policy measures was subject to evaluation via the AHP method.

Criteria for pairwise comparisons

Three criteria were used to evaluate the policy measures:

- **Relevance:** the policy measure is highly relevant and significant for the further social, economic and environmental development of Slovakia. The policy measure is important for coping with societal challenges in the next decade.
- **Urgency:** the policy measure must be implemented as soon as possible. The policy measure is also a precondition for implementing next-stage policies.
- **Feasibility:** some economic, social and environmental challenges are extremely important for the future development of Slovakia (population ageing, climate change), but are of the remit of the Slovak government. Some other challenges fell within the scope of government intervention, but the government did not implement the policy measures properly in the past. Do you think the government can implement this policy measure properly?

Panel size and structure

The Delphi and AHP exercises have different objectives. The Delphi identifies key challenges and suggests a broad list of alternative solutions. The challenges and solutions are suggested by experts specialized in specific fields. The AHP method prioritizes alternative solutions on multiple criteria. The criterion of feasibility, for example, requires knowledge of available resources, past experience with policy implementation and awareness of the legal, economic and social context of policy interventions. Members of the AHP panel sometimes are forced to do some difficult trade-offs between relevance and feasibility of the intervention. Composition of the Delphi and AHP panel may therefore differ.

The structure of the expert panel was agreed with the Deputy Prime Minister office. Policies prioritized under the AHP exercise will be implemented by the central government agencies in the programming period 2021-2027. The central government ministries and agencies, therefore, provided most experts for the exercise. Some 34 experts were invited and 17 agreed to participate in the exercise (Table 1). Analytical units by the central government Ministries and agencies provided over half of the expert

pool. The Ministries' ESIF implementation units were excluded from the sampling to avoid a potential conflict of interest. Other experts included top academics, members of the Prime Minister advisory board, and analysts of the National Bank of Slovakia. About half members of the AHP expert pool was identical with the Delphi expert pool.

There are diverse opinions on the size of the expert panel in the AHP exercise. Some authors consider levels of expertise by each expert and the consistency of the expert judgements and suggest no more than seven experts. Saaty and Özdemir (2014), for example, argue that a small number of knowledgeable experts can cover all relevant aspects of the problem. Additional, but less knowledgeable, experts may dilute professional opinions by top experts. This argument is valid in narrowly-defined areas. If decision problems are complex and different specializations are required to judge specific aspects of decisions, higher numbers of experts can be invited. Diversity of opinions partially can be addressed by aggregating judgements by individual experts in large expert panels (Tsyganok et al. 2012).

Performance of the AHP exercise

The AHP exercise was performed online and recorded in the Qualtrics XM software. A short introductory video on the purpose of the exercise was placed at the opening part of the task. The authors prepared a summary of objective, intervention logic, key activities, target group and expected outputs for each policy measure. The participants could read the summary in pop-up windows, first and then continue to pairwise comparisons. Each participant had to read a summary of nine policy objectives (Table 3).

Data for the AHP exercise were collected in September 2019, and the invitation to fill in the online questionnaire was valid for one month. Reading and processing information in summaries, as well as performing pairwise comparisons, generated significant cognitive load for the participants. The authors consulted issues of cognitive load with psychology experts. It was decided to limit the maximal number of weighting criteria to three and policy measures to four.

Completion of each AHP evaluation took about 40-90 minutes. Participants were able to interrupt their work, save results and continue the next day.

Priority vector

Priorities are produced through a rigorous mathematical process (Mu and Pereyra-Rojas 2017: 106). The AHP method produces the priority vector of weights \mathbf{w} . The eigenvector method (Saaty 2008) is the most popular method to compute the priority vector in the AHP method.

$$\mathbf{A}\mathbf{w} = \begin{pmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \dots & \dots & \dots & \dots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{pmatrix} \begin{pmatrix} w_1 \\ \dots \\ \dots \\ w_n \end{pmatrix} = \begin{pmatrix} nw_1 \\ \dots \\ \dots \\ nw_n \end{pmatrix} = n\mathbf{w}$$

Where \mathbf{A} is the comparison matrix for alternatives A_1 to A_n .

Aggregation of individual judgments

Several methods for aggregating individual judgements are applied in group decisions. Aggregation of individual judgements (AIJ) or individual priorities (AIP) are the most common methods of grouping individual judgements. The former method aggregates individual judgments for each entry of the pairwise comparison matrices, while the later ones aggregate individual resulting priorities. The averaging procedure can use either weighted arithmetic mean (WAM) or weighted geometric mean (WGM) (Dong et al. 2010).

The AIJ method

Let's have group of participants $P = \{p_1, p_2, \dots, p_m\}$, and the weight vector of participants $\lambda = \{\lambda_1, \lambda_2, \dots, \lambda_m\}$, assuming $\lambda_k > 0$; $k=1, 2, \dots, m$; and $\sum_{k=1}^m \lambda_k = 1$. Let's be the $A^{(k)} = (a_{ij}^{(k)})_{n \times n}$ the individual judgement matrix elicited by a specific participant $p_k \{k_1, k_2, \dots, k_m\}$.

If the AIJ method and the WGM averaging procedure are applied, then the group judgement matrix

$$A^{(g)} = (a_{ij}^{(g)})_{n \times n}; \text{ is generated, where } a_{ij}^{(g)} = \prod_{k=1}^m (a_{ij}^{(k)})^{\lambda_k}.$$

The AIP method

If the AIP method and the WGM averaging procedure are applied, and the $w^{(k)} = (w_1^{(k)}, w_2^{(k)}, \dots, w_n^{(k)})^T$ is an individual priority vector derived from individual judgement matrix $A^{(k)}$, then the group priority vector derived via the AIP method is $w^{(g)}$

$$= (w_1^{(g)}, w_2^{(g)}, \dots, w_n^{(g)})^T, \text{ where } w_i^{(g)} = \frac{\prod_{k=1}^m (w_i^{(k)})^{\lambda_k}}{\sum_{i=1}^n \prod_{k=1}^m (w_i^{(k)})^{\lambda_k}}.$$

There has been an extensive discussion on aggregating methods and averaging procedures in group judgements (Saaty 2008; Wu et al. 2008; Bernasconi et al. 2014; Ossadnik et al. 2016). The AIJ is more intuitive and more common than the AIP method (Russo & Camanho, 2015). The AIJ method, however, cannot guarantee the Pareto optimality axiom. The axiom says that if all group members prefer alternative A_1 to alternative A_2 , then the group should prefer A_1 to A_2 as well (Ossadnik et al., 2016). The AIP aggregates and WGM averaging procedure generally are recommended (Saaty 2008, Ossadnik et al. 2016). We further report results achieved via the AIP method and the WGM averaging procedure.

Consistency

Consistency of judgements is an important indicator of the quality of judgements. The AHP comparison matrix should respect the transitivity property. The property means that if alternative $A > B$, and $B > C$, then $A > C$. If A is considered three as important as B is considered two times more important than C , and A should be considered $3 * 2 = 6$ times more important than C . Human judgement sometimes is not fully consistent. Some level of inconsistency is acceptable in the AHP exercise. The AHP measures the degree of consistency via the Consistency Index (CI) and Consistency Ratio (CR). The

comparison of the Consistency Index (CI) to the Random Index (RI) generates the Consistency Ratio (CR).

The formula for the consistency index is:

$$CI = \frac{(\lambda_{max} - n)}{(n-1)},$$

where λ_{max} is the maximal eigenvalue index, and n is the size of comparison matrix.

Ratio of the Consistency Index (CI) to the Random Index (RI) is the Consistency Ratio (CR): $CR = CI/RI$. The RI is the average CI of 500 randomly filled matrices. The RI values are available in published tables and/or provided by specialized AHP software packages.

Consistency of the aggregate comparison matrix improves in sufficiently large groups (Aull-Hyde et al., 2004: 294). The rule of thumb says that $CR \leq 0.1$ is considered acceptable in the AHP exercise. The authors checked consistency by individual experts in the panel. Experts with high inconsistency levels were excluded from the computation of priorities.

Results of prioritization

Results of prioritization in in the intervention fields 4.1, 4.2 and 4.3 are stated in Table 3. The intervention field 4.1 prioritized two policy measures, 4.2 three, and 4.4 four ones. The score for each policy measure on particular criteria, as well as the total score, are stated in Table 3. The sum of criteria scores and total scores by specific policy measure is always equal to 1 within the intervention field. Values of the Consistency Ratio are stated for fields 4.2 (0.062) and 4.3 (0.033) in Table 3. Both values are below the 0.10 level. The field 4.1 contained only two policy measures. The Consistency Ratio can be computed only for three and more alternatives.

The AHP produces weights for each policy alternative. The sum of the weights is equal to 1 in each column. The policy measures 4.1.1 and 4.1.2, for example, received weights 0.68 and 0.32 respectively on criterion of relevance ($0.68 + 0.32 = 1.00$) (Table 3). The policy measure 4.1.1 also received higher weight on the criterion of urgency than policy measure 4.1.2 (0.71 versus 0.29), but lower on the criterion of feasibility (0.49 versus 0.51). In total, the policy measure 4.1.1 received much higher priority score than policy measure 4.1.2 (0.64 versus 0.36).

The prioritization assigned the following ranks to the policy measures:

- Two policy measures were compared in the intervention field 4.1 ‘Improving access to quality employment of all job seekers, enhancing the effectiveness of labour market institutions’. The policy measure 4.1.1 ‘Improving access to employment and modernizing institutions and services on labour market’ achieved higher scores on criteria of relevance and urgency than the policy measure 4.1.2 ‘supporting a better work-life balance’. The policy measure 4.1.1 also achieved the highest overall score within the intervention field 4.1.
- The policy measure 4.2.2 ‘Equal access to quality and inclusive education’ dominated in the intervention field 4.2.2 on all criteria.

- The policy measure 4.3.2 ‘Supporting social and economic integration of marginalized Roma communities’ got the highest scores on all three criteria, and also the highest total score within the intervention field 4.3 ‘Enhancing equal and timely access to quality, sustainable and affordable social and health services’.

Table 3. Results of the AHP exercise, policy objective 4: A more social Europe – Implementing the European Pillar of Social Rights

Measures	Relevance	Urgency	Feasibility	Total
4.1 Improving access to quality employment of all jobseekers, enhancing effectiveness of labour market institutions				
Consistency ratio: n.a.				
4.1.1 Improving access to employment and modernising institutions and services on labour market	0.68	0.71	0.49	0.64
4.1.2 Supporting a better work-life balance	0.32	0.29	0.51	0.36
4.2 Promoting equal access to quality and inclusive education, training and life-long learning				
Consistency ratio: 0.062				
4.2.1 Improving the quality and effectiveness of education and training systems	0.25	0.25	0.24	0.26
4.2.2 Equal access to quality and inclusive education	0.47	0.49	0.41	0.46
4.2.3 Support to life-long learning – adaptability of human resources to the skills of the 21st century	0.28	0.26	0.35	0.28
4.3 Enhancing equal and timely access to quality, sustainable and affordable social and health services				
Consistency ratio: 0.033				
4.3.1 Supporting active inclusion with the aim to promote equal opportunities and active participation	0.15	0.16	0.21	0.17
4.3.2 Supporting social and economic integration of marginalised Roma communities	0.33	0.30	0.24	0.30
4.3.3 Ensuring equal access to healthcare including primary care	0.30	0.30	0.27	0.28
4.3.4 Promotion of social integration of people at-risk-of-poverty or threatened by social exclusion ...	0.22	0.23	0.28	0.24

Source: authors' summary of the exercise results. Notes: top priorities are in bold. Consistency ratios can be only computed for matrices with 3+ alternatives.

Priority rankings reflected some long-standing development challenges of the Slovak Republic.

- The policy measure 4.1.1 ‘Improving access to employment and modernizing institutions and services on labour market’ clearly dominated over the policy measure 4.1.2 in the intervention field 4.1. The dominance is explained by profound structural changes in the Slovak labour market in period 2014-2019. The overall unemployment rate decreased from 14.2% to 5.1% in the above-mentioned period. The number of jobseekers fell from 402 thousand to 135 thousand, while the number of vacancies increased from 4 thousand to 98 thousand. Some regions, however, (in eastern and southern parts of Slovakia in particular) coped with the high unemployment rate. These regions accounted for above-average rates of vulnerable job seekers (elderly workers, long-term unemployed, low-skill workers, members of the marginalized Roma

population). The current portfolio of the active labour market policies concentrates on short-term courses, training and re-training (Karasová and Baláž, 2019). These policies have had limited impact on labour market inclusion by the vulnerable job seekers. The current portfolio of the active labour market policies also does not address the challenges of population ageing and employment of older workers. Creating inclusive and well-operating labour market institutions should be a priority in the programming period 2021-2027.

- The 4.2.2 policy measure ‘Equal access to quality and inclusive education’ emerged the most important policy option in the intervention field 4.2. In the Europe 2020 document, the Slovak Republic planned to reduce the school drop-out rate from 6.7% in 2014 to 6.0% in 2020. The actual drop-out rate, however, increased to 9.31% by 2018. Increase in numbers of early school leavers was related to increased shares of children from disadvantaged communities. Equal access to quality and inclusive education is key to reducing drop-out rates in the programming period 2021-2027. The policy measure should support a number of policy activities, including an increase in numbers of kindergartens and elementary schools, terminating segregation of Roma children into special schools, and support to early intervention services.
- The policy measure 4.3.2 ‘Supporting social and economic integration of marginalized Roma communities’ was identified as the priority option in the policy intervention field 4.3. The policy measure received the highest rankings on criteria of relevancy and urgency, but lower ranking on criteria of feasibility. The lower ranking on feasibility reflects long-standing difficulties with the integration of the marginalized Roma communities. The policy measure should support activities aimed at inclusion of communities from socially disadvantaged areas and priority support for marginalized Roma communities, in terms of improved access to employment, better housing, inclusive education, health care services, drinking water, and waste management.

Both the total score and scores on partial criteria are of potential interest by policymakers. The policy measure 4.3.2, for example, received higher overall ranking, and also the highest partial rankings on criteria of relevance and urgency. The lower ranking on feasibility indicates that this policy measure is more difficult to implement. The rankings indicate that the policy measure 4.3.2 would require urgent and longer preparation, and the higher concentration of financial and managerial efforts than other policy measures in the intervention field 4.3.

Discussion, conclusions and direction for further research

This paper presented the application of the Delphi method and Analytical Hierarchy Process in preparation of the Partnership Agreement for the Slovak Republic in the period 2021-2027. Use of participatory process and application of the expert methods in high-stake decision making was a novelty in Slovakia. Top development strategies used to be prepared by the internal staff of the central government ministries in the past. Information about decisions that have already been made and consultative mechanism

were typical forms of the stakeholder involvement. The interactive processes, in which people participate both in preparation and implementation of policies, have not been implemented so far in the Slovak Republic.

Involvement of diverse stakeholders proved beneficial for drafting the Partnership Agreement. The stakeholder brought diverse (and sometimes conflicting) views about key development challenges and potential policy responses. Key principles of the Delphi method – anonymity and interactivity – helped to avoid personal and political clashes, and promoted consensus building. The Delphi participants firstly identified a broad list of major development challenges and suggested list of potential policy interventions. The participants had to argue about their choices of challenges and policy options. The arguments were provided to other members of the panel. Interactive exchange of opinions was conducive to consensus building.

The initial list of policy options was condensed to lower the number of policy priorities and then subject to prioritization by the AHP. The AHP exercises identified key policy priorities in four policy objectives. As for the policy objective 4 ‘A more social Europe – Implementing the European Pillar of Social Rights’, nine policy measures were subject to prioritization. Access to inclusive employment and education were identified dominant policy options. Support to the social and economic integration of marginalized Roma communities, alongside the equal access to healthcare, were ranked top priorities in the intervention field 4.3. The ‘Value for Money’ unit of the Slovak Ministry of Finance performed its own prioritization of policies suggested by the Annex D of the PA. The prioritization was based on challenges and policies suggested by the National Reform Programme. The final list of priorities and their ranks were quite similar to those produced by the AHP panelists.

The Partnership Agreement covers very diverse fields of policy intervention. The policy objective 4, for example, supports social care, health care, social exclusion of marginalized communities, education, etc. These policy fields are sometimes intertwined. Increasing numbers of the early school leavers, for example, relate to the high numbers of children living in marginalized communities.

Complex social topics should not be evaluated by experts narrowly specialized in some specific areas. It is a good idea to build a panel of experts who understand interconnections between policy fields. Panels with diverse specialities necessarily are larger than those addressing narrow policy fields. Higher levels of inconsistency in the AHP exercise are a potential risk of large expert panels. Several procedures may address the risk of excessive inconsistency, such as (1) careful selection of experts for the AHP panels; (2) reviewing individual inconsistencies by the panellists and excluding experts with high inconsistency levels from the aggregating procedures; and (3) Application of the AIP / WGM methods and procedures for grouping and averaging individual expert opinions.

Future policy evaluations may consider alternative expert methods. Choice of expert decision methods should reflect the purpose of the policy exercise, type of policy intervention and information available to decision-makers.

- If exact policy goals are specified in quantitative terms, quantitative targets are set and there is enough quantitative information, quantitative evaluation methods should be used to select the best policy options, such as multi-attribute approaches, data envelopment analysis or cost benefit analysis. Such evaluations may benefit from ‘technical decision making’, i.e. involvement of highly knowledgeable experts with specific skills in narrowly-defined policy areas (Munaretto et al. 2014).
- If the policy exercise aims at selecting the most important intervention fields and/or identifying the best policy alternatives to address major development challenges, the combination of quantitative and qualitative methods is appropriate to do the job. Cross-sectoral policy evaluations with high social impacts would benefit from broad inclusion of diverse stakeholders. High-impact development policies must have socially acceptable outcomes. The ‘societal decision making’ must involve representatives of all relevant stakeholders, and benefit from the fair and transparent design of policies.

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References

- ALIPOR, H., NASAB, S.N.H., ARDAKANI, A.H.H., CHESHMIDARI, M.N. and SHOJAEI, S. (2016). Comparison of Delphi and Analytic Hierarchy Process (AHP) techniques in locating flood spreading. *Elixir Earth Science*, 94: 39993–39999.
- AULL-HYDE, R., ERDOGAN, S., and DUKE, J. M. (2006). An experiment on the consistency of aggregated comparison matrices in AHP. *European Journal of Operational Research*, 171(1): 290–295.
- BERNASCONI, M., CHOIRAT, C. and SERI, R. (2014): Empirical properties of group preference aggregation methods employed in AHP: Theory and evidence. *European Journal of Operational Research*, 232(3): 584–592.
- DELBARI, S.A., NG, S.I., YUHANIS, A. A. and JO, A.H. (2016): An investigation of key competitiveness indicators and drivers of full-service airlines using Delphi and AHP techniques. *Journal of Air Transport Management*, 52(C): 23-34.
- DONG, Y., ZHANG, G., HONG, W. C. and XU, Y. (2010). Consensus models for AHP group decision making under row geometric mean prioritization method. *Decision Support Systems*, 49(3): 281–289.
- EC-European Commission (2014): Commission Delegated Regulation (EU) No 240/2014 of 7 January 2014 on the European code of conduct on partnership in the framework of the European Structural and Investment Funds.
- FERREIRA, P., ARAÚJO, M.M. and O’KELLY, M.E. (2010): The Integration of Social Concerns into Electricity Power Planning: A Combined Delphi and AHP Approach. Pp 343-364 in S. Rebennack et al. (eds.), *Handbook of Power Systems I, Energy Systems*, Springer-Verlag Berlin Heidelberg 2010.

- HABIBI, A., SARAFRAZI, A. and IZADYAR, S. (2014): Delphi Technique Theoretical Framework in Qualitative Research. *The International Journal of Engineering and Science*, 3(4): 08-13.
- HANAFIN, S. (2004): Review of literature on the Delphi Technique. Dublin: National Children's Office.
- HASSON, F. and KEENEY, S. (2011): Enhancing rigour in the Delphi technique research. *Technological Forecasting & Social Change*, 78(9): 1695–1704.
- KABIR, G. and HASIN, M.A.A. (2013): Integrating modified Delphi method with fuzzy AHP for optimal power substation location selection. *International Journal of Multicriteria Decision Making*, 3(4): 381-398.
- KARASOVÁ, K., BALÁŽ, V. and POLAČKOVÁ, Z. (2019): Efficiency of the Active Labour Market Policies: Evidence from the Slovak Republic. *Ekonomický časopis (Journal of Economics)*, 67(1): 11-32.
- KIM, M., JANG, Y.C. and LEE, S. (2013): Application of Delphi-AHP methods to select the priorities of WEEE for recycling in a waste management decision-making tool. *Journal of Environmental Management*, 128(C): 941-948.
- MCMILLAN, S.S., KING, M. and TULLY, M.P. (2016): How to use the nominal group and Delphi techniques. *International journal of clinical pharmacy*, 38(3): 655–662.
- MU, E. and PEREYRA-ROJAS, E. (2017): *Practical Decision Making. An Introduction to the Analytic Hierarchy Process (AHP). Using Super Decisions v2*. Springer Briefs in Operations Research. Springer International Publishing AG Switzerland.
- MUNARETTO, S., SICILIANO, G. and TURVANI, M.E. (2014): Integrating adaptive governance and participatory multicriteria methods: a framework for climate adaptation governance. *Ecology and Society*, 19(2): 74.
- NIINIKOSKI, E.R., KELHÄ, L. and ISOHERRANEN, V. (2017): The European Cohesion Policy and Structural Funds in Sparsely Populated Areas: A Case Study of the University of Oulu. *International Journal of Management, Knowledge and Learning*. 6(1):77-96.
- OSSADNIK, W., SCHINKE, S. and KASPAR, R.H. (2016): Group Aggregation Techniques for Analytic Hierarchy Process and Analytic Network Process: A Comparative Analysis. *Group Decision and Negotiation*, 25(2): 421–457.
- ROWE G. and WRIGHT G. (2001): Expert Opinions in Forecasting: The Role of the Delphi Technique. In: Armstrong J.S. (eds) *Principles of Forecasting*. International Series in Operations Research & Management Science, vol 30. Springer, Boston, MA.
- ROWE, G. and WRIGHT, G. (1999): The Delphi technique as a forecasting tool: issues and analysis. *International Journal of Forecasting*, 15(4): 353–375.
- RUSSO, R. D. F. S. M., & CAMANHO, R. (2015). Criteria in AHP: A systematic review of literature. *Procedia Computer Science*, 55: 1123–1132.

- SAATY, T. (2008). Decision making with the analytic hierarchy process. *International Journal of Services Sciences*, 1(1): 83-98.
- SAATY, T.L. and ÖZDEMİR, M.S. (2014): How Many Judges Should There Be in a Group? *Annals of Data Science*, 1: 359-368.
- SCHMID, J.V., HAGER, A., JECHLITSCHKA, K. and KIRSCHKE, D. (2010): Programming rural development funds – An interactive linear programming approach applied to the EAFRD program in Saxony-Anhalt. Structural Change in Agriculture / Strukturwandel im Agrarsektor (SiAg). Working Papers 59523, Humboldt University Berlin, Department of Agricultural Economics.
- TSYGANOK, V.V., KADENKO, S.V. and ANDRIICHUK, O.V. (2012): Significance of expert competence consideration in group decision making using AHP. *International Journal of Production Research*, 50(17): 4785–4792.
- VAN ZOLINGEN, S.J. and KLAASSEN, C.A. (2003): Selection processes in a Delphi study about key qualifications in Senior Secondary Vocational Education. *Technological Forecasting and Social Change*, 70(4): 317-340.
- WU, W.-H., CHIANG, C.-T. and LIN, C.-T. (2008). Comparing the aggregation methods in the analytic hierarchy process when uniform distribution. *WSEAS Transactions on Business and Economics*. 5(3): 82-87.
- YANG, C., LIU, T., KAO, C., WANG, H. and TOWNSHIP, T. (2010): Integrating AHP and DELPHI Methods to Construct A Green Product Assessment Hierarchy for Early Stages of Product Design and Development. *International Journal of Operations Research*, 7(3): 35-43.