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Employing citizens' opinions on sustainability in the agri-food sector to construct sustainability measures

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Abstract

This paper analyses data on opinions on agri-food sustainability collected through a survey of citizens in Germany, Hungary and the UK in 2023 within H2020 TRADE4SD project. The paper considers the elicitation of sustainability measures from individual survey responses. Data on ranking of economic, social and environmental pillars of sustainability, and of evaluation of the importance of each pillar sustainability components were used. The components were designed in the survey to broadly follow texts of the UN Sustainable Development Goals (SDGs). The rating of components in the survey responses was used to construct importance measures for each pillar separately which were then combined into a single sustainability measure. Furthermore, the paper also considers possible inter-connections between the three pillars. The inter-connection analysis demonstrates that hierarchical ordering of the pillars improves the reliability of the measurement and confirms that modelling along the hierarchy inspired by the Planetary Boundaries Framework describes best the personal evaluations by survey respondents of the importance and structure of the different components of sustainability.

1 Introduction

This paper analyses a unique database including opinions on and preferences for agri-food sustainability developed through a survey of citizens in three countries – Germany, Hungary and the UK.[1] Researching and constructing measures of sustainability is a challenge due to "the variety of considered scales, the number of disciplines involved, the out-of-equilibrium states, the complex quantitative and qualitative factors" (Perrot *et al*., 2016, p. 88).

Sustainability could be defined as the ability of humanity "to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs" (Report of the World Commission on Environment and Development, 1987, para 27). Agyemang *et al*. (2002, p. 78) argue that "a truly sustainable society is one where wider questions of social needs and welfare, and economic opportunity are integrally related to environmental limits imposed by supporting ecosystems". Concerning agriculture, Gray (1991) defines sustainability as the maintenance of the net benefits agriculture provides to society for present and future generations. The above definitions reflect the complexity of the issue bringing important inter-generational implications.

The motivation to study citizens' opinions on sustainability is based on the understanding that in a democratic society an important indication of future policies is what citizens think of the issue at hand. When dealing with such a complex societal issue, it is necessary to consult citizens and understand their views and individual motivation to make sacrifice now for the benefit of future sustainability (Shanen *et al*., 2021).

Sustainability has three aspects - economic, social and environmental – hereinafter called pillars. In the survey, respondents were asked to rank the pillars of sustainability according to their opinions, and then to evaluate the importance of the components of each pillar, broadly inspired by the text of the UN Sustainable Development Goals (SDGs). These evaluations have been analysed under two basic assumptions. First, for simplification, each pillar was assumed to be a separate distinct measure of sustainability without interactions with the other pillars. At the second stage, the assumption was modified and the pillars were treated as interdependent in a hierarchical fashion, based on the "planetary boundaries" concept (Stockholm Resilience Centre, 2017).

[1] The paper is based on research carried out within the H2020 Trade4SD project (Fostering the positive linkages between trade and sustainable development), grant agreement No 101000551.

The paper includes a range of specifications starting from the unrelated pillars approach, described above, to a full recognition of the planetary boundaries approach. By testing these specifications, the paper demonstrates that the hierarchical nested interdependence assumed in the planetary boundaries is a better representation of the respondents' evaluations of sustainability.

The structure of the paper is as follows. The next section explains the data collection and section three describes the data used in the analysis. The fourth section presents the quantitative approach, section five discusses the results and section six concludes.

2 Data collection

Two surveys were carried out in order to collect information about the opinions on and preferences for agri-food sustainability. The first one, used as a pilot survey, was implemented in 2022 with a small group of TRADE4SD project stakeholders in order to test the questionnaire and find out whether the questions were properly understood. Invited stakeholders were from different parts of the agri-food chain, and also included farm consultants and researchers working on issues relevant to agri-food sustainability.

The survey was designed in two rounds based on two different questionnaires. The first round asked the respondents to rank the pillars of sustainability. The second round was more detailed asking stakeholders to evaluate components within each pillar pre-determined by the research team. Before the 'content-related' core questions, a section was included with questions on gender, age, work experience etc. After the first round, TRADE4SD researchers analysed the responses and sent a summary feedback to the respondents. The survey was anonymous and the different rounds of responses were only electronically linked by tokens.

The lessons from stakeholders' responses helped improve the questionnaire for the citizens' survey. The later consisted of one round only and the two questionnaires used in the rounds of stakeholders' survey were consolidated in one questionnaire, editorial amendments were incorporated to avoid technical concepts which might be difficult to citizens to comprehend, attempting to make the questionnaire comprehensible for non-experts. The open questions were removed since the observations were that they had not contributed substantially to the stakeholders' survey. The components of the three pillars of sustainability were reformulated to make them closer to the UN SDGs text. Similarly to the stakeholders' survey, before the core content there was a section with questions requiring personal information without disclosing the individual respondent.

The citizens' survey was commissioned to an external company (Szinapszis ltd, Hungary), specialised in market research and was implemented in 2023. The company was asked to create a sample representative of the population in the respective country by gender, age and residence in the country (due to budget constraints, the survey was only implemented in three countries - Germany, Hungary and the UK). The survey was not intended to address a specific target group, but to cover as representative as possible cross-section of the population. The choice of countries was based on different demographics and GDP/capita, which were assumed to have influence on opinions.

3 Data

The returns covered 1,000 responses per country. Country samples included both male and female with a slightly higher share of female (the details of the sample are included in Table 1). The predominant age group of the respondents was 45 - 54 years of age. In Germany one fourth of the respondents were between 55 and 64 years old, which reflected the well-known fact of aging population in the country. More than one-half in each country were employed in a 'secure job' with nearly 9 per cent difference between Hungary and the UK in favour of the latter.

There was a large dispersion according to the area of work experience. As we pointed out earlier, it was not required that the respondents had specialised knowledge or particular vested interests in the agri-food area. This was confirmed by the small share of respondents with work experience in the agri-food sector - 4.3 per cent in Hungary, 2.7 per cent in Germany and 1.7 per cent in the UK. The years of work experience showed that the respondents were either at the beginning of their working life with less than 5 or 5 to 10 years of experience, or with a lengthy work career of more than 21 years.

The respondents were relatively well-educated. Those with only elementary school were less than 5 per cent in Hungary and Germany, with the notable exception of the UK with just above 10 per cent. The majority of the sample in Hungary and the UK have completed high school or possessed an advanced degree. The data represented well the differences in educational systems in the countries. The fact that Germany has a well-developed traditional vocational education and training system, which provides learning on the job through apprenticeships, is likely to be responsible for fact that nearly one-half of their sample had a completed vocational school.

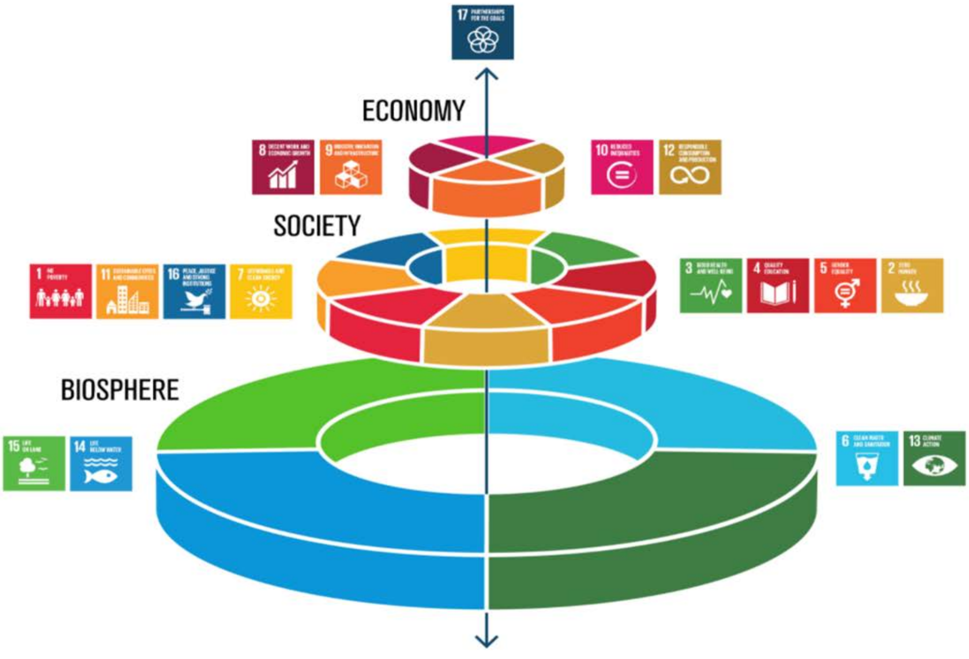
Possible home ownership was included in the survey as a proxy for wealth. Here also the traditions in different countries have influenced the sample. Germans are traditionally 'renters'.

There are interrelated reasons of available supply, government policy encouraging renting, relatively low rent due to control, and social acceptability to rent all lifetime. In the sample, nearly 55 per cent of Germans were renting, whilst these percentages were 15 and 31 in Hungary and the UK respectively. A majority of the respondents in all three countries resided in urban area.

Data that was analysed quantitatively concerned the ranking of pillars of sustainability and the evaluations of their components (six per pillar), the latter presented in Table 2. Respondents were asked to rank the most valued pillar as 1 and the least as 3, and to evaluate the importance of each component in a pillar from 1 (very important) to 3. The survey answers indicated that nearly 50 per cent of the respondents ranked the economic pillar first, social second and environmental third. It has to be reminded that citizens' survey was carried out at the beginning of 2023 over which the war in Ukraine and a cost of living crisis cast their shadow.

For the second stage of the analysis, the framework of the planetary boundaries concept was used and Figure 1 illustrates the concept as depicted by the Stockholm Resilience Centre (2017). Planetary boundaries involve Earth system processes that contain environmental boundaries. The illustration below implies that societies and economies are seen as embedded parts of the biosphere, thus implying that the environmental pillar is the most important followed by the social one in the middle and the economic at the end.

Figure 1: Planetary boundaries



Source: Stockholm Resilience Centre (2017)

4 Quantitative approach

Sustainability has been measured in terms of the three pillars, and in turn, each of the three pillars has been measured indirectly by the six components presented in Table 2.

Since measuring any component is essentially providing a measure of the corresponding pillar, an overall measure, i.e. evaluation of the importance of each pillar, could be constructed by combining the respondents' evaluations of the six components. A naïve approach would involve averaging over the components measures. This would, however, assume that all components have equal contribution to the corresponding pillar, which would be a very strong assumption. Instead, any component evaluation could be viewed as an indirect measure for the corresponding pillar. Unlike the naïve averaging approach this results in different contributions of these measures which are not equal.

If each pillar were considered in isolation, technically this would have reduced the analysis to a simple confirmatory factor analysis (CFA) specification. However, in the paper the three pillars were combined into an overall sustainability, constructed via the three pillars' measures. Combining all the above measurements (the three pillars plus the overall one) results in a rather straightforward Structural Equations Model (SEM) specification, which only contains a measurement part. The above measurements allow to analyse the country differences and possible variations in the evaluation of sustainability according to gender, age and location.

Technically, this is a latent variables model with sustainability and the three pillars which are unobservable as latent variables. The relative size of the parameters can be estimated via maximum likelihood. The model is, however, only identified up to a proportionality factor. This means that some standardisation of the estimated parameters is required. The way the estimated parameters were standardised was that the effect of the first contributor was set to 1. These parameters fixed to 1 were those of the first components in each of the sustainability pillars as presented in Table 2, as well as the first measure of the overall sustainability, i.e. the economic pillar. The remaining parameters were estimated.

It should be reminded that the component measures in the survey were the individual importance assessments by the survey respondents for each of the components. Therefore, the resulting pillar measures, as well as the overall sustainability, also reflect the importance assessment by survey respondents. In order to account for the country differences in evaluating the importance of different components country versions of the model were estimated. Then the values predicted from the model for the pillars and overall sustainability were added to the dataset.

This approach, however, does not take into account the possible interdependence of the three pillars. In order to allow for such interdependence, the planetary boundary framework was accommodated in modified models. These modified models were tested against each other and their applicability is discussed later.

5 Results

The approach described above is referred to as model A, to distinguish it from different model specifications that follow. The estimated contributions of each component in model A are presented in Table 3. These were standardised, as explained above, so that the first component was set to 1. Since the raw survey data included an assessment of importance in which smaller values denoted higher importance assigned to by respondents, lower loading into any of the latent dimensions denotes higher weight in the overall importance for the corresponding measure.

Looking at the overall sustainability measure, social and environmental sustainability have higher loadings than economic sustainability with the social sustainability having the highest one in all countries except England where is it similar to environmental sustainability. This means that economic sustainability is considered to be more important in relative terms than the other two pillars with social sustainability being the least important. Whilst within each country per capita GDP growth is considered the most important component of economic sustainability, the ranking of the other components differs between countries.

However, it is necessary to test the reliability of the constructed sustainability measures. This can only be inferred from the comparative fit statistics of the estimation model. These are presented in Table 4 together with the corresponding fit statistics for each of the three pillars which are derived from partial versions of the model which treat each pillar in isolation (all partial versions are essentially CFA models). Three indicators of fit statistics were estimated – Comparative Fit Index (CFI), Tucker-Lewis Index (TLI) and Standardized Root Mean Square Residual (SRMSR). As a rule of thumb, for reliable measurement the two fit indices (CFI and TLI) have to exceed 90 per cent, while SRMSR has to be below 5 per cent. Looking at these for the overall sustainability model, all three are acceptable for England, but the TLI for Hungary and both the CFI and TLI for Germany are marginally below 90 per cent which suggests some potential issues with the underlying measures. The sources of these issues could be investigated by looking at the fit statistics for the partial models. These reveal that environmental sustainability measure is reliable with all fit measures within acceptable ranges. And while the statistics for social sustainability are almost acceptable (with at least two of the three measures being acceptable for each country), the problem appears to be the economic dimension where except the SRMSR, only the CFI for the UK is acceptable. This means that the overall measurement issue for sustainability arises from measuring the economic pillar, which is also more important in the overall sustainability. This is an issue which will be revisited later.

As explained previously, at the beginning of the survey questionnaire there were questions about the socio-economic characteristics of the respondents. The responses allow to test whether there are significant differences in assessment of sustainability measure by different groups of respondents. The approach employed was to use the direct assessments in the survey and contrast these to the assessments derived from the structural measurement model. The direct assessments of the pillars concerned the ranking of the three pillars. The importance evaluation referred to the pillar components and the survey allowed the respondents to assign the same value to several components, thus respondents could, for example, assign the highest importance to all components. Since the ranking separates clearly the pillars (each pillar is given a different value from 1 to 3) which is not the case in importance valuations which reduces the difference between them, one may expect to observe more group differences in relation to pillars.

To assess the group differences in each of the measures explained, non-matching two sample nonparametric Kruskal-Wallis tests were applied. In particular, differences between gender, rural vs urban residence, age (more or less than 45 years old) and home ownership were tested. The P-values from the tests are presented in Table 5.

The first observation is that the direct elicitation of sustainability importance does not appear to show any differences between groups. The only exception is the case of environmental sustainability in Germany where there were significant gender differences. Therefore, in general, the direct elicitation of sustainability importance appears uniform across countries and groups. Yet, this is not the case when the latent measure constructed from the stated importance of different sustainability components is concerned. The latter indicates significant gender differences in assessing the importance of sustainability. Females consistently attached higher importance to all environmental measures. Overall, residents of urban and rural areas did not show significant differences in assessing the importance of sustainability components (with a few exceptions). Age effects in sustainability assessment were country specific. For example, they existed in England with regard to economic and social sustainability, and in Germany with regard to environmental sustainability. Home ownership for the three countries together showed differences in the overall sustainability but in the country models had country specific effects (see Table 5). These group differences hint that the measures for pillars importance created via their components in addition to providing more nuanced view on the issue could be actually more informative than the direct evaluation using raw data of respondents’ answers.

What has been explained so far assumed that economic, social and environmental sustainability are independent of each other. The planetary boundary framework argues otherwise. More specifically, the planetary boundary framework argues that economic sustainability is built upon the social which, in turn, derives from the environmental one (referred in this paper to as a layered cake approach; in some articles it is referred to as a SDGs wedding cake). If this is the case, the corresponding evaluations of these sustainability pillars would follow the same hierarchical structure, thus, economic sustainability could in principle (alongside the components that have already been discussed) be measured by social and environmental sustainability, while social sustainability would be measurable via environmental sustainability. The model that follows exactly the hierarchy of planetary boundary framework is labelled as model B in Table 6, whilst model A, explained previously, is used as a reference. Another specification which applies exactly the opposite hierarchical ordering is referred to as ‘inverted cake’ approach. In this construct, the economic pillar sits at the bottom with the environmental at the top. The inverted cake equivalent of model B is denoted as model C.

Note, however, that in such planetary boundary layered cake approach the environmental pillar is an indirect measure for economic sustainability (since it characterises the bottom layer, as presented in Figure 1). It would, therefore, be more logical to exclude environmental as a direct measure of economic sustainability. This means that environmental sustainability will be considered as a direct measure for social sustainability with the latter being a direct measure for economic sustainability. A model following this logic is denoted as D in Table 6 and its inverted cake counterpart as model E.

Since the modelling approach in all the above models only consists of measurement relations, it does not imply any causality. This means, that although not identical, the standard ‘cake’ approach and its inverted version would be equally applicable and, thus, statistically none of them would dominate the other.

All models A-E were estimated separately for each country and in order to distinguish between their explanatory power two Vuong (1989) tests for non-nested models were implemented (these are presented in table 6). The first one, variance test, tests whether the variance predictions from two models are statistically significant and, the second one, the Likelihood Ratio (LR) is testing which model performs better. The two possible LR tests split the probability space into two mutually exclusive areas, in that their P-values add to 1. Interestingly, the more naïve models B and C are not distinguishable from the reference model (A). The full cake and inverted cake models (D and E), on the other hand, are preferable to all other models, which demonstrates that models in which the connections between the bottom and top layers has been 'severed' (D and E) as opposed to B and C, where the bottom layer pillar has also been used as a measure for the top one, achieve better measurement. As expected, similar models from the two approaches, full and inverted cake (B vs C and D vs E) cannot be distinguished, which is to be expected in the absence of any causality restrictions.

Thus, although not being able to explicitly distinguish between the planetary boundary framework and its 'inverted' version, the paper confirms that the interdependence of the three pillars of sustainability is improving sustainability measurement. Furthermore, it is established the separation of economic and environmental sustainability as in models D&E while they only interact via the social dimension, but not directly, performs better than models where the bottom layer is also used to measure the top one. In other words, purely environmental or economic sustainability measurements can only be related to each other after being 'translated' via the social dimension. Table 7 presents the fit statistics for the initial model A and the final planetary boundaries framework model D. It is noteworthy that in addition to improving over the initial model (which is expected given the test results in Table 6) the final specification meets all fit statistics criteria for reliable measurement. Thus, the 'layered cake' specification provides reliable sustainability measurement.

Conclusions

The paper considered the issue of constructing sustainability measures from individual evaluations by a survey respondents of the components of the three pillars of sustainability. Comparing the proposed sustainability measures vs directly elicited rankings of the three pillars demonstrated the superiority the approach advocated here. The analysis found that the sustainability pillars are not independent, but are interdependent in a typical hierarchical fashion, as suggested in the planetary boundaries framework. Furthermore, by considering the separate interconnected parts of the overall measurement approach the paper demonstrated that inverting the hierarchy does not improve the measurement of the separate pillars and this implicitly confirms the superiority of the 'layered cake' measurement approach as depicted by Stockholm Resilience Centre (2017).

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Tables

Table 1 Sample of citizens survey

	Hungarian sample (*n*=1 000)	**English sample (*n*=1 000)**	**German sample (*n*=1 000)**
Gender (%)			
Female	51.85	50.95	50.95
Male	47.95	48.75	48.75
Non-binary	0.1	0.3	0.2
No answer	0.1	0	0.1
Age category (%)			
18–24	11.99	12.99	10.29
25–34	19.98	21.98	20.78
35–44	24.98	21.58	19.48
45–54	22.98	23.98	24.38
55–64	20.08	19.48	25.08
Employment status (%)			
Employed with job security	55.64	64.34	61.04
Employed with short-term or hourly contract	12.59	8.79	9.69
Self-Employed	5.69	5.89	5.1
Unemployed	7.29	11.19	8.59
Neither working. unemployed or retired	12.79	6.19	6.49
Retired	5.99	3.6	9.09
Work experience (%)			
Research/Information/Media	3.3	5.29	3.6
Trade/Commerce (buying or selling in any sector other than Food or Finance)	12.39	5.09	10.89
Agriculture or food production	4.3	1.7	2.7
Other manufacturing/Energy	10.59	5	7.89
Finance	5.89	6.69	7.39
Other private sector services	8.59	12.09	10.09
Education	8.59	9.59	4.4
Police/Armed Forces/Justice	4.1	1.2	1.4
Local/regional or national government employee	7.19	4.2	3.3

Non-governmental organisation/charity	2.4	4.6	1.7
Other	32.67	44.56	46.65
Highest level of education (%)			
Elementary school	2.9	10.39	4.5
Vocational school	14.89	23.78	49.45
Graduation	48.65	35.17	22.18
Advanced degree	33.57	30.67	23.88
Years of work experience (%)			
< 5 years	27.67	27.77	22.58
5–10 years	26.37	29.37	29.17
11–20 years	18.38	19.68	22.68
> 21 years	27.57	23.18	25.57
Residence (%)			
Rural (open countryside. low population density. small settlements –mainly villages)	24.38	29.47	35.66
Urban	75.62	70.53	64.34
Type of your home (%)			
Home owner with Mortgage	16.08	30.07	14.29
Home owner without Mortgage	40.86	28.77	22.98
Renter	15.29	31.47	54.45
Living in family or friends' home	24.28	8.79	5.69
Other	3.5	0.9	2.6

Table 2: Components by pillar

Economic Pillar	
Q2_1	Sustain per capita economic growth
Q2_2	Achieve productive employment and decent work for all
Q2_3	Decrease inequality
Q2_4	Reduce poverty
Q2_5	Halve per capita food waste
Q2_6	Reduce food losses along production and supply chains, including post-harvest losses
Social Pillar	
Q3_1	Improve food security
Q3_2	Improve human nutrition
Q3_3	Eradicate hunger
Q3_4	Reforms to give women equal rights to economic resources
Q3_5	Support trade, social and environmental links between urban and rural areas
Q3_6	Promote and enforce non-discriminatory laws and policies for sustainable development
Environmental Pillar	
Q4_1	Improve/Protect Water Quality
Q4_2	Reduce water waste
Q4_3	Increase share of renewable energy
Q4_4	Greater adoption of environmentally friendly technologies in agriculture
Q4_5	Protect soils from erosion
Q4_6	Protect Nature

Table 3.Measurement model contributions

	Hungary		Germany		England	
	Estimate	Std.Err	Estimate	Std.Err	Estimate	Std.Err
Economic Pillar						
Q2_1	1		1		1	
Q2_2	1.02	0.099	1.45	0.212	1.162	0.135
Q2_3	1.377	0.127	1.731	0.243	1.447	0.163
Q2_4	1.19	0.112	1.702	0.238	1.332	0.146
Q2_5	1.273	0.121	1.954	0.268	1.402	0.156
Q2_6	1.203	0.117	1.921	0.263	1.341	0.149
Social Pillar						
Q3_1	1		1		1	
Q3_2	0.881	0.064	1.097	0.073	1.053	0.083
Q3_3	0.876	0.06	0.922	0.069	0.982	0.077
Q3_4	1.023	0.072	0.989	0.075	1.197	0.092
Q3_5	0.948	0.067	0.781	0.067	1.076	0.084
Q3_6	0.915	0.07	0.925	0.072	1.17	0.09
Environmental Pillar						
Q4_1	1		1		1	
Q4_2	0.944	0.054	1.106	0.072	1.064	0.064
Q4_3	0.874	0.06	0.987	0.075	0.9	0.063
Q4_4	1.053	0.061	1.026	0.073	0.983	0.065
Q4_5	1.247	0.065	1.138	0.076	1.1	0.067
Q4_6	0.857	0.05	1.028	0.069	0.861	0.059
Sutainability						
Economic Pillar	1		1		1	
Social Pillar	1.445	0.135	2.051	0.283	1.415	0.155
Environmental Pillar	1.145	0.105	1.727	0.239	1.417	0.148

Table 4 . Fit statistics

	Hungary	Germany	England
Economic pillar			
Comparative Fit Index (CFI)	0.864	0.871	0.904
Tucker-Lewis Index (TLI)	0.773	0.786	0.841
SRMR	0.057	0.048	0.041
Social pillar			
Comparative Fit Index (CFI)	0.963	0.917	0.933
Tucker-Lewis Index (TLI)	0.939	0.862	0.889
SRMR	0.032	0.047	0.04
Environmental pillar			
Comparative Fit Index (CFI)	0.954	0.978	0.965
Tucker-Lewis Index (TLI)	0.924	0.964	0.941
SRMR	0.041	0.027	0.034
Overall model			
Comparative Fit Index (CFI)	0.907	0.89	0.918
Tucker-Lewis Index (TLI)	0.892	0.872	0.904
SRMR	0.043	0.045	0.04

Table 5. P-values from Kruskal-Wallis tests for difference in means

	Gender		Urban vs Rural		Age		Home ownership	
	Stated	Estimated	Stated	Estimated	Stated	Estimated	Stated	Estimated
				Overall				
Economic	0.63	0.00	0.59	0.17	0.41	0.00	0.84	0.02
Social	0.65	0.00	0.48	0.05	0.13	0.00	0.16	0.02
Environmetal	0.33	0.03	0.13	0.61	0.03	0.27	0.48	0.64
Sustainability		0.00		0.10		0.00		0.04
				Hungary				
Economic	0.17	0.00	0.27	0.86	0.79	0.43	0.15	0.11
Social	0.82	0.00	0.58	0.15	0.39	0.17	0.21	0.01
Environmetal	0.09	0.14	0.70	0.44	0.67	0.47	0.65	0.96
Sustainability		0.00		0.31		0.37		0.05
				Germany				
Economic	0.22	0.00	0.78	0.12	0.28	0.14	0.33	0.70
Social	0.09	0.00	0.83	0.00	0.16	0.07	0.31	0.60
Environmetal	0.00	0.13	0.70	0.22	0.02	0.02	0.89	0.25
Sustainability		0.00		0.01		0.46		0.58
				England				
Economic	0.31	0.10	0.12	0.33	0.28	0.00	0.58	0.02
Social	0.49	0.00	0.35	0.12	0.78	0.00	0.61	0.03
Environmetal	0.57	0.46	0.00	0.73	0.22	0.93	0.33	0.89
Sustainability		0.03		0.19		0.00		0.05

Table 6. Non-nested model Vuong test (P-Values)

Model 1	Model 2	Models are distinguishable	Model 1 fits better	Model 2 fits better	Models are distinguishable	Model 1 fits better	Model 2 fits better	Models are distinguishable	Model 1 fits better	Model 2 fits better
B	A	0.50	0.50	0.05	0.5	0.50	0.50	0.50	0.50	0.50
C	A	0.07	0.82	0.18	0.36	0.63	0.343	0.34	0.68	0.32
D	A	0.00	0.98	0.02	0.00	0.973	0.03	0.00	0.98	0.02
E	A	0.00	0.98	0.02	0.00	0.96	0.04	0.01	0.983	0.02
D	B	0.00	0.98	0.02	0.39	0.72	0.28	0.00	0.98	0.02
E	B	0.00	0.98	0.02	0.76	0.56	0.44	0.01	0.98	0.02
D	C	0.00	0.97	0.03	0.34	0.67	0.33	0.00	0.97	0.03
E	C	0.00	0.99	0.01	0.42	0.38	0.62	0.00	0.96	0.04
C	B	0.07	0.82	0.18	0.36	0.66	0.34	0.34	0.69	0.31
D	E	0.263	0.70	0.30	0.22	0.72	0.28	0.79	0.55	0.45

Table 7 Comparison of fit statistics Model A vs model D

	Hungary	Germany	England
		Model A	
Comparative Fit Index (CFI)	0.907	0.890	0.918
Tucker-Lewis Index (TLI)	0.892	0.872	0.904
SRMR	0.043	0.045	0.040
		Model D	
Comparative Fit Index (CFI)	0.923	0.919	0.927
Tucker-Lewis Index (TLI)	0.909	0.904	0.915
SRMR	0.041	0.043	0.038