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Are environmental sustainability and happiness the keys to prosperity in Asian nations?

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ABSTRACT

Various research prove that happy nations are prosperous in numerous areas containing GDP, productivity, social support and inclusion, health, lower corruption and environmental sustainability. The analysis in this multicriteria study covers the environmental sustainability, success and happiness trends in Asian nations during a 25-year time span. Strong and average correlations amongst the success, happiness and environmental sustainability, of Asian nations, in one regard, and, in another regard, the macroeconomics, well-being and human development, values-based, quality of life and environmental indicators were established across numerous statistical databases. Six multiple regression models of success and happiness in Asian nations were compiled with the assistance of IBM SPSS Statistics. The linear regression model of success in 40 Asian nations illustrates how nine independent variables explain 90.7 percent of the significances of results. The 19-Asian nation, multiple regression happiness model show how 16 independent variables account for 99.5% of the Happiness index weight dispersion.

1. Introduction

Studies by the present authors and other scholars and organizations indicate that the level of happiness in nations is associated with the endeavors of those nations in various fields (Ram, 2017; Helliwell et al., 2018; Sachs et al., 2018; Greco et al., 2019; Tofallis 2019). These studies show that, generally speaking, nations with achievements in a variety of areas tend to be happier. Areas of achievement can include the economy, technology, productivity, GDP, religion, social help, morals, well-being, energy savings, environment, health, social matters, education, housing and transportation, politics, law, government and low corruption, and freedom for making everyday choices.

Environmental sustainability and happiness in Asian nations constitutes a fascinating field for investigation, and studies in this area are on the rise. Nevertheless, an examination of the current research reveals a gap in integrated multiple criteria analysis and multivariate regression of environmental sustainability and happiness in Asian nations. The present work therefore seeks to reveal trends regarding integrated environmental

Abbreviations: AAG, Average Annual Growth; AAG of GDPpc in PPP, Average Annual Growth of GDPpc in PPP terms; ACPI, Average Corruption Perceptions Index; AEDB, Average Ease of Doing Business Ranking; AEI, Average Education Index; AFIB, Average Fiscal Balance; AGII, Average Gender Inequality Index; AHDI, Average Human Development Index; AHI, Average Happiness Index; AINF, Average Inflation; ALPE, Average Labor Productivity per employee in 2015 USD; APBD, Average Public Debt; AUNR, Average Unemployment Rate; COPRAS, Complex Proportional Assessment; CPI, Corruption Perceptions Index; EDB, Ease of Doing Business; EFpc, Ecological Footprint per capita; EI, Education Index; EPI, Environmental Performance Index; ESH, Well-being and human development, macroeconomic, values-based, quality of life and environmental; FIB, Fiscal Balance; GDP, Gross Domestic Product; GDP AGR, Annual GDP Growth Rate; GDP GR, GDP Growth Rate; GDPpc, GDP per capita; GI, Gender Inequality; GII, Gender Inequality Index; GNH, Gross National Happiness; HDI, Human Development Index; HI, Happiness Index; INFG, Inflation; INVAR, Degree of Project Utility and Investment Value Assessments along with Recommendation Provisions; LPE, Labor Productivity per employee; MCDM, Multiple Criteria Decision-making; OECD, Organization for Economic Co-operation and Development; PBD, Public Debt; PPP, Purchasing Power Parity; QLI, Quality of Life Index; QOL, Quality of Life; SON, success of the nation; SPI, Social Progress Index; UAE, United Arab Emirates; UNR, Unemployment Rate; VIF, Variance Inflation Factor; WVS, World Values Survey; WVST, World Values Survey: Traditional values (versus Secular-rational values)

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sustainability and happiness in Asian nations to stimulate prospects in these areas.

Florida (2009) believes that all aspects of our life, including our happiness, are affected by the place where we live. Many dimensions of happiness have recently received a great deal of attention in research and policy making (Ram, 2017). Bixter's (2015) findings support those of prior studies and show that happiness and both political conservatism and religiosity are linked in a positive way. Political conservatism and religiosity were found to interact in predicting happiness levels, and the results that are currently available suggest that, for more politically conservative individuals, religiosity has a greater effect on happiness than it has for more politically liberal individuals (Bixter, 2015). Based on a set of cross-nation data, Ram (2017) explores a Kuznets-type relationship between average happiness and happiness inequality.

Compared to their peers in other nations, people living in post-communist nations are less satisfied with life (Djankov et al., 2016). Scholars have predicted that this happiness gap would gradually close, but, contrary to their predictions, it has persisted over time. The way governments and corruption are perceived in post-communist nations is one explanation for this phenomenon proposed by Djankov et al. (2016). The findings by Djankov et al. (2016) suggest that, at least in the minds of people, the transition from central planning is still incomplete.

A dramatic decline in life satisfaction in China was recorded simultaneously with its unprecedented economic growth and poverty reduction (Graham et al., 2017). Educated urbanites are more likely to report depression. Rural and uneducated people, in contrast, are less likely to report poor mental health and are more satisfied with their lives. Another finding is a strong correlation between stress, insufficient rest, and low life satisfaction and mental health problems. With China's huge gains in economic growth and poverty reduction, it is now time to consider policies that focus on mental illness and quality of life (Graham et al., 2017).

Sanz et al. (2018) have presented a new human happiness index covering the five dimensions of freedom, development, justice, solidarity, and peace. Many researchers (Florida et al., 2013; Montgomery, 2013; Cloutier and Pfeiffer, 2015) have examined the ways in which sustainability and happiness are linked. Reasonably strong evidence provided by Lyubomirsky et al. (2005) has demonstrated that happy people achieve greater success in many areas. While very happy people seem to be more successful than people who feel unhappy, there is hardly any evidence that extreme happiness increases success proportionally (Lyubomirsky et al. 2005).

Significant reductions in average happiness have been shown by Fanning and O'Neill (2019) in nations with declining per capita consumption, measured in terms of either carbon footprint or gross domestic product (GDP). Where per capita consumption grows, however, nations show no significant change in happiness (Fanning and O'Neill, 2019). Tofallis (2019) discusses a model of happiness, and this multiplicative rather than additive model allows interaction between the explanatory variables or their synergy. The measure of sustainability and the measures of happiness show a positive correlation where "happier" nations are, on average, more "sustainable" (Zidanšek, 2007). The framework of community happiness index (CH-index) developed by Sabatini (2014) fully integrates broad sustainability domains to capture individual subjective perceptions of how communities and development impact are experienced. The domains include a human well-being and eco-environmental well-being sub-index and four sustainability dimensions (social, economic, environmental, and urban governance) (Sabatini, 2014).

Policy makers seeking greater well-being benefits for their nations need to target the factors showing the lowest ratings in their own nations. Therefore this should result in more advantages regarding subjective well-being. Indeed, the 1776 United States Declaration of Independence names happiness as an ideal for guiding the nation or, put in the words of Thomas Jefferson, that there is a universal right to the "pursuit of happiness" (Schlesinger, 1964). However, despite this word's subjectivity, it must not be interpreted as being based only on emotions, as in the 18th century, the word happiness implied "prosperity, thriving and well-being," rather than the psychological well-being or pleasure implied in the current definition (Fountain, 2016).

There has been considerable support for measuring happiness or subjective well-being solely or predominantly in terms of the progress of a nation (Stewart, 2014). Gross National Happiness (GNH) constitutes another, non-monetary measure of progress. Indeed, the development of this concept resulted from the search for a more holistic and psychological indicator than GDP, and the GNH measure is an alternative frequently mentioned, when discussing progress, quality of life and/or social development (Giannetti et al., 2015). The use of GDP for measuring the well-being of a nation has fallen into disfavor around the world. The focus for developing different quality of life (hereafter QOL) measures was either to amend the GDP, complement it or do away with it entirely (Delhey and Kroll, 2013). A "happiness test" presented by Delhey and Kroll (2013) was meant to illustrate these newly found alternative measures. Were these new QOL measures better at establishing satisfaction with life and experienced happiness, when compared to GDP?

Cross-nation panel data–based analysis has indicated that political success comes from more than the national macroeconomic state, something which much of the literature on "economic voting" seems to suggest, but also due to the broader concept of well-being among the relevant citizenry (Ward, 2015). Both the United Nations and the Organisation for Economic Co-operation and Development (OECD) now advocate happiness as an objective for governmental policy, which is an encouraging sign, but neither of these institutions proposes eliminating GDP as a measure but, rather, advocate including the consideration of happiness in addition to GDP (Rojas, 2019). Happiness is a more complete measure than GDP – that is its most important aspect. The reason is that GDP, at best, approximates average per capita fluctuations in real income measured – that is, by the quantity of goods and services produced and purchased. In contrast, the Happiness measure not only gauges income but also people's circumstances in terms of health, family, and other aspects of their well-being, which are even more important. A focus on output and income – like GDP, which only measures the economic aspects of life – is often only partly significant for summarizing the daily lives of people, who all require a measure of happiness for full satisfaction in life (Bruni, 2005).

Maximizing utility levels is frequently discussed by economists. Decisions can be made that result in less happiness due to prioritization of other objectives. It is best to seek a broad range of possible choices by which people can make their own decisions about what they want most (Glaeser, 2007). Seligman (2004) believes that people experience happiness (the feeling that life is good, meaningful and worthwhile) due to the result of the range they set (five elements), the circumstances of their lives (age, gender, ethnicity, income, wealth, growing up area, and marital state) and certain controllable variables involving personal behavior. Meanwhile the definition of Positive Psychology proposed by Seligman (2004) includes numerous biological, personal, relational, institutional, cultural, and global dimensions of life at various levels. It thus constitutes a scientific study dealing with positive, thriving, multi-level human functioning.

Considerations of nation's image and success can also affect economic behavior. The macro-environment relevant to a company's marketing contains diverse economic, legal, image, success, political, technological, ecological, health-related, and social dimensions, which are visible on a national level.

Buyers often have associations with the nation-of-origin (COO) of certain products. Distinct *images* provide products with a sustainable impression that result in different buyer preferences on a worldwide market. Many researchers and managers have sought to target understanding of buyer associations, and a nation's image and success should be included in such studies. Generally, the image and success of a nation reveals no more than whether it is viewed positively or negatively and to what degree. Managers might thus grasp the associations determining the superiority or inferiority of one COO compared to others (Kock et al., 2019). A nation's *image* indicates the combination of evaluations that create a nation's *imagery*, as the findings of Kock et al. (2019) indicate. This further serves as mediation between buyer predispositions and the effect from the obtained *imagery*. Detailed appraisal of the emotions elicited by a nation can create greater understanding of the sources of buyer behaviors. Animosity, for example, can spring from fear or from anger, and this becomes pertinent in grasping the implications inherent in how buyers view one nation or another. An absolute boycott of products from a specific nation probably comes from anger-based animosity. However, fear-based animosity can simply cause buyers to avoid that nation's products. The holistic image of some nation,

when measured in terms of some *emotion*, as Kock et al. (2019) have discovered, can approximate an affective fusion of animosity and affinity for second-guessing buyer moods. Marketing managers can conveniently use the emoticon measure due to its cost-conscious and intuitive nature and thereby reveal the sentiments elicited by one nation for application in various export markets (Kock et al., 2019). The results of this study can thus help potential buyers arrive at a decision regarding the best COO for their product purchases.

This study contributes in the following three directions to the Big Picture:

- The INVAR method (Kaklauskas, 2016), which these authors invented, constitutes the first innovation.
- IBM SPSS Statistics was used to perform multiple regressions to compile the three multiple regression models on happiness and success in Asian nations, which constitutes the second innovation.
- Economics and the other customary measures were deemed insufficient to upgrade the EPI (Environmental performance index ranking), EFpc (Ecological footprint per capita) and HI (Happiness index) indicators relevant to Asian nations. The third innovation was to underline areas considered less often like greater gender equality, less corruption and betterments of happiness, education and social progress indices.

The arrangement of this manuscript is as follows. Section 2 explains the INVAR Method. Section 3 shows the multiple criteria decision making (hereafter MCDM) and the ESH correlational analysis of Asian nations. Sections 4 and 5 present the success and happiness models for Asian nations. The conclusions and notes on future work complete this article (Section 6).

2. INVAR method

Various well-known MCDM or MCDA (Analytic Hierarchy Process (AHP), ELECTRE (Outranking), Evaluation Technique (MACBETH), PROMETHEE (Outranking), Similarity to Ideal Solution (TOPSIS), VIKOR method, et.) methods can be used for this research. Degree of Project Utility and Investment Value Assessments, along with Recommendation Provisions (INVAR) (Kaklauskas, 2016), is used in this research for several reasons. This method offers a few more opportunities (see steps 9–11) and is reliable. We describe the reliability below. The INVAR method shares Steps 2–6 with the COPRAS method, which Zavadskas et al. (1994) had developed. The COPRAS method has been cited 210 times. Meanwhile the INVAR method has been cited 23 times. Other scholars, Mulliner et al. (2013, 2016) have employed the COPRAS method widely for their analyses. They assert that COPRAS can both maximize benefit (maximizing) and minimize cost assessments, permitting one process for each separate assessment. The transparency of the COPRAS method, its ease of use and accomplishment of calculations in short order makes it especially attractive compared to other MCDM methods like AHP and TOPSIS (Chatterjee et al. 2011; Mulliner et al. 2016). Not only is COPRAS an effective assessment method, its application has broad use in many regions as well as internationally (Mulliner et al., 2013, 2016).

The rankings and weights of the nations in question directly and proportionally depend on the criterion that defines them, as well as on the values and weights of these decision factors. Experts decide which decision-making criteria will comprise the set of criteria and then calculate the values and weights of the factors.

An expanded version of the INVAR method shares Steps 2–6, applying the complex proportional assessment (COPRAS) method created by Zavadskas et al. (1994); Step 7, the sensitivity investigation; Step 8, developing and presenting best practices; Step 9, criterion optimization; Steps 10 and 11, online tips on ways to improve nations values in terms of well-being and human development, macroeconomic, values-based, quality of life and environmental (hereafter ESH); and Step 12, method validation. All steps are described below.

Step 1. In this step, two decision-making tables were compiled with data concerning the Asian nations for the period between 1991 and 2016 (see Chapter 3.2. “Indicators for assessment of ESH, their interdependences”). The tables were intended as data sources for the analysis looking into changes in ESH in these nations over 25 years. The decision-making tables present a summary of the results for the compared nations. Each column of the table represents a nation n, and each row represents criteria considered of each nation. Each criterion is described in terms of weights, minimizing or maximizing effects, units, values.

Analyzed indicators and is an input presented in Tables 1 and 2. Values of indicators for Tables 1 and 2 were obtained using the sources specified in Kaklauskas et al. (2018).

Each decision factor was assigned to one of two groups: either the group of the average values for the period in question or the group of the values for the latest available year.

25 macroeconomic [X_1–X_{18}], well-being and human development [X_{19}–X_{25}] indicators for 40 countries were considered by 26 experts, and they assigned an equal weight of 1 to all factors, which means that the weights of the 25 criteria add to a total of 25. The experts compared the sum of the weights of these 25 decision-making criteria [X_1–X_{25}] with the EPI ranking [X_{26}] and the EFpc [X_{27}]). It was established that the weights of the Efpc and the EPI ranking were 25:2 = 12.5 ($q_{27} = q_{26} = 12.5$) (see Table 1).

Table 2 summarizes the details covering the 25 years of progress in nineteen Asian nations according to the 33 well-being and human development, macroeconomic, values-based, quality of life and environmental (hereafter ESH) indicators. To each macroeconomic [X_1–X_{18}], well-being and human development [X_{19}–X_{25}, X_{28}–X_{29}, X_{33}] and values-based [X_{30}–X_{31}] indicators, experts assigned a weight of one. The weights of these 30 indicators were added together and compared with the sum of the weights of the EPI, the EFpc and the QLI; each of those weights was equal to 30:3 = 10 ($q_{26} = q_{27} = q_{32} = 10$) (Table 2).

Step 2. There, an adjusted, normalized decision-making table D is created to change the indicators x_{ij} that have to be compared. They are transformed into non-dimensional (normalized) adjusted values d_{ij}. Tables 1 and 2 sum up the outcomes of the multiple criteria analysis of the Asian nations spanning 25 years of changes related to ESH. The results are presented in the form of a decision-making table.

Step 3. In this step, S_{+j} (the attainments of nations where a better value shows that more goals have been reached) and S_{-j} (where a lower value shows better performance in terms of the goals) indicate to what extent the nations have achieved their goals.

Step 4. In this step, the positive features S_{+j} (pluses) and negative features S_{-j} (minuses) of each nation Q_j are considered to determine the weight (efficiency) of their ESH.

Step 5. In this step, the Q_j of a nation d_j shows the nation’s performance in terms of its goals and needs related to ESH. The maximum weight Q_{max} always indicates the most efficient nation.

Step 6. In the context of ESH, a nation’s utility degree N_j directly depends on the system of the decision indicators, values and weights. The N_j of a nation can be between 0% (worst) and 100% (best, or N_{max}). This facilitates visualizing the efficiency of each nation for an easier assessment.

Step 7. Sensitivity analyses (see Chapter 3.4).

Step 8. The goal of Step 8 is to develop and present best practices. It includes looking at Gender Inequality Index (hereafter GII), Corruption Perceptions Index (hereafter CPI), Happiness Index (hereafter HI), Education Index (hereafter EI), Social Progress Index (hereafter SPI) to come up with a best practice. The correlations linking GII, HI, CPI, EI and SPI to the EFpc, EPI and QLI of the 19–40 nations were determined. A statistical examination of the cross-nation data for the years compared was conducted. A strong correlation between the EFpc and the HI, the EI and the SPI (the three also correlate among themselves) was noted (see Fig. 1a and Table 3). As some nations were missing certain data, the number of nations varies between the charts. The analysis shows that better GII, lower CPI, and higher HI, EI and SPI contribute to better nation success in terms of EFpc, EPI and QLI. Judging from these results, the Asian nations can reach better values of their EFpc, EPI and QLI if they make efforts to ensure better GII, reduce CPI, improve HI, EI and SPI. Other best practices can be generated and presented by means of similar analyses.

Fig. 1a shows normalized EFpc data correlations with the HI, EI, and SPI. As seen in Table 3, a strong direct correlation links the 2013 EFpc and the 2016 HI (r = 0.7456) (40 nations), the 2015 EI (r = 0.7425) (40 nations), and the 2016 SPI (r = 0.68915) (40 nations).

If the 19 or 40 nations want reach better EFpc, EPI and QLI indicators, it is enough to improve other less analyzed indicators, such as reducing GII,

Table 1
Decision-making table of ESH in 40 Asian nations under analysis.

	Compared nations and criteria describing the nations														
	Average GDP growth (by annual %) in 1991–2016	GDP per Capita in 2016 (2015)	GDP per capita in PPP terms in 2016	Average annual growth of GDP per capita in PPP terms in 1991–2016	Inflation grow in 2016 (or 2015, 2014)	Average inflation in 1995–2016	Unemployment rate in 2016	Average unemployment rate in 1991–2016	Labor productivity per employee in 2016	Average labor productivity per person employed in 2015 USD in 1991–2016	Public debt in 2016 (or 2015)	Average public debt in 2004–2016	Fiscal balance in 2016 (or 2015)	Average fiscal balance in 2011–2016	Ease of doing business ranking in 2016
Afghanistan	7.42	561.78	1944.12	6.01	2.17	6.83	8.6	5	6267.6	5107.89	8	45.7	−0.7	−6.53	177
Armenia	3.11	3614.69	8832.76	6.48	−1.27	12.86	17.6	17.62	20792.01	12394.41	51.73	31.12	−5.6	−3.08	35
Azerbaijan	4.56	3878.71	17256.63	5.59	4.18	23.84	5	6.31	33202.32	21129.65	51.1	17.14	−0.4	−0.1	63
Bahrain	5.13	22579.09	46775.74	2.62	2.8	1.53	1.2	1.32	75472.11	91103.66	82.1	35.33	−17.7	−9	65
Bangladesh	5.44	1358.78	3579.76	5.84	5.51	6.45	4.1	3.83	8648.8	5598.31	27.7	35.29	−4.7	−4.1	174
Bhutan	6.65	2773.55	8900.76	7.29	4.38	5.21	2.4	2.66	17092.98	11051.65	118.6	88.38	−1.2	−0.57	71
Cambodia	7.64	1269.91	3736.96	7.54	3.02	4.91	0.2	0.88	5993.39	3720.56	36.7	35.15	−0.3	−4.75	127
China	9.85	8123.18	15529.08	11.21	2	2.89	4.6	4.42	25987.58	11220.6	44.3	33.22	−3.8	−2.15	84
Cyprus	2.71	23541.49	32707.87	3.73	−1.43	1.98	13	7.12	49752.16	48466.86	106.6	73.95	0.3	−4.4	47
Georgia	0.66	3865.79	10004.53	4.66	2.13	14.3	11.7	13.25	18189.16	10548.3	43.9	35.96	−4	−2.37	24
India	6.63	1709.59	6570.62	7.2	4.94	7.16	3.5	3.94	16305.24	8905.83	69.6	72.66	−3.52	−4.47	130
Indonesia	4.84	3570.29	11609.03	5.32	3.53	10.2	5.6	6.77	23380.79	16255.01	28.7	30.35	−2.46	−2.1	109
Iran	3.52	5219.11	19948.82	3.75	8.57	19.26	11.4	11.68	59457.98	51771.25	34.5	32.1	−2.1	−0.88	118
Iraq	7.15	4609.6	17348.94	8.91	1.39	30.61	15.1	17.45	63529.45	50120.16	66.9	101.92	−13.4	−4.27	161
Israel	4.23	37180.53	37258.22	3.56	−0.54	3.17	4.8	9.8	77191.01	68470.49	62.3	72.82	−2.15	−2.76	53
Japan	1.01	38972.34	42281.19	2.92	−0.12	0.11	3.1	3.97	74554.95	68137.24	250.4	216.58	−4.5	−6.5	34
Jordan	5.04	4087.94	9047.77	3.33	−0.79	3.36	15.3	14.2	39372.11	37072.83	95.1	81.02	−3.2	−4.93	113
Kazakhstan	2.87	7714.69	25285.95	5.07	14.51	17.93	5	8.08	47299.27	30949.31	21	11.69	−1.6	−2.22	41
Kuwait	5.31	27359.23	74,264	1.3	3.2	3.13	2.7	1.68	123830.12	151053.84	18.5	11.22	0.63	21.31	101
Kyrgyzstan	1.37	1077.6	3552.09	2.41	0.42	11.31	7.7	8.72	8586.47	6371.69	56.6	60.09	−4.6	−3.08	67
Laos	6.89	2338.69	6549.67	7.19	1.51	18.32	1.4	1.77	11070.04	6510.17	37.68	50.9	−5.9	−5.53	134
Lebanon	5.44	8257.29	14308.75	2.92	−0.81	2.31	6.5	7.54	38397.56	43083.14	148	152.01	0.14	1.6	123
Malaysia	5.76	9508.24	27682.61	5.44	2.13	2.52	3.5	3.3	54809.39	43807.69	52.7	49.3	−3.1	−3.83	18
Mongolia	4.59	3694.08	12252.28	5.83	0.55	11.52	6.8	6.38	29139.99	16933.76	79.4	57.37	−17	−9.8	56
Myanmar	9.01	1195.52	5721.23	10.41	6.96	17.93	0.8	0.82	11371.25	5068.83	36.41	58.57	−4.1	−2.22	167
Nepal	4.28	729.12	2477.9	4.49	8.79	7.22	3.4	2.97	4098.14	3355.64	25.7	38.47	−2.5	−2.42	99
Oman	4.03	14982.36	42742.54	2.53	1.1	2.53	16.5	18.28	82675.81	128281.81	31.4	9.14	–22	−7.27	70
Pakistan	4.13	1443.63	5235.48	3.78	3.75	8.22	5.9	6.02	14295.27	12,892	66.5	62.38	−4.6	−6.48	138
Philippines	4.35	2951.07	7804.17	4.53	1.77	4.71	5.5	8.42	17564.04	13136.66	42.1	52.73	−2.4	−1.6	103
Qatar	10.44	59324.34	127480.48	2.59	2.88	3.96	0.2	1.1	157756.25	165623.86	56.5	29.95	−9.2	6.63	68
Saudi Arabia	3.43	20028.65	54416.61	2.27	3.52	2.33	5.5	5.71	128798.52	144194.74	13.1	16.21	−12.8	0.3	82
Singapore	5.91	52962.49	87832.59	5.46	−0.5	1.57	1.8	3.6	142111.53	114483.65	111.5	97.7	−1.2	0.38	1
Sri Lanka	5.36	3835.39	12312.94	6.62	3.99	8.68	4.4	8.08	29902.6	17833.04	78.8	80.27	−5.4	−5.98	107
Tajikistan	1.54	795.84	2979.31	1.86	6	11.19	10.8	11.3	8026.13	5788.4	41.8	36.24	−1.7	−0.82	132
Thailand	4.21	5910.62	16913.37	5.28	0.19	2.89	0.9	1.48	27954.55	20005.54	41.2	42.23	−2.7	−2.18	49
Turkey	4.52	10862.6	25247.2	5.85	7.78	31.58	10.8	9.01	68674.96	50466.71	28.3	38.37	−1.1	−1.23	55
United Arab Emirates	4.39	37622.21	72399.65	0.23	1.62	2.82	3.8	3.33	98612.09	148069.4	20.7	14.65	−3.9	4.07	31
Uzbekistan	4.51	2110.67	6512.68	4.97	8	14.33	8.8	9.07	14011.76	8673.24	12.8	14.8	−0.1	0.16	87
Viet Nam	6.84	2170.65	6295.59	7.62	3.24	6.6	2.2	2.32	9912.4	6071.73	60.7	46.5	−4.2	−3.68	90
Yemen	2.15	990.33	2507.47	0.77	8.1	13.47	16.2	14.86	11849.11	19018.36	85.4	49.82	−13.5	−7.7	170

(*continued on next page*)

Table 1 (*continued*)

	Compared nations and criteria describing the nations												Success of the nation, Q_j	Priority of the nation	Utility degree of the nation, N_j (%)
	Average ease of doing business ranking in 2006–2016	Corruption perceptions index in 2016	Average corruption perceptions index in 2004–2016	Human development index in 2015	Average human development index in 1991–2015	Gender inequality index in 2015	Average gender inequality index in 1995–2015	Average happiness index in 2012–2016	Education index in 2015	Average education index in 1995–2015	Environmental performance index ranking (EPI) in 2016	Ecological footprint per capita (EF) in 2013			
Afghanistan	165	1.5	1.4	0.479	0.383	0.667	0.701	3.692	0.398	9.034	21.74	0.79	0.9438	34	37.68%
Armenia	43	3.3	3.09	0.743	0.67	0.293	0.36	4.351	0.73	16.346	61.67	2.03	0.8224	39	32.83%
Azerbaijan	71	3	2.45	0.759	0.689	0.326	0.323	5.085	0.723	15.77	55.47	2.31	1.0441	23	41.68%
Bahrain	39	4.3	4.9	0.824	0.794	0.233	0.243	5.894	0.717	2.113	51.83	6.18	1.584	5	63.24%
Bangladesh	123	2.6	2.66	0.579	0.485	0.52	0.568	4.687	0.457	13.352	25.61	0.77	1.033	25	41.24%
Bhutan	129	6.5	5.88	0.607	0.592	0.477	0.496	5.153	0.452	1.827	46.86	4.69	1.2769	13	50.98%
Cambodia	141	2.1	2.12	0.563	0.455	0.479	0.526	3.99	0.459	13.183	35.41	1.3	1.0435	24	41.66%
China	91	4	3.61	0.738	0.621	0.164	0.195	5.159	0.631	15.221	43	2	1.2048	15	48.1%
Cyprus	44	5.5	6.03	0.856	0.812	0.116	0.17	5.831	0.786	19.401	66.23	3.32	1.2566	14	50.16%
Georgia	26	5.7	3.95	0.769	0.726	0.361	0.393	4.256	0.794	16.585	47.23	1.79	1.0037	26	40.07%
India	133	4	3.42	0.624	0.519	0.53	0.586	4.514	0.535	13.768	31.23	1.08	0.9991	28	39.89%
Indonesia	124	3.7	2.86	0.689	0.614	0.467	0.503	5.331	0.622	15.567	44.36	1.51	0.9991	29	39.88%
Iran	134	2.9	2.58	0.774	0.684	0.509	0.543	4.709	0.704	14.779	51.08	3.04	1.0974	19	43.81%
Iraq	153	1.7	1.7	0.649	0.61	0.525	0.558	4.642	0.5	11.884	33.39	2	0.9147	35	36.52%
Israel	34	6.4	6.1	0.899	0.853	0.103	0.154	7.264	0.87	19.204	65.78	5.67	1.5031	7	60%
Japan	20	7.2	7.48	0.903	0.862	0.116	0.131	5.973	0.842	20.643	72.35	4.86	1.3559	12	54.13%
Jordan	98	4.8	4.97	0.742	0.708	0.478	0.53	5.311	0.701	16.52	55.78	2.13	0.8959	37	35.77%
Kazakhstan	60	2.9	2.62	0.794	0.723	0.202	0.287	5.816	0.805	15.86	51.07	5.55	1.4908	8	59.52%
Kuwait	68	4.1	4.46	0.8	0.768	0.335	0.353	6.289	0.611	17.856	63.94	8.26	2.5049	1	100%
Kyrgyzstan	78	2.8	2.28	0.664	0.611	0.394	0.436	5.129	0.721	15.402	40.63	1.84	0.9712	30	38.77%
Laos	159	3	2.4	0.586	0.486	0.468	0.506	4.846	0.474	13.268	40.37	1.67	0.9502	31	37.93%
Lebanon	102	2.8	2.85	0.763	0.753	0.381	0.392	5.031	0.656	15.805	50.15	3.43	1.1417	18	45.58%
Malaysia	19	4.9	4.88	0.789	0.726	0.291	0.317	5.905	0.7	17.353	59.31	4.37	1.3659	11	54.53%
Mongolia	64	3.8	3.22	0.735	0.631	0.278	0.368	4.893	0.737	15.047	44.67	6.08	1.3722	10	54.78%
Myanmar	175	2.8	1.78	0.556	0.455	0.374	0.44	4.422	0.41	13.089	27.44	1.43	1.0787	22	43.06%
Nepal	108	2.9	2.62	0.558	0.466	0.497	0.577	4.606	0.475	14.209	37	0.99	1.0019	27	40%
Oman	56	4.5	5.12	0.796	0.765	0.281	0.312	6.853	0.652	1.61	47.75	5.72	1.4597	9	58.27%
Pakistan	97	3.2	2.55	0.55	0.476	0.546	0.588	5.222	0.395	12.347	34.58	0.78	0.8819	38	35.21%
Philippines	125	3.5	2.89	0.682	0.633	0.436	0.455	5.192	0.637	16.301	44.02	1.09	0.9441	33	37.69%
Qatar	45	6.1	6.55	0.856	0.811	0.542	0.555	6.507	0.698	2.335	63.03	10.8	2.3702	2	94.62%
Saudi Arabia	30	4.6	4.16	0.847	0.763	0.257	0.476	6.404	0.768	16.816	66.66	5.61	1.5641	6	62.44%
Singapore	1	8.4	8.99	0.925	0.833	0.068	0.134	6.662	0.814	2.287	81.78	6.6	1.7179	4	68.58%
Sri Lanka	95	3.6	3.43	0.766	0.699	0.386	0.408	4.319	0.752	15.547	53.88	1.44	0.9143	36	36.5%
Tajikistan	147	2.5	2.2	0.627	0.578	0.322	0.362	4.801	0.658	14.266	31.34	0.94	0.9487	32	37.87%
Thailand	20	3.5	3.55	0.74	0.665	0.366	0.347	6.431	0.641	16.754	52.83	2.65	1.1927	16	47.61%
Turkey	69	4.1	4.22	0.767	0.67	0.328	0.442	5.392	0.668	16.551	54.91	3.27	1.1767	17	46.98%
United Arab Emirates	42	6.6	6.46	0.84	0.799	0.232	0.366	6.817	0.687	11.155	72.91	9.53	2.052	3	81.92%
Uzbekistan	144	2.1	1.86	0.701	0.647	0.287	0.282	5.896	0.74	15.137	43.23	2.17	1.0867	20	43.38%
Viet Nam	94	3.3	2.85	0.683	0.592	0.337	0.337	5.257	0.617	1.842	38.17	1.71	1.0828	21	43.23%
Yemen	115	1.4	2.16	0.482	0.456	0.767	0.776	3.862	0.35	10.564	30.16	0.98	0.7537	40	30.09%

Table 2
Decision-making table of ESH in 19 Asian nations under analysis.

No.	Compared nations and criteria describing the nations																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
		Average GDP growth (by annual %) in 1991–2-016	GDP per Capita in 2016 (2015)	GDP per capita in PPP terms in 2016	Average annual growth of GDP per capita in PPP terms in 1991–20-16	Inflation grow in 2016 (or 2015, 2014)	Average inflation in 1995–20-16	Unemplo-yment rate in 2016	Average unemploy-ment rate in 1991–20-16	Labor produc-tivity per employee in 2016	Average labor produc-tivity per person employed in 2015 USD in 1991–20-16	Public debt in 2016 (or 2015)	Average public debt in 2004–20-16	Fiscal balance in 2016 (or 2015)	Average fiscal balance in 2011–20-16	Ease of doing business ranking in 2016	Average ease of doing business ranking in 2006–20-16	Corruption percep-tions index in 2016	Average corrup-tion percep-tions index in 2004–2-016
1	Armenia	3.11	3614.69	8832.76	6.48	−1.27	12.86	17.6	17.62	20792.01	12394.41	51.73	31.12	−5.6	−3.08	35	43	3.3	3.09
2	Azerbaijan	4.56	3878.71	17256.63	5.59	4.18	23.84	5	6.31	33202.32	21129.65	51.1	17.14	−0.4	−0.1	63	71	3	2.45
3	Bangladesh	5.44	1358.78	3579.76	5.84	5.51	6.45	4.1	3.83	8648.8	5598.31	27.7	35.29	−4.7	−4.1	174	123	2.6	2.66
4	China	9.85	8123.18	15529.08	11.21	2	2.89	4.6	4.42	25987.58	11220.6	44.3	33.22	−3.8	−2.15	84	91	4	3.61
5	Cyprus	2.71	23541.49	32707.87	3.73	−1.43	1.98	13	7.12	49752.16	48466.86	106.6	73.95	0.3	−4.4	47	44	5.5	6.03
6	Georgia	0.66	3865.79	10004.53	4.66	2.13	14.3	11.7	13.25	18189.16	10548.3	43.9	35.96	−4	−2.37	24	26	5.7	3.95
7	India	6.63	1709.59	6570.62	7.2	4.94	7.16	3.5	3.94	16305.24	8905.83	69.6	72.66	−3.52	−4.47	130	133	4	3.42
8	Indonesia	4.84	3570.29	11609.03	5.32	3.53	10.2	5.6	6.77	23380.79	16255.01	28.7	30.35	−2.46	−2.1	109	124	3.7	2.86
9	Iran	3.52	5219.11	19948.82	3.75	8.57	19.26	11.4	11.68	59457.98	51771.25	34.5	32.1	−2.1	−0.88	118	134	2.9	2.58
10	Iraq	7.15	4609.6	17348.94	8.91	1.39	30.61	15.1	17.45	63529.45	50120.16	66.9	101.92	−13.4	−4.27	161	153	1.7	1.7
11	Israel	4.23	37180.53	37258.22	3.56	−0.54	3.17	4.8	9.8	77191.01	68470.49	62.3	72.82	−2.15	−2.76	53	34	6.4	6.1
12	Japan	1.01	38972.34	42281.19	2.92	−0.12	0.11	3.1	3.97	74554.95	68137.24	250.4	216.58	−4.5	−6.5	34	20	7.2	7.48
13	Jordan	5.04	4087.94	9047.77	3.33	−0.79	3.36	15.3	14.2	39372.11	37072.83	95.1	81.02	−3.2	−4.93	113	98	4.8	4.97
14	Malaysia	5.76	9508.24	27682.61	5.44	2.13	2.52	3.5	3.3	54809.39	43807.69	52.7	49.3	−3.1	−3.83	18	19	4.9	4.88
15	Pakistan	4.13	1443.63	5235.48	3.78	3.75	8.22	5.9	6.02	14295.27	12,892	66.5	62.38	−4.6	−6.48	138	97	3.2	2.55
16	Philippines	4.35	2951.07	7804.17	4.53	1.77	4.71	5.5	8.42	17564.04	13136.66	42.1	52.73	−2.4	−1.6	103	125	3.5	2.89
17	Saudi Arabia	3.43	20028.65	54416.61	2.27	3.52	2.33	5.5	5.71	128798.5-2	144194.7-4	13.1	16.21	−12.8	0.3	82	30	4.6	4.16
18	Thailand	4.21	5910.62	16913.37	5.28	0.19	2.89	0.9	1.48	27954.55	20005.54	41.2	42.23	−2.7	−2.18	49	20	3.5	3.55
19	Turkey	4.52	10862.6	25247.2	5.85	7.78	31.58	10.8	9.01	68674.96	50466.71	28.3	38.37	−1.1	−1.23	55	69	4.1	4.22

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Table 2 (*continued*)

No.	Compared nations and criteria describing the nations															Success of the nation, Q_j	Priority of the nation	Utility degree of the nation, N_j (%)
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
		Human development index in 2015	Average human development index in 1991–20-15	Gender inequality index in 2015	Average gender inequality index in 1995–20-15	Average happiness index in 2012–20-16	Education index in 2015	Average education index in 1995–20-15	Environmental performance index ranking (EPI) in 2016	Ecological footprint per capita (EF) in 2013	Social progress index in 2017	Average social progress index in 2014–20-17	World values survey: Traditional values versus Secular-rational values in 2006 (or 2000, 1995)	World values survey: Survival values versus Self-expression values in 2006 (or 2000, 1995)	Quality of life index (QLI) in 2018	Happiness index in 2016			
1	Armenia	0.743	0.67	0.293	0.36	4.351	0.73	16.346	61.67	2.03	69.01	66.58	0.55	−1.31	118.64	4.376	2.5077	15	50.67%
2	Azerbaijan	0.759	0.689	0.326	0.323	5.085	0.723	15.77	55.47	2.31	65.33	63.46	−0.14	−1.38	99.65	5.234	2.7738	10	56.05%
3	Bangladesh	0.579	0.485	0.52	0.568	4.687	0.457	13.352	25.61	0.77	54.84	53.42	−1.21	−0.93	68.03	4.608	2.3805	17	48.11%
4	China	0.738	0.621	0.164	0.195	5.159	0.631	15.221	43	2	63.72	60.49	0.8	−1.16	98.23	5.273	3.1816	7	64.29%
5	Cyprus	0.856	0.812	0.116	0.17	5.831	0.786	19.401	66.23	3.32	81.15	79.27	−0.56	0.13	162.42	5.621	3.9239	4	79.29%
6	Georgia	0.769	0.726	0.361	0.393	4.256	0.794	16.585	47.23	1.79	70.8	66.88	−0.04	−1.31	122.14	4.286	2.7716	11	56.01%
7	India	0.624	0.519	0.53	0.586	4.514	0.535	13.768	31.23	1.08	58.39	53.9	−0.36	−0.21	122.08	4.315	2.6946	12	54.45%
8	Indonesia	0.689	0.614	0.467	0.503	5.331	0.622	15.567	44.36	1.51	65.1	61.52	−0.47	−0.8	108.31	5.262	2.6739	13	54.03%
9	Iran	0.774	0.684	0.509	0.543	4.709	0.704	14.779	51.08	3.04	61.93	58.47	−1.22	−0.45	90.35	4.692	2.82	9	56.99%
10	Iraq	0.649	0.61	0.525	0.558	4.642	0.5	11.884	33.39	2	48.38	46.6	−0.4	−1.68	91.77	4.497	2.3668	18	47.83%
11	Israel	0.899	0.853	0.103	0.154	7.264	0.87	19.204	65.78	5.67	80.61	74.87	0.26	−0.36	153.19	7.213	4.4188	2	89.29%
12	Japan	0.903	0.862	0.116	0.131	5.973	0.842	20.643	72.35	4.86	86.44	84.6	1.96	−0.05	182.26	5.92	4.1825	3	84.52%
13	Jordan	0.742	0.708	0.478	0.53	5.311	0.701	16.52	55.78	2.13	69.85	65.03	−1.61	−1.05	113.62	5.336	2.5093	14	50.71%
14	Malaysia	0.789	0.726	0.291	0.317	5.905	0.7	17.353	59.31	4.37	71.14	70.23	−0.73	0.09	120.02	6.084	3.6744	5	74.25%
15	Pakistan	0.55	0.476	0.546	0.588	5.222	0.395	12.347	34.58	0.78	51.54	46.53	−1.42	−1.25	102.3	5.269	2.2803	19	46.08%
16	Philippines	0.682	0.633	0.436	0.455	5.192	0.637	16.301	44.02	1.09	67.1	66.14	−1.21	−0.11	96.22	5.43	2.5066	16	50.65%
17	Saudi Arabia	0.847	0.763	0.257	0.476	6.404	0.768	16.816	66.66	6.51	69.45	66.03	−1.31	0.15	154.46	6.344	4.9486	1	100%
18	Thailand	0.74	0.665	0.366	0.347	6.431	0.641	16.754	52.83	2.65	68.51	66.66	−0.64	0.01	104.65	6.424	3.1706	8	64.07%
19	Turkey	0.767	0.67	0.328	0.442	5.392	0.668	16.551	54.91	3.27	68.68	66.51	−0.89	−0.33	127.89	5.5	3.2133	6	64.93%

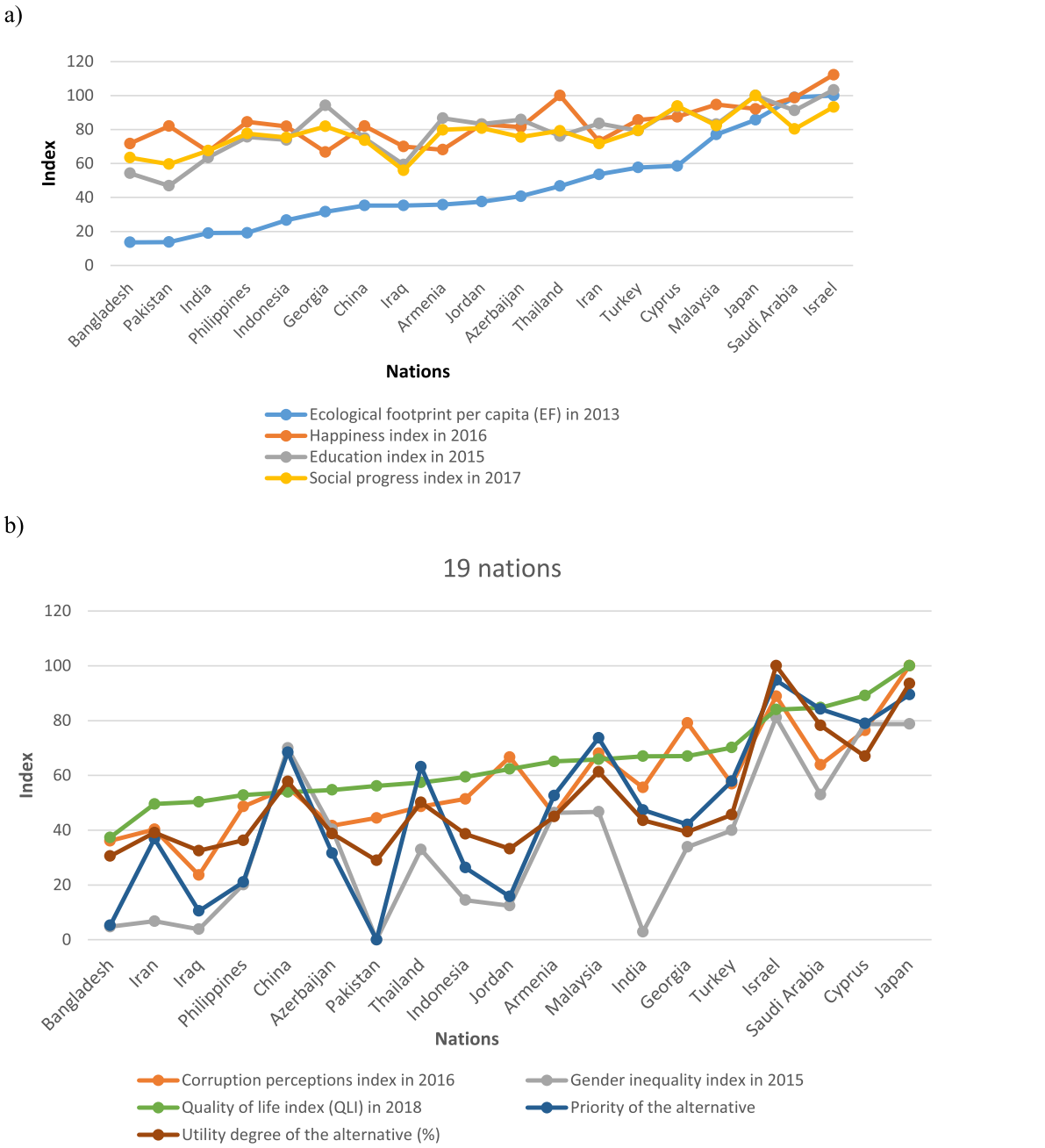


Fig. 1. Interdependencies of P_j and N_j with QLI, EPI, EFpc, CPI, GII of Asian nations—a graphic illustration. a) Correlations linking normalized values of the 2013 EFpc, 2016 HI, 2015 EI and 2016 SPI (see Eq. (1)). b) Correlations P_j and N_j with the 2018 QLI, 2016 CPI and 2015 GII for 19 nations under study, normalized (see Eqs. (1) and (2)). c) Correlations P_j and N_j with the 2016 EPI ranking, 2016 CPI and 2015 GII for 19 nations under study, normalized (see Eqs. (1) and (2)). d) Correlations P_j and N_j with the 2016 EPI ranking, 2016 CPI and 2015 GII for 40 nations under study, normalized (see Eqs. (1) and (2)). e) Correlations P_j and N_j with the 2013 EFpc, 2016 CPI and 2015 GII for 19 nations under study, normalized (see Eqs. (1) and (2)). f) Correlations P_j and N_j with the 2013 EFpc, 2016 CPI and 2015 GII for 40 nations under study, normalized (see Eqs. (1) and (2)). g) The N_j, P_j and 2018 QLI, 2015 GII and 2016 CPI correlations for nations under study, normalized (see Eq. (1)). h) The N_j, P_j and 2016 EPI ranking, 2015 GII and 2016 CPI correlations for nations under study, normalized (see Eq. (1)). i) The N_j, P_j and 2013 EFpc, 2015 GII and 2016 CPI correlations for nations under study, normalized (see Eq. (1)).

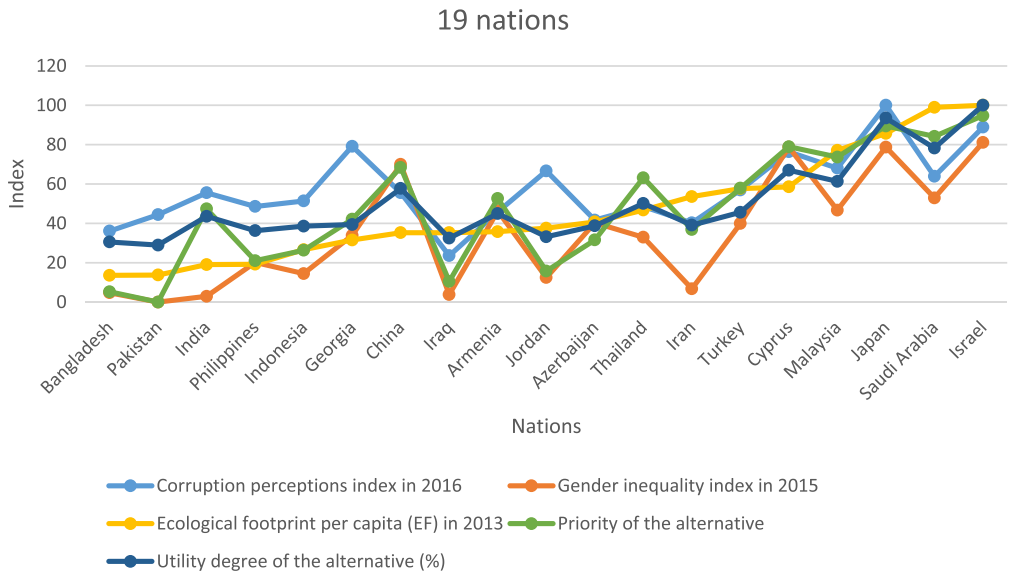
reducing CPI, improving HI, EI and SPI. So, the cross-nation data during the period 1991–2016 were analyzed and compared in Fig. 1a and Chapter 3.3 "Correlation analysis".

As shown in Fig. 1a and Table 3, the EFpc is strongly correlated with the HI (r = 0.745580488 (19 nations)), the EI (r = 0.74250957 (19 nations)) and the SPI (r = 0.689079359 (19 nations)), which are all correlated among themselves. As shown in Table 3, there is a strong, direct correlation of the EFpc in 2013 with HI in 2016 (r = 0.7456), EI in 2015 (r = 0.7426), and SPI in 2017 (r = 0.6892). That means that the higher the HI, EI and SPI, the better the EFpc indicator.

Step 9. All chosen criteria may be optimized in this step. Let us take Indonesia (a_{12}) 2016 EPI (X_{26}) as an example (Kaklauskas, 2016) (Table 4). The goal is to optimize Indonesia's EPI ($x_{26\ 12}$) so that in terms of its ESH, the nation ends up in the Top 20 among the nations considered. The value of $x_{26\ 12}$, then, must be lowered until Indonesia rises in the Top 20 (Table 4).

The data in Tables 1 and 4 show that, among the nations, Indonesia (a_{12}) ranked 29th: its 2016 EPI (X_{26}) was 44.36 gha ($x_{26\ 12\ (\text{cycle } 0)} = 44.36$) and its utility degree $N_{12\ (\text{cycle } 0)} = 39.88\%$. Approximation in six cycles pushed Indonesia (a_{12}) up two positions to 28 with its new utility degree $N_{12\ (\text{cycle } 6)} = 39.90\%$ and its EPI 0.06 points lower ($x_{26\ 12\ (\text{cycle } 6)} = 44.30$). The

e)



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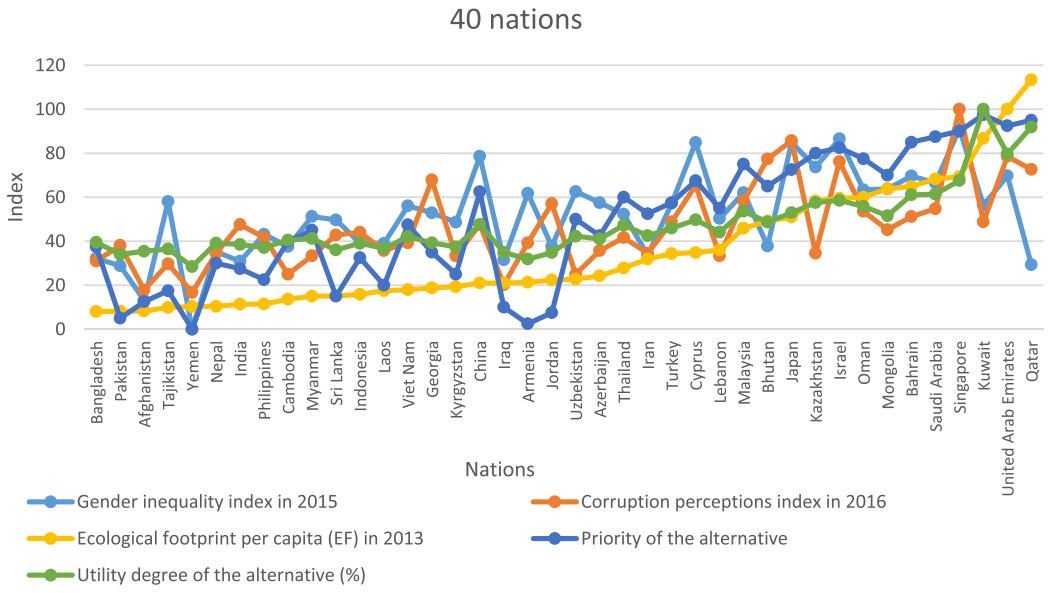


Fig. 1. (*continued*)

objective, however, had not been achieved yet, and the aim was set to reach an even lower value of $x_{26\ 12}$. Only after 639 cycles, Indonesia's (a_{12}) score reached $x_{26\ 12\ (\text{cycle } 639)} = 33.97$ and utility degree $N_{12\ (cycle\ 639)} = 43.33\%$ – high enough to land the nation in the Top 20 in terms of its ESH (see Table 4).

Steps 10 and 11 offer nations online tips on ways to reach better values and provide information about the effect of the new scores on the cumulative nation rankings in terms of their ESH. The tips are displayed as a matrix (see Table 5). Tables 2 and 5, for instance, show that Japan's (a_{12}) QLI ($x_{32\ 12} = 182.26$) is the highest among the nations, while Malaysia's (a_{14}) QLI is 120.02 ($x_{32\ 14} = 120.02$). If Malaysia aims for a QLI (X_{32}) equal to that of Japan (a_{12}), its index needs a lift of 51.86% ($t_{32\ 14} = 51.86\%$ (Table 5)). Malaysia's (a_{14}) rank in the overall nation ranking would then improve by 8.643% ($r_{32\ 14} = 8.643\%$ (Table 5)). In this way, other score improvement options in other nations can be analyzed.

Step 12. Validation (see subsection 2.1).

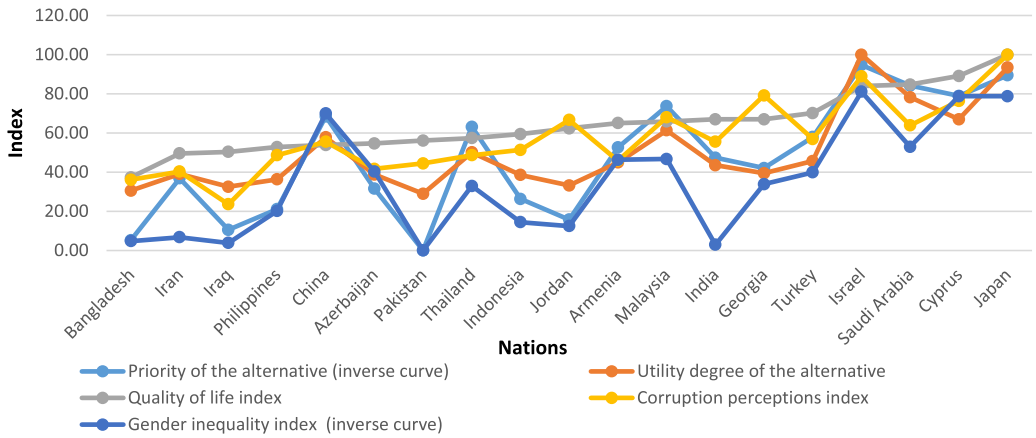
2.1. Validating the method (Step 12)

To validate the method, the well-being and human development, macroeconomic, values-based, quality of life and environmental (hereafter ESH) indicators of the nations considered was examined to see whether the utility degree and priority ranking are precise. Since the ESH indicators, P_j and N_j have several dimensions, the indicators considered were normalized. A strong linear correlation with the N_j and P_j in terms of ESH was determined for the nations considered according to their various analyzed indicators. The strong linear correlation prove the validity of the method.

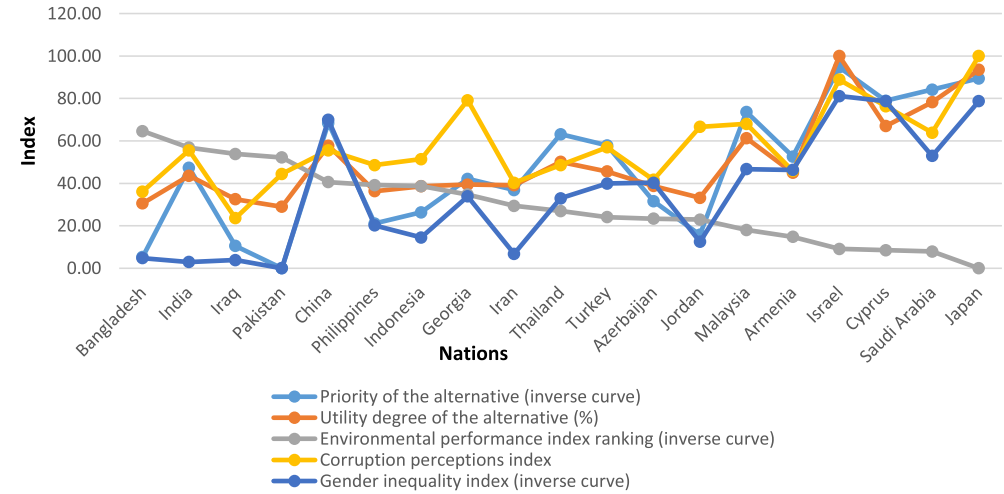
The nations were ranked by P_j and their N_j were determined according to multiple criteria decision making (MCDM) table results (see Tables 1 and 2). The analysis that established the correlations linking the EPI ranking, EFpc, QLI, the N_j and P_j of the nations covered 19–40 nations. Data availability was the main determining factor of the number of nations analyzed (see Tables 1 and 2).

Fig. 1g–i shows the normalized results. Tables 1 and 2 show how the maximizing decision-making criteria n_{ij} (higher means better) was

g)



h)



i)

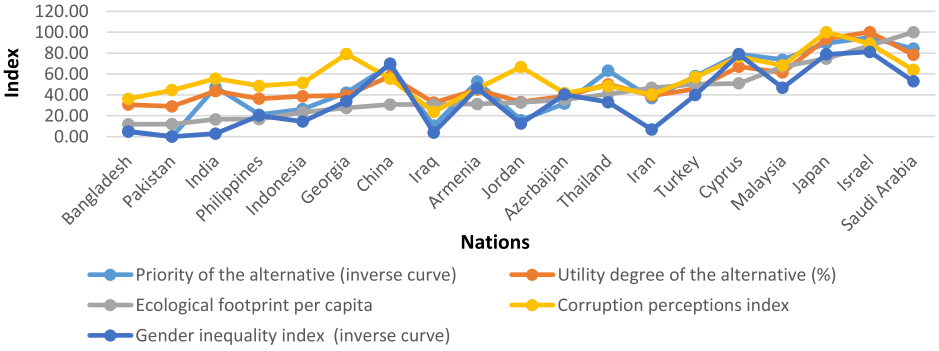


Fig. 1. (*continued*)

calculated using the normalization equation (Equation 1):

$$n_{ij+} = 100^*(x_{ij}: x_{i\ \max}) \quad (1)$$

where x_{ij} is the value of the *i-th* decision-making criterion in the *j-th* nation, n is the number of the nations analyzed, m is the number of decision-making criteria, and $x_{i\ \max}$ is the greatest value of the analyzed decision-making criteria (X_i).

To calculate the minimizing (see Tables 1 and 2) decision-making criterion (lower means better) and to visualize the results with direct dependences in a chart, an inverse equation was used (Equation 2):

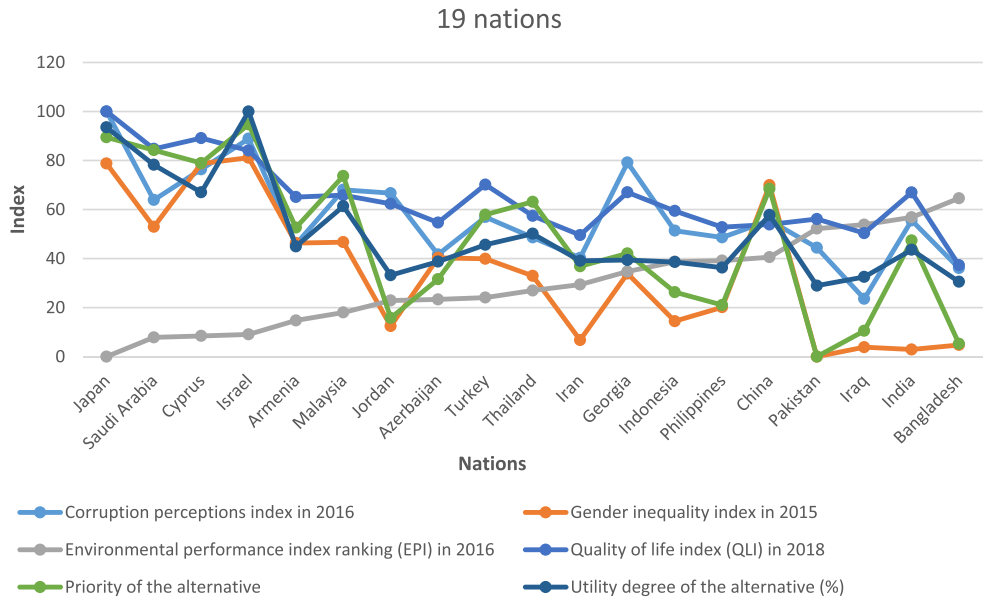
$$n_{ij-} = 100 - 100^*(x_{ij}: x_{i\ \max}) \quad (2)$$

Table 3 shows the calculations of the correlation coefficients done using primary, non-normalized data.

The data are arranged in an ascending order according to the EPI, QLI and EFpc. Table 3 and Fig. 1 show that a strong relation exists with:

- The 2018 (or 2015) QLI and the 2015 GII (r = −0.73917, negative linear dependence), the 2016 CPI (r = 0.85367, linear dependence), the N_j (r = 0.80389, linear dependence) and the P_j (r = −0.73921, negative linear dependence).
- The 2014 EPI ranking and the 2015 GII (r = −0.78177, negative linear dependence), the N_j (r = 0.75086, linear dependence) and the P_j (r = −0.7693, negative linear dependence).
- The 2012 EFpc and the 2015 GII (r = −0.71865, negative linear dependence), the N_j (r = 0.938391, linear dependence) and the P_j

c)



d)

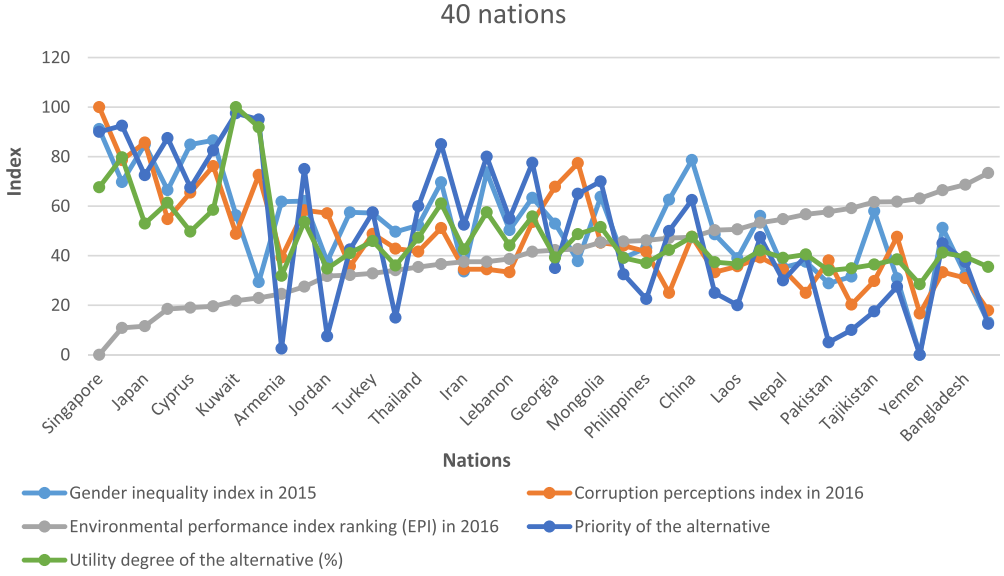


Fig. 1. (*continued*)

(r = −87338, negative linear dependence). The correlations linking the CPI to the EPI ranking (r = 0.681794 linear dependence) and the EFpc (r = 0.6331301, linear dependence) are average.

2.2. Verification of variables

Separation of criteria into a hierarchy structure allows to analyze variables within each category. In Table 6, we made a further separation into the group of cross-sectional data variables that show values of a recent year and the group of variables that represent averages within the indicated period. Data of 40 nations were used for making calculations in the "Macroeconomic" category (Table 6) while for the remaining categories, data of 19 nations were used (Table 6).

At the present stage, a multicollinearity analysis was performed. Unlike models with linear regression, this stage is not compulsory in the MCDM analysis. Nevertheless, the analysis helps to identify possibly redundant variables. We used the Variance inflation factor (VIF) (Field, 2009), a popular indicator of multicollinearity (Iran, 2018), for each variable in a category (3):

$$VIF = \frac{1}{1 - R^2} \tag{3}$$

Here, R^2 relates to the linear regression equation, which expresses a chosen variable by a fitted linear combination of the remaining variables in the same category. Levels above 10 are perceived as indicating a high level of multicollinearity of a certain variable. In the case that the chosen variable induces a VIF > 10, the variable is excluded from the category group and further similar analysis is performed with the remaining variables.

In the first set of criteria of the "Macroeconomic" category, the multicollinearity analysis revealed the largest VIF = 25.935, related to the variable X_3. Values of the VIF after exclusion of this variable X_3 are presented in Table 6. As all the values appeared to be below the level 10, we may deduce that X_3 is the only variable to be considered for exclusion because of its considerable correlation with other variables in the set.

In the second set of criteria of the "Macroeconomic" category, the

Table 3
Correlations of ESH and other indicators (19 and 40 nations).

Indicators	40 nations*			19 nations**				Correlations with EPI	Correlations with QLI
	EPI ranking in 2016 (–)	EFpc in 2013 (+)	INVAR	EPI ranking in 2016 (–)	QLI in 2018 (+)	EFpc in 2013 (+)	INVAR		
*X_1: GDP per capita in 2016 (or *2015)*	0.766322	0.824969992	−0.71128/0.805081	0.724766	0.851458	0.834109747	−0.76591/0.84896	Alam and Kabir (2013); Gallego-Álvarez et al. (2014); Roy and Goll (2014); Abu Bakar et al. (2015); Mavragani et al. (2016); Liu et al. (2016); Lee and Thiel (2017); Chowdhury and Islam (2017); Cook et al. (2017)	Luzzati and Gucciardi (2015); Hajduová et al. (2014); Proto and Rustichini (2013)
X_3: GDP per capita in PPP terms in 2016	0.716279	0.899127357	−0.74378/0.902149	0.7621744	0.775036	0.944177283	−0.86678/ 0.952168		
X_9: Labor productivity per employee in 2016	0.7563722	0.872286734	−0.73036/0.841353	0.626883	0.604679	0.877977434	−0.70144/0.805519	Lannelongue et al. (2017); Cook et al. (2017)	Luzzati and Gucciardi (2015); Hajduová et al. (2014)
X_{10}: Average labor productivity per person employed in 2015 USD in 1991–2016	0.68301755	0.88537229	−0.7172/0.863208	0.607762	0.608340	0.841662253	−0.66157/0.809404		
X_{15}: Ease of doing business ranking in 2016	−0.79347079	−0.555095847	0.590596/−0.4428	−0.7855166	−0.615416	−0.562802198	0.660588/−0.53463	Mavragani et al. (2016); Roy and Goll (2014)	Nikolaev (2014); Hajduová et al. (2014)
X_{16}: Average ease of doing business ranking in 2006–2016	−0.8039498	−0.613181639	0.593412/−0.52284	−0.7664812	−0.664678	−0.65845522	0.684623/−0.67435		
X_{17}: Corruption perceptions index in 2016	0.781827979	0.642941497	−0.61389/0.57096	0.681794	0.853668	0.63313018	−0.69684/ 0.694107	Gallego-Álvarez et al. (2014); Mavragani et al. (2016)	Absalyamova et al. (2016); Alves et al. (2017); Luzzati and Gucciardi (2015); Hajduová et al. (2014)
X_{18}: Average corruption perceptions index in 2004–2016	0.813975	0.701655474	−0.65081/0.631406	0.737254	0.865088	0.695914694	−0.72732/ 0.72985		
X_{19}: Human development index in 2015	0.9077491	0.71061915	−0.70239/0.620831	0.92684	0.7826213	0.876783987	−0.8788/0.82545	Liu et al. (2017); Roy and Goll (2014); Shahabadi et al. (2017); Liu et al. (2016); Cook et al. (2017); Frugoli et al. (2015)	Absalyamova et al. (2016); Alves et al. (2017); Frugoli et al. (2015); Hajduová et al. (2014)
X_{20}: Average human development index in 1991–2015	0.8947259	0.722524686	−0.66897/0.620095	0.918982	0.78510864	0.839004239	−0.78502/0.765082		
X_{21}: Gender inequality index in 2015	−0.686300	−0.446319328	0.62738/−0.4025	−0.781772	−0.739172	−0.718645364	0.808114/ −0.78604	Roy and Goll (2014); Nazrul Islam (2015)	Human Development Report (2016); Bibi et al. (2017); Hajduová et al. (2014)
X_{22}: Average gender inequality in 1995–2016	−0.6367065	−0.381557834	0.581866/−0.362	−0.696446	−0.6162677	−0.581473813	0.694345/ −0.62326		
X_{23}: Social progress index in 2017				0.879012	0.8155000	0.689152042	−0.75642/ 0.706444	Saisana and Philippas (2012); Abu Bakar et al. (2015)	Mosaner (2016); Frugoli et al. (2015); Luzzati and Gucciardi (2015); Hajduová et al. (2014)
X_{24}: Average social progress index in 2014–2017				0.8717263	0.779788	0.673238858	−0.74341/ 0.68914		
X_{25}: Happiness index in 2016				0.614072	0.5188371	0.745600128	−0.6873/ 0.758384	Kei (2016); Zidanšek (2007); Liu et al. (2016); Frugoli et al. (2015)	Frugoli et al. (2015); Medvedev and Landhuis (2018)
X_{26}: Average happiness index in 2012–2016	0.7225032	0.753048537	−0.77085/0.723894	0.606909	0.5681060	0.762771603	−0.7027/ 0.790269		

(*continued on next page*)

Table 3 (*continued*)

Indicators	40 nations*			19 nations**				Correlations with EPI	Correlations with QLI
	EPI ranking in 2016 (–)	EFpc in 2013 (+)	INVAR	EPI ranking in 2016 (–)	QLI in 2018 (+)	EFpc in 2013 (+)	INVAR		
X 27: Education index in 2015	0.7627206	0.468329262	−0.48009/0.352545	0.890905	0.7166386	0.74250418	−0.75845/ 0.68584	Gallego-Álvarez et al. (2014); Frugoli et al. (2015)	Frugoli et al. (2015); Luzzati and Gucciardi (2015); Hajduová et al. (2014); Van Hiel et al. (2018)
X 28: Average education index in 1995–2015				0.8861088	0.8050909	0.711893646	−0.77111/ 0.727497		
X_{30}: Survival values vs. self-expression values in 2006 (or *2000. **1995)				0.5102248	0.5830355	0.646870123	−0.66402/ 0.668601	WVS (2015); Cheng et al. (2016)	Hajduová et al. (2014); Van Hiel et al. (2018)
INVAR	−0.62813/0.621121	−0.85984/0.938126	–	−0.7693/ 0.75086	−0.73921/ 0.803898	−0.87338/ 0.938391	–	–	–

*Nations: Afghanistan; Armenia; Azerbaijan; Bahrain; Bangladesh; Bhutan; Cambodia; China; Cyprus; Georgia; India; Indonesia; Iran; Iraq; Israel; Japan; Jordan; Kazakhstan; Kuwait; Kyrgyzstan; Laos; Lebanon; Malaysia; Mongolia; Myanmar; Nepal; Oman; Pakistan; Philippines; Qatar; Saudi Arabia; Singapore; Sri Lanka; Tajikistan; Thailand; Turkey; United Arab Emirates; Uzbekistan; Viet Nam; Yemen.
**Nations: Armenia; Azerbaijan; Bangladesh; China; Cyprus; Georgia; India; Indonesia; Iran; Iraq; Israel; Japan; Jordan; Malaysia; Pakistan; Philippines; Saudi Arabia; Thailand; Turkey.

Table 4
The required EPI value for Indonesia to rise in Top 20.

Approximation cycle	Index	Indonesia 's (a_{12}) utility degree	Ranking
0	44.36	39.88%	29
…	…	…	…
6	44.30	39.90%	28
…	…	…	…
536	35.00	42.95%	23
…	…	…	…
639	33.97	43.33%	20

multicollinearity analysis revealed that for each variable in the group, values of the VIF were below 10 (Table 6). Thus, from the analysis it could be concluded that there are no redundant variables in the set.

In the first set of criteria of the "Human Development and Well-Being" category, the multicollinearity analysis revealed the largest VIF = 25.924, related to the variable X_{19}. Values performed in the same set after exclusion of this variable X_{19} are presented in Table 6. All the values after the exclusion of X_{19} appeared to be below the level 10. Thus, we may deduce that it is sufficient to consider to exclude only the variable X_{19} because of its correlation with other variables in the set and because of the absence of multicollinearity after its exclusion.

In the second set of criteria of the "Human Development and Well-Being" category, two very large value VIF indices appeared. For the variable X_{25}, the value of the VIF is 240.824, while for the variable $X_{29}$the VIF equals to 208.106. This means that the linear equations that express these two variables in terms of other remaining variables fit extremely well to the analyzed data, and the variables are clearly correlated. After exclusion of X_{25}, we have a much better situation. The VIF is now below 10 for all the remaining variables; thus, it is enough to consider exclusion of only the X_{25} variable.

In the remaining category "Value-based; Environmental; Quality of Life", all values of the VIF appear to be well below 10 (Table 6). This indicates that all the four variables in the category are exempt from multicollinearity.

It is yet not clear though if the correlated variables have a historically established, investigated by the theory of economics, linear relationship. Intuitively, the situation is not unusual when variables that represent a nation's development in various aspects move together in a similar or opposite direction. The analysis was based on certain data only; we name this factor as a limitation. That said, we decided not to omit the variables X_3, X_{19}, X_{25}.

3. MCDM and correlation analysis of the ESH in Asian nations

3.1. MCDM analysis of the ESH of considered nations

Multiple criteria decision making (MCDM) analysis according to environmental sustainability, macroeconomic, well-being and value-based criteria initially was performed for 40 Asian nations by applying Steps 2–7 of the INVAR method (see Section 2). The quality of life criterion was not included into the analysis due to lack of data for some of the nations. Multiple criteria analysis allowed to rank the nations by P_j and N_j and to distinguish the best and worst performing ones.

Analysis revealed that the best performing nations among 40 Asian nations are Kuwait (Q_{19} = Q_{max} = 2.5049; N_{19} = 100%), Qatar (Q_{30} = 2.3702; N_{30} = 94.62%) and United Arab Emirates (Q_{37} = 2.052; N_{37} = 81.92%). All three nations are among the highest income economies in the world, mostly due to large oil reserves. The highest average annual growth of GDP during the period 1991–2016 in these nations was impressive – reaching in Qatar 10.44%, in Kuwait 5.31% and in the United Arab Emirates 4.39%. Other indicators were also favorable – very low (< 4%) unemployment, high labor productivity, positive fiscal balance, high and improving human development indices (average Human Development Index (HDI) in 1991–2015 for Kuwait was 0.768, for Qatar 0.811 and for United Arab Emirates 0.799). Average GII for the years 1995–2015 was 0.353 for Kuwait, 0.555 for Qatar and 0.366 for United Arab Emirates, much higher than in Japan (0.131), Singapore (0.134) and Cyprus (0.17). Average HI in 2012–2016 was 6.289 in Kuwait, 6.507 in Qatar and 6.817 in United Arab

Table 5
Sample online tips on ways to improve nations values in terms of ESH.

Quantitative and qualitative information pertinent to alternatives																		
Criteria describing the alternatives	*	Measuring units	Weight	Compared alternatives Possible improvement of the analysed criterion by % Possible market value growth of alternatives by % as first impacted by criterion value growth Armenia	Azerbaijan	Bangladesh	China	Cyprus	Georgia	India	Indonesia	Iran	Iraq	Israel	Japan	Jordan	Malaysia	Pakistan
										...								
GDP per Capita in 2016 (2015)	+	USD	1	3614.69 (978.17%) (16.3028%)	3878.71 (904.78%) (15.0796%)	1358.78 (2768.19%) (46.1364%)	8123.18 (379.77%) (6.3295%)	23541.49 (65.55%) (1.0925%)	3865.79 (908.13%) (15.1356%)	1709.59 (2179.63%) (36.3272%)	3570.29 (991.57%) (16.5262%)	5219.11 (646.72%) (10.7787%)	4609.6 (745.46%) (12.4243%)	37180.53 (4.82%) (0.0803%)	38972.34 (0%) (0%)	4087.94 (853.35%) (14.2225%)	9508.24 (309.88%) (5.1647%)	1443.63 (2599.61%) (43.3268%)
Average positive GDP growth (by annual %) in 1991-2016	+	%	0.5	3.11 (216.72%) (1.806%)	4.56 (116.01%) (0.9667%)	5.44 (81.07%) (0.6756%)	9.85 (0%) (0%)	2.71 (263.47%) (2.1956%)	0.66 (1392.42%) (11.6035%)	6.63 (48.57%) (0.4047%)	4.84 (103.51%) (0.8626%)	3.52 (179.83%) (1.4986%)	7.15 (37.76%) (0.3147%)	4.23 (132.86%) (1.1072%)	1.01 (875.25%) (7.2937%)	5.04 (95.44%) (0.7953%)	5.76 (71.01%) (0.5917%)	4.13 (138.5%) (1.1542%)
GDP per capita in PPP terms in 2016	+	USD	1	8832.76 (516.08%) (8.6013%)	17256.63 (215.34%) (3.589%)	3579.76 (1420.12%) (23.6686%)	15529.08 (250.42%) (4.1736%)	32707.87 (66.37%) (1.1062%)	10004.53 (443.92%) (7.3987%)	6570.62 (728.18%) (12.1363%)	11609.03 (368.74%) (6.1457%)	19948.82 (172.78%) (2.8797%)	17348.94 (213.66%) (3.561%)	37258.22 (46.05%) (0.7675%)	42281.19 (28.7%) (0.4784%)	9047.77 (501.44%) (8.3573%)	27682.61 (96.57%) (1.6096%)	5235.48 (939.38%) (15.6564%)
Average positive annual growth of GDP per capita in PPP terms in 1991-2016	+	%	0.5	6.48 (72.99%) (0.6083%)	5.59 (100.54%) (0.8378%)	5.84 (91.95%) (0.7663%)	11.21 (0%) (0%)	3.73 (200.54%) (1.6711%)	4.66 (140.56%) (1.1713%)	7.2 (55.69%) (0.4641%)	5.32 (110.71%) (0.9226%)	3.75 (198.93%) (1.6578%)	8.91 (25.81%) (0.2151%)	3.56 (214.89%) (1.7907%)	2.92 (283.9%) (2.3659%)	3.33 (236.64%) (1.972%)	5.44 (106.07%) (0.8839%)	3.78 (196.56%) (1.638%)
										...								
Quality of life index (QLI) in 2018	+	Points	10	118.64 (53.62%) (8.9374%)	99.65 (82.9%) (13.8167%)	68.03 (167.91%) (27.9852%)	98.23 (85.54%) (14.2574%)	162.42 (12.22%) (2.0359%)	122.14 (49.22%) (8.2037%)	122.08 (49.3%) (8.2159%)	108.31 (68.28%) (11.3794%)	90.35 (101.73%) (16.9544%)	91.77 (98.61%) (16.4342%)	153.19 (18.98%) (3.1627%)	182.26 (0%) (0%)	113.62 (60.41%) (10.0686%)	120.02 (51.86%) (8.643%)	102.3 (78.16%) (13.027%)
Happiness index in 2016	+	Points	1	4.376 (64.83%) (1.0805%)	5.234 (37.81%) (0.6302%)	4.608 (56.53%) (0.9422%)	5.273 (36.79%) (0.6132%)	5.621 (28.32%) (0.472%)	4.286 (68.29%) (1.1382%)	4.315 (67.16%) (1.1194%)	5.262 (37.08%) (0.618%)	4.692 (53.73%) (0.8955%)	4.497 (60.4%) (1.0066%)	7.213 (0%) (0%)	5.92 (21.84%) (0.364%)	5.336 (35.18%) (0.5863%)	6.084 (18.56%) (0.3093%)	5.269 (36.9%) (0.6149%)

*- The sign + (−) indicates that a greater (lesser) criterion value corresponds to a greater (lesser) significance for stakeholders.

Table 6
Weights of variance inflation factor indices for criteria under analysis.

Category	Group	Criteria	VIF
Macroeconomic	2016 (or *2015, **2014)	X_1: GDP per Capita in 2.017	7.917
		X_3: GDP per capita in PPP terms in 2016	–
		X_5: Inflation grow in 2016 (or *2015, **2014)	1.396
		X_7: Unemployment rate in 2016	1.279
		X_9: Labor productivity per employee in 2016	6.050
		X_{11}: Public debt in 2016 (or *2015)	1.535
		X_{13}: Fiscal balance in 2.016 (or *2015)	1.2.57
		X_{15}: Ease of doing business ranking in 2016	2.144
		X_{17}: Corruption perceptions index in 2016	4.552
	Average	X_2: Average GDP growth (by annual %) in 1991–2016	5.054
		X_4: Average annual growth of GDP per capita in PPP terms in 1991–2016	5.077
		X_6: Average inflation in 1995–2016	2.027
		X_8: Average unemployment rate in 1991–2016	1.728
		X_{10}: Average labor productivity per person employed in 2015 US $ in 1991–2016	5.738
		X_{12}: Average public debt in 2004–2016	1.503
		X_{14}: Average fiscal balance in 2011–2016	1.630
		X_{16}: Average ease of doing business ranking in 2006–2016	3.492
		X_{18}: Average corruption perceptions index in 2004–2016	4.240
Human Development and Well-Being	2016 (or 2015, 2016 or 2018, as indicated)	X_{19}: Human development index in 2015	-
		X_{21}: Gender inequality in 2016	3.579
		X_{24}: Education index in 2015	5.599
		X_{28}: Social progress index in 2017	9.055
		X_{32}: Quality of life index (QLI) in 2018	3.143
		X_{33}: Happiness index in 2016	1.702
	Average	X_{20}: Average human development index in 1991–2015	4.872
		X_{22}: Average gender inequality in 1995–2015 X_{23}: Average happiness index in 2012–2016	3.013
		X_{25}: Average education index in 1995–2015	1.590
		X_{29}: Average social progress index in 2004–2016	5.928
Value-based, Environmental; Quality of Life		X_{26}: Environmental Performance Index ranking (EPI), 2016	3.176
		X_{27}: Ecological footprint per Capita (EF), 2013	3.267
		X_{30}: Traditional values vs_ secular-rational values 1995–2006	1.247
		X_{31}: Survival values vs. self-expression values 1995–2006	1.578

VIF- Values of the VIF indicators for variables after exclusion of variables **X_3, X_{19}, X_{25}** within each corresponding group.

Emirates, slightly smaller than in Israel (7.264) and Oman (6.853). All three nations, however, had lower EI, compared to Israel, Japan and Cyprus. Estimation of EPI in 2016 confirmed findings from previous research (Alam and Kabir, 2013) that highly developed nations have higher EPIs: for Kuwait EPI = 63.94, for Qatar EPI = 63.03 and for United Arab Emirates EPI = 72.91. Higher EPIs were observed only in Singapore (EPI = 81.78), Japan (EPI = 72.35), Cyprus (EPI = 66.2) and Israel (EPI = 65.78). Unfortunately, high economic growth imposes increase of EFpc, and in these three nations this indicator is among the highest (in Kuwait 8.26 gha, in Qatar 10.8 gha and in United Arab Emirates 9.53 gha).

The three worst performing nations are Yemen (Q_{40} = 0.7537; N_{40} = 30.09%), Armenia (Q_2 = 0.8224; N_2 = 32.83%) and Pakistan (Q_{28} = 0.8819; N_{28} = 35.21%). All three nations have moderate economic growth – GDP during the period 1991–2016 was growing by 2–3%, very high inflation, low labor productivity, extremely high unemployment (especially in Armenia, where the average reached 17.6% in 1991–2016), negative fiscal balance, high corruption (except Yemen), low HDI (except of Armenia where average HDI in 1991–2015 was 0.67). Besides, Yemen had

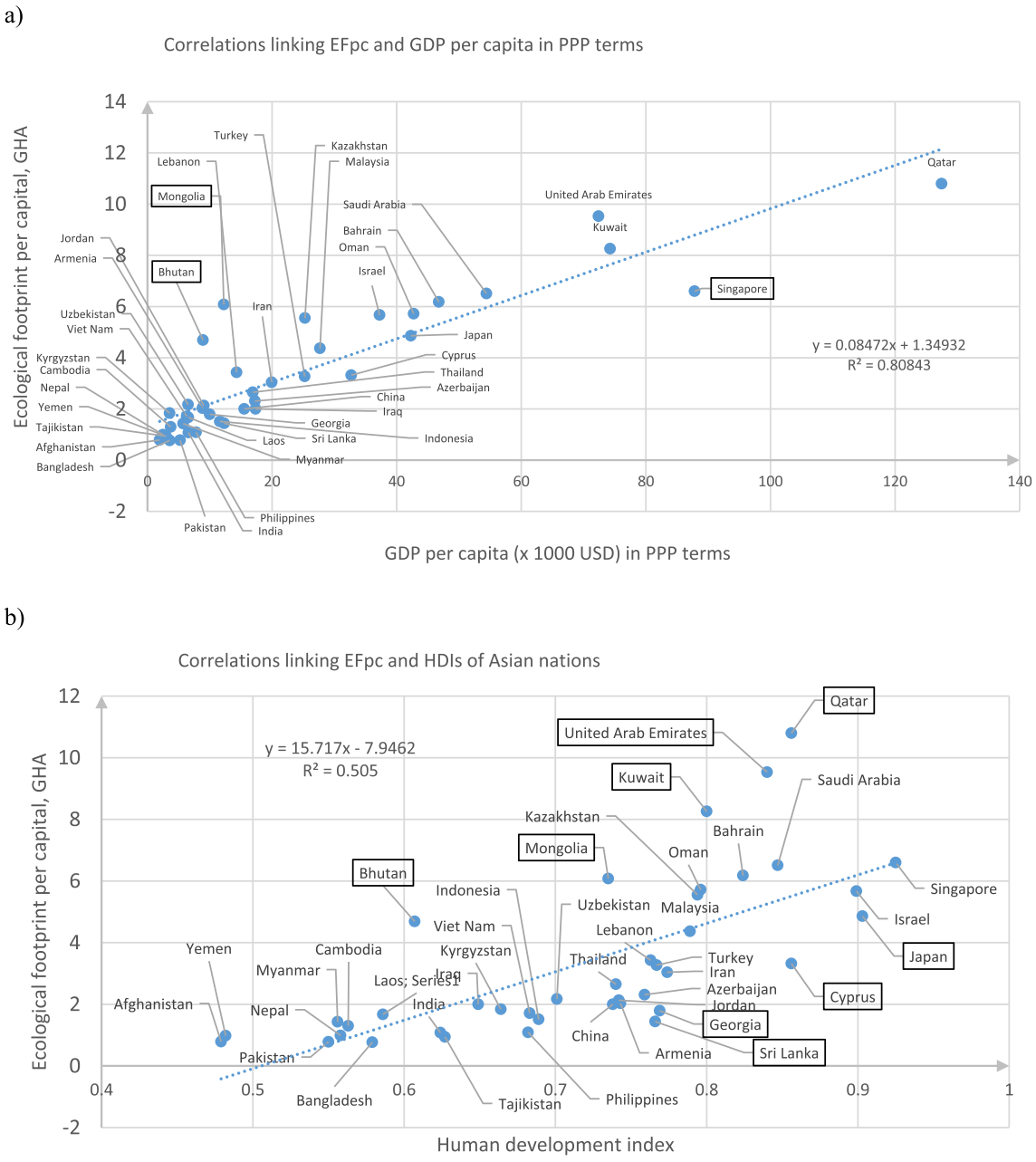


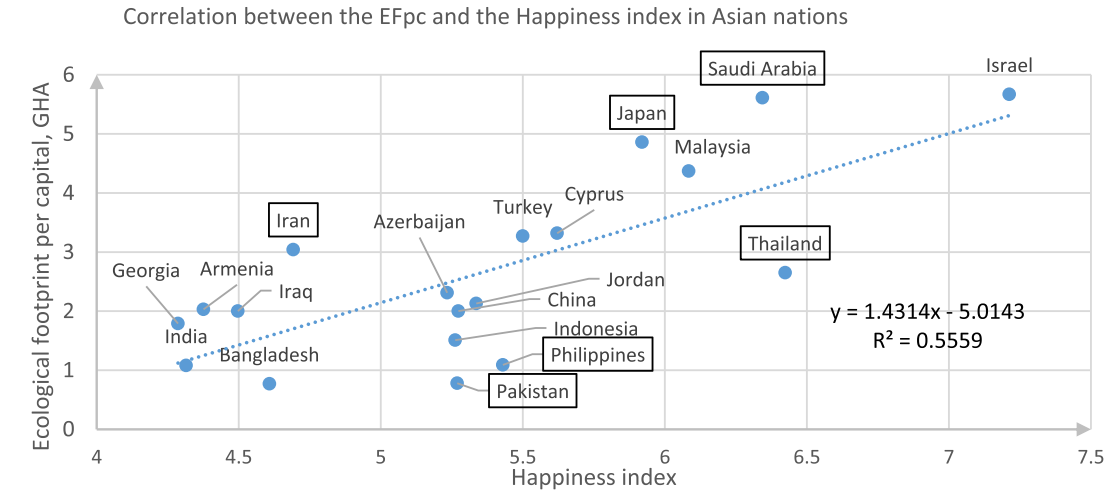
Fig. 2. Interdependencies of macro-level criteria of Asian nations—a graphic illustration. a) Correlations between EFpc and GDPpc in PPP terms. b) Correlations between EFpc and HDI. c) Correlations between EFpc and Happiness Index. d) Correlations between EFpc and CPI. e) Correlations between EFpc and Survival values versus Self-expression values from the WVS. f) Correlations between EFpc and QLI. g) Correlations between QLI and CPI. h) Correlations between the QLI and GII.

the highest average GII in 1995–2015 (0.776), one of the lowest average HI. EPI is also among the lowest in Yemen (EPI = 30.16), after other undeveloped nations such as Afghanistan (EPI = 21.74), Bangladesh (EPI = 25.61), Myanmar (EPI = 27.44). On the other hand, these nations are in favorable positions in terms of EFpc, which is among the lowest: in Yemen 0.98 gha – 11 times lower than in Qatar; in Pakistan 0.78 gha – almost 14 times lower than in Qatar; in Amenia 2.03 gha – 5 times lower than in Qatar.

After analysis of 40 Asian nations, 19 nations were distinguished and more detailed data was analyzed, including QLI and other important sustainability indicators (Table 2).

Analysis revealed that the best performing nations among the selected 19 Asian nations are Saudi Arabia (Q_{17} = 4.9486; N_{17} = 100%), Israel (Q_{11} = 7.5047; N_{11} = 89.29%) and Japan (Q_{12} = 4.1825; N_{12} = 84.52%). These are highly developed nations with stable GDP per capita (GDPpc) growth, low inflation and unemployment, high labor productivity, and slightly negative fiscal balance. Although corruption perceptions in Israel and Japan are rather high, HDI is among the highest compared to other nations (average HDI in 1991–2015 in Japan was 0.862, in Israel 0.853, in Saudi Arabia 0.763). Average GII in 1995–2015 was very low in Japan (0.131) and Israel (0.154), however much higher in Saudi Arabia (0.476). According to average HI in 2012–2016, Israel (7.264) and Japan (5.973) are the happiest nations among the 19 nations under concideration. Average EI in 1995–2015 was highest in Japan (20.643) and Israel (19.204) – slightly lower than in Cyprus (19.401). Japan is leading in terms of average SPI in 2014–2017, which is equal to 84.6. The best EPI indicators are also in Japan (72.35), Saudi Arabia (66.66) and Israel (65.78). On the other hand, EFpc is among the highest (Saudi Arabia 6.51 gha, Israel 5.67 gha, Japan 4.86 gha). The aforementioned nations also had the highest QLI in 2018 (in Japan QLI = 182.26, in Israel QLI = 153.19, and in Saudi Arabia QLI = 154.46). It is noteworthy to mention different cultural values of the three nations. In Japan and Israel, secular-rational and self-expression values are more

c)



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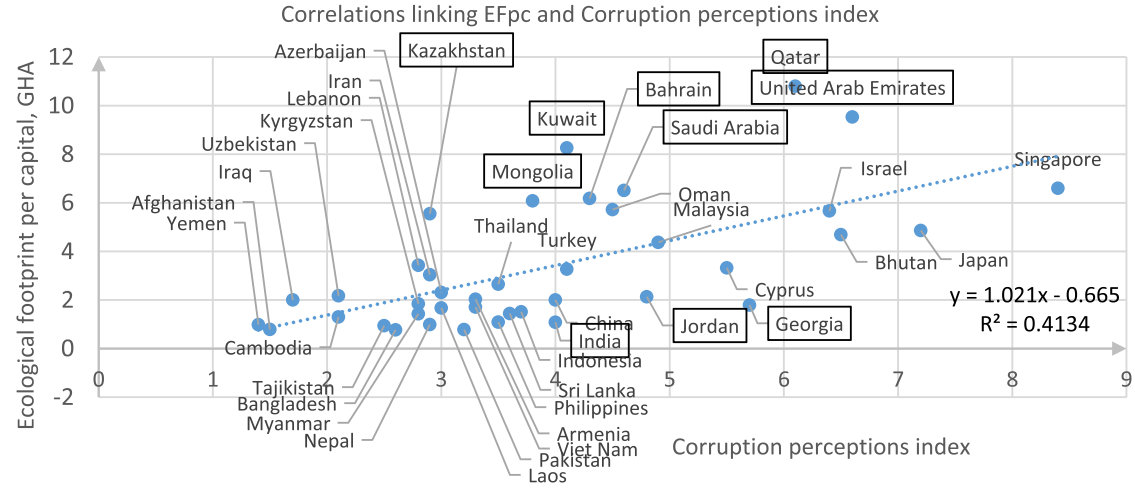


e)

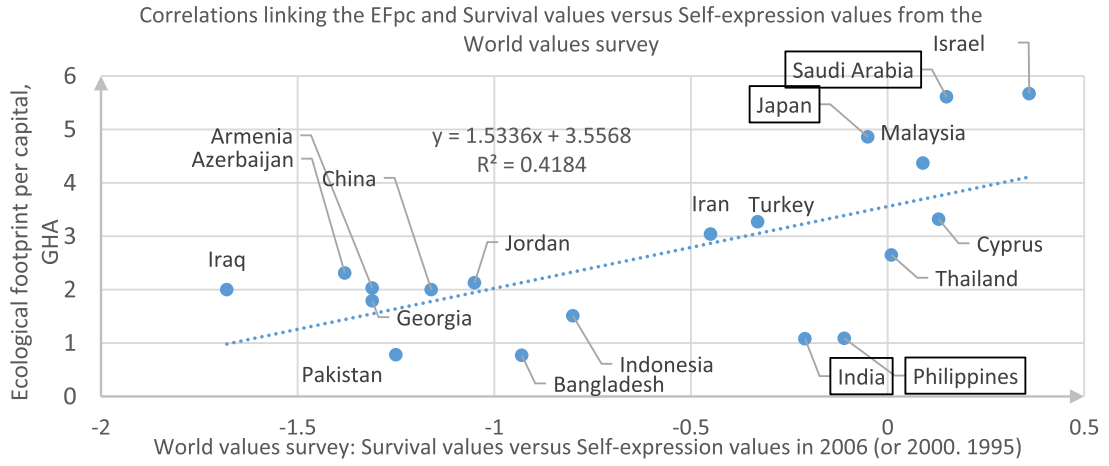
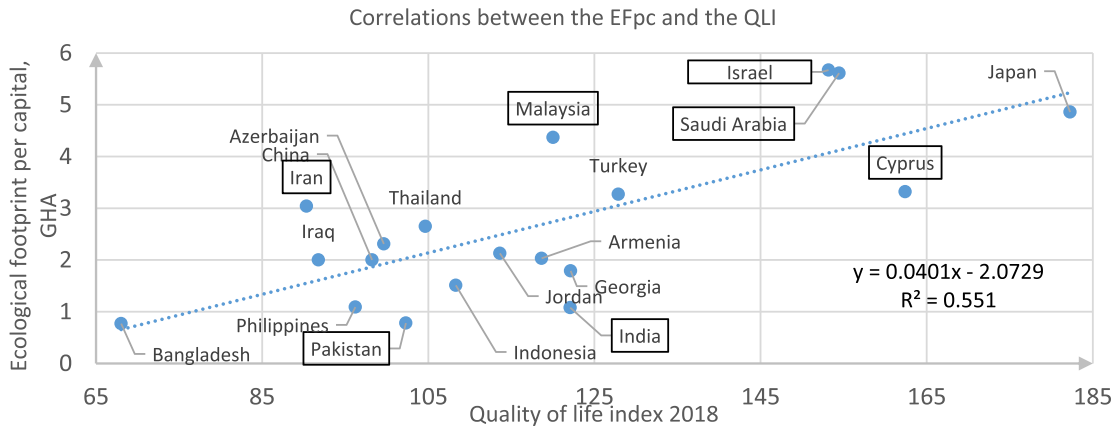


Fig. 2. (*continued*)

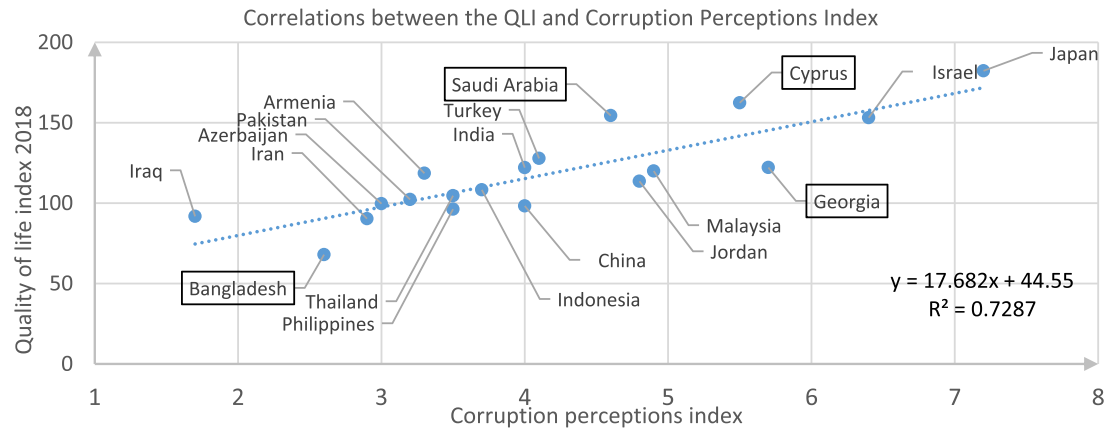
dominant compared to Saudi Arabia where traditional and survival values are more common.

The three worst performing nations among the 19 nations are Pakistan (Q_{15} = 2.2803; N_{15} = 46.08%), Iraq (Q_{10} = 2.3668; N_{10} = 47.83%) and Bangladesh (Q_3 = 2.3805; N_3 = 48.11%). Pakistan and Bangladesh have moderate economic growth – GDP during the period 1991–2016 was growing by 3–6%, in Iraq much more – 8.91%, very high average inflation in 1995–2016 (7–8% in Pakistan and Bangladesh and 30.61% in Iraq), low labor productivity, especially in Bangladesh (average USD 5598.31 per person in 1991–2016), however, low unemployment, except Iraq, where average unemployment in 1991–2016 reached 17.45%, negative fiscal balance, moderate corruption, but high difficulties in doing business. All

f)



g)



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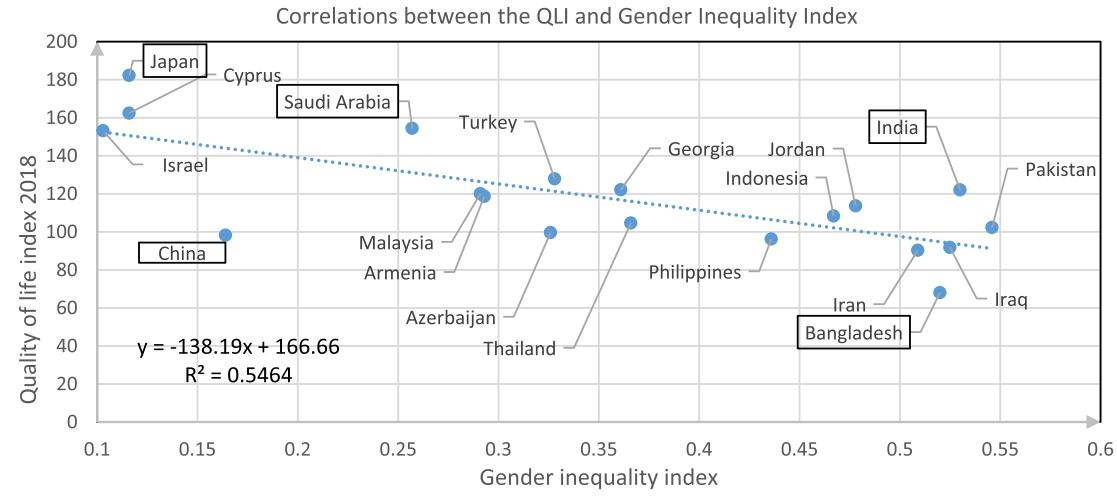

Fig. 2. (*continued*)

nations had low average HDI in 1991–2015 (Iraq 0.61, Bangladesh 0.485, Pakistan 0.476). Moreover, Pakistan had the highest average GII in 1995–2015 (0.588), Iraq was one of the lowest average HI in 2012–2016 (4.642). Average EI in 1995–2015 was lowest in Iraq (11.884) and Pakistan (12.347) among the 19 analyzed nations. Average SPI in 2014–2017 was lowest in Pakistan (46.53), followed by Iraq (46.6). EPI in 2016 was lowest (25.61) in Bangladesh, followed by Iraq (33.39) and Pakistan (34.58). On the other hand, these nations are in favorable positions in terms of EFpc, which is among the lowest in Bangladesh 0.77 gha – 8 times lower than in Israel, in Pakistan 0.78 gha – almost 7 times lower than in Israel, and in Iraq 2 gha – almost 3 times lower than in Israel. QLI in 2018 was lowest in Bangladesh (68.03) and Iraq (91.77), and in Pakistan it was higher (102.3). It is also noteworthy to mention that in the worst performing nations, traditional and survival values are dominated.

3.2. Indicators for assessment of ESH, their interdependences

In this study, Ecological Footprint per capita (hereafter EFpc), Environmental performance index (hereafter EPI) and the Happiness Index (hereafter HI) are used as basic dependent indicators to analyze trends in

Asian nations.

The EFpc is usually measured in global hectares (Global Footprint Network, 2019). Some authors (e.g. Gallego-Álvarez et al., 2014; Alam and Kabir, 2013; Mavragani et al., 2016; Liu et al., 2016) use the EPI instead of EFpc, which is also an ecological one (Environmental performance Index, 2018).

The Quality of life index (hereafter QLI) estimates overall quality of life by using an empirical formula (Numbeo, 2019). Many authors worldwide have investigated the interrelations among ESH and macroeconomic, well-being and value-based indicators. One of the most researched relations links economic growth (expressed as annual GDP growth rate (hereafter GDP AGR) or GDP per capita (hereafter GDPpc)) and EPI or EFpc. Most of the authors (Gallego-Álvarez et al., 2014; Uddin et al., 2016; Fu et al., 2015) found positive correlation, indicating that EFpc increases as GDPpc grows. However, GDPpc is positively correlated with EPI (Mavragani et al., 2016; Liu et al., 2016). There are also exceptions. Chowdhury and Islam (2017) found negative, but not strong, correlation between EPI and GDP growth rate (hereafter GDP GR) in five emerging developing nations: Brazil, Russia, India, China and South Africa. Not surprisingly, the positive correlation is among quality of life and GDPpc (Luzzati and Gucciardi, 2015) as well as life satisfaction (Proto and Rustichini, 2013) as quality of life tends to increase with economic growth of the nation. Labor productivity is another macro-economic factor which affects economic growth of the nation. It is positively correlated with EFpc (Fu et al., 2015; Hayden and Shandra, 2009), EPI (Lannelongue et al., 2017) and quality of life (Luzzati and Gucciardi, 2015; Hajduová et al., 2014).

The Ease of doing business (hereafter EDB) index is based on the average of 10 sub-indices (Ease of doing business index, 2019). The lower the index, the greater the ease of doing business. Research on correlations between this index and environmental sustainability is rather limited. However, some authors (Ghita et al., 2018; Özler and Obach, 2009; Jakub and Roche, 2017) found that EDB, economic freedom and capitalism are related to higher EFpc, but on the other hand, also higher EPI (Mavragani et al., 2016; Roy and Goll, 2014). Moreover, economic freedom encourages an increase in quality of life (Nikolaev, 2014).

The Corruption Perceptions Index (hereafter CPI) ranks nations by their perceived levels of public sector corruption, determined by expert assessments and opinion surveys (Corruption perceptions index, 2018). The lower the score, the higher the corruption in the nation. Studies indicate that CPI is positively correlated with EFpc, and according to Morse (2006) corruption was found to reduce any positive contribution from the response indicators toward environmental sustainability. Corruption has negative effects on EPI (Gallego-Álvarez et al., 2014; Mavragani et al., 2016) and quality of life (Absalyamova et al., 2016).

The Human Development Index (hereafter HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living (Human development index, 2019). Many researchers (Roy and Goll, 2014; Liu et al. 2017) report the significant positive effect of HDI on EPI, meaning that improvements in the dimensions of HDI result in better environmental performance. However, negative effects can be observed in terms of EFpc (Bostan et al., 2017; Moran et al., 2008; Fuentes-Nieva and Pereira, 2010; Morse and Vogiatzakis, 2014; Heshmati and Tausch, 2018). Indeed, higher HDI is positively correlated with QLI (Hajduová et al. 2014; Absalyamova et al., 2016).

The Gender Inequality Index (hereafter GII) measures gender inequalities in three important aspects of human development – reproductive health, empowerment and economic status (Gender inequality index, 2019). Gender inequality (hereafter GI) is seldom investigated in terms of its effects on environmental sustainability. Few studies mention that GII has negative impacts on EPI (Roy and Goll, 2014; The Environment and Gender Index, 2013) and EFpc (Heshmati and Tausch, 2018; McKinney and Fulkerson, 2015; Shaker, 2015; Yorulmaz, 2016) as inequality is usually particular to developing nations. Negative impact of GI is obvious in terms of quality of life (Hajduová et al. 2014; Bibi et al., 2017).

The Social Progress Index (hereafter SPI) is a comprehensive measure of quality of life, independent of economic indicators, determined according 51 social and environmental indicators (Social progress index, 2018). Studies indicate that SPI has positive correlations with EPI (Saisana and Philippas, 2012), however, also with EFpc (Quality of life index, 2019; Rudolph and Figgeb, 2017) and, definitely, quality of life (Luzzati and Gucciardi, 2015; Hajduová et al., 2014).

Another social progress and well-being related indicator is the Happiness Index (hereafter HI) developed by the United Nations. The happiness rankings initiate many debates. However, few are linked with environmental sustainability. Only few studies found that HI is positively correlated with EPI (Kei, 2016; Zidanšek, 2007) and EFpc (Heshmati and Tausch, 2018; Caldas, 2010). A positive correlation between HI and QLI was reported by Susniene and Jurkauskas (2009), Frugoli et al. (2015) and Medvedev and Landhuis (2018).

The Education Index (hereafter EI) is calculated for 176 nations as the geometric average of mean years of schooling and of expected years of schooling in a given nation or territory (Education index, 2019). Education in general positively influences sustainable development and well-being; educated people tend to pay higher attention to environmental problems. A positive correlation among EI and EPI was found by Gallego-Álvarez et al. (2014), Moran et al. (2008), Fuentes-Nieva and Pereira (2010), Morse and Vogiatzakis (2014), Heshmati and Tausch (2018) determined a positive correlation with EFpc, and it is not surprising as EI is included in HDI. EI is also positively correlated with QLI (Luzzati and Gucciardi, 2015; Hajduová et al., 2014; Frugoli et al., 2015; Van Hiel et al., 2018).

The World Values Survey (hereafter WVS) distinguishes survival and self-expression values (World Values Survey, 2019). Nations with high points in self-expression values – Sweden, Norway, Japan, Benelux, Germany, France, Switzerland, Czech Republic, Slovenia, and some English-speaking nations – tend to have higher EPI, and, however, higher EFpc (Jagers and Matti, 2010; Smith et al., 2016) and quality of life (Van Hiel et al., 2018).

Analysis of indicators allows concluding that assessment of ESH is a comprehensive problem which can only be solved if an integrated system of indicators is used. The present study proposes to use the INVAR method and to perform a holistic ESH assessment based on indicators proposed in recent literature (Table 3). The method is described in next section.

3.3. Correlation analysis

Table 3 shows the calculated EPI in 2016, EFpc in 2013, QLI in 2018, and the P_j and N_j relation with other well-being and human development, macroeconomic, values-based and quality of life indicators. These correlations were found using data from Tables 1 and 2.

Fig. 2a–h give outputs from this research in graphical form. Some of these cover 40 nations, while others cover only 19, depending on data availability. The two dependent variables in the figures are EFpc and QLI. Authors preferred to focus on EFpc rather than EPI because the former is based on an actual measure that normalizes for population – i.e., the amount of global hectares required to sustain a person in a given nation – while the latter is merely an index, based on 19 factors.

In addition, it should be noted that human and ecological well-being are often opposed to each other. This is reflected in the directions of the correlations in Table 3. Almost all of them are positive; which means that EFpc will increase (i.e., there will be greater demands on ecology) with the increase of the various parameters that are commonly considered to constitute human progress and development. The only negative ones are those related to the EDB ranking and GII. These indicators reflect lower human development, which contributes to lower EFpc. As anticipated, these parameters are negatively correlated with QLI as well. Thus, human development almost always appears to entail an ecological cost, especially with a growing world population.

It is also important to analyze the nations that are outliers. These are highlighted in the figures. We can classify nations in various ways; i.e., geographical region (West Asia, Central Asia, South Asia, South-east Asia, East Asia); latitude (whether tropical or not); landmass (whether island, landlocked or neither); and history (whether colonized or not). It is explored whether the outliers together reflect some of these classifications.

Fig. 2a–e explore the correlation with EFpc of two macroeconomic factors, two human development factors and a value-based factor. Fig. 2f is the pivotal one where the correlation between EFpc and QLI is presented. Fig. 2g and h present the correlation with QLI of one macroeconomic and one

Table 7
Sensitivity investigation of nation success in the QLI.

Years	Method	China	India	Indonesia	Iran	Israel	Japan	Malaysia	Pakistan	Philippines	Saudi Arabia	Singapore	Thailand	Turkey	United Arab Emirates
2012 Calculation result	N	14	8	9	13	3	2	7	11	12	5	4	10	6	1
	C	11	9	14	13	3	2	6	8	12	4	5	10	7	1
	D	3	1	5	0	0	0	1	3	0	1	1	0	1	0
2013 Calculation result	N	12	8	18	17	5	3	6	16	13	4	9	10	7	1
	C	13	8	18	16	7	4	5	15	12	2	11	9	6	1
	D	1	0	0	1	2	1	1	1	1	2	2	1	1	0
2014 Calculation result	N	13	8	16	18	5	2	6	15	14	4	7	10	9	1
	C	17	7	16	19	8	4	5	13	15	2	11	12	6	1
	D	4	1	0	1	3	2	1	2	1	2	4	2	3	0
2015 Calculation result	N	22	11	20	23	6	2	8	21	18	1	7	15	10	4
	C	23	10	22	24	6	5	9	18	20	1	12	19	9	3
	D	1	1	2	1	0	3	1	3	2	0	5	4	1	1
2016 Calculation result	N	7	6	11	8	2	1	14	9	12	3	10	13	5	4
	C	9	6	10	8	3	5	13	7	12	1	11	14	4	2
	D	2	0	1	0	1	4	1	2	0	2	1	1	1	2
2017 Calculation result	N	13	10	11	15	2	3	18	12	17	4	14	16	7	5
	C	13	9	15	12	5	7	17	11	16	2	14	18	6	3
	D	0	1	4	3	3	4	1	1	1	2	0	2	1	2
2018 Calculation result	N	13	8	10	15	4	1	9	12	14	6	5	11	7	2
	C	15	7	9	12	6	4	8	11	13	1	10	14	5	2
	D	2	1	1	3	2	3	1	1	1	5	5	3	2	0
Sensitivity, %		86.97	95.07	84.90	89.91	88.55	83.66	94.17	88.14	93.77	85.72	81.31	86.97	90.65	93.39

Abbreviations found in Table 7:
N – nation prioritization established by the Quality of life index.
C – nation prioritization established by the COPRAS method.
D – difference between the nation prioritization established by the Quality of life index and the COPRAS method.

human development factor.

Fig. 2a shows that the EFpc vs. GDPpc on a purchasing power parity (PPP) relationship is very well correlated with few outliers. Its r value of 0.9442 is greater than that with GDPpc alone (of 0.8341) in Table 3. This positive correlation has been obtained by many other researchers as well (Liu et al, 2016; Uddin et al., 2016; Fu et al., 2015). The outliers above the line are Bhutan and Mongolia, both landlocked central and East Asian nations, respectively, which may contribute to their correspondingly lower GDP. The single outlier below the line is Singapore, suggesting that a rich island city state can have a low EFpc. There is some evidence that the carbon footprint of cities could be lower than that of the corresponding nation, on a per capita basis (da Schio and Fagerlund Brekke, 2013).

Fig. 2b shows the relationship between EFpc and HDI, which is based on life expectancy, education and per capita income indicators. These two parameters are also well correlated, with an r value of 0.8767 (Table 3). A similar positive correlation has been obtained by many other researchers (Moran et al., 2008; Fuentes-Nieva and Pereira, 2010; Morse and Vogiatzakis, 2014; Heshmati and Tausch, 2018); a negative correlation has also been reported (Tarte, 2009). Fig. 2b shows two sets of outliers above the line, namely Bhutan and Mongolia, as in Fig. 2a, and also Qatar, United Arab Emirates (UAE) and Kuwait, all three West Asian nations that produce oil and probably increase EFpc. Cyprus is a clear outlier below the line, as are Japan, Georgia and Sri Lanka to a lesser extent. Both Cyprus and Georgia are virtually European nations while Sri Lanka is in South Asia and Japan in East Asia. Three of the four outliers below the line (other than Georgia) are island states while a separate three (other than Sri Lanka) are temperate zone nations; these features may contribute to correspondingly higher HDI, in spite of the fact that temperate zone nations could tend to have higher EFpc values compared to tropical ones, due to heating requirements in the former.

Fig. 2c shows the correlations among EFpc and HI (another human development index). The indices are also well correlated with an r value of 0.7456 (Table 3). A similar positive correlation has been obtained by other researchers as well (Heshmati and Tausch, 2018; Caldas, 2010). The outliers above the line in Fig. 2c are Iran, Japan and Saudi Arabia; those below the line are Pakistan, Philippines and Thailand. There does not appear to be any basis for the above commonality, apart from the facts that those above the line were never colonized by European nations and are also largely in the temperate zone, while those below are largely tropical nations that were colonized (apart from Thailand). In fact, the above dual distinctions hold true for most nations above and below the line (and not merely the identified outliers); the explanation for it is, however, not clear. It could be that temperate zone nations have correspondingly higher EFpc values due to heating requirements.

Fig. 2d shows that the EFpc and CPI (a macroeconomic indicator) are only moderately correlated, with an r value of 0.6331 (Table 3). High CPI indicates that there is high perception of corruption, which would tend to reduce the level of corruption. A similar positive correlation has been obtained by other researchers as well (Morse, 2006; Ewers and Smith, 2007). Fig. 2d shows two sets of above-the-line outliers, namely Kazhakstan and Mongolia, both landlocked and somewhat inaccessible, which may contribute to their lower CPI, and also Qatar, United Arab Emirates (UAE) and Kuwait, as in Fig. 2b, and to a lesser extent Bahrain and Saudi Arabia, all West Asian nations that produce oil and increase EFpc. Georgia is a clear outlier below the line, and so are Cyprus, Jordan and India to a lesser extent. Both Cyprus and Georgia are virtually European nations (and coupled together as in Fig. 2b), while the South Asian post-colonial nation below the line is India this time (as Sri Lanka was in Fig. 2b, and Pakistan was in Fig. 2c); these historical and cultural factors may contribute to correspondingly higher perceptions of corruption.

The only value-based index correlated with EFpc, and moderately so with $r = 0.6468$ in Table 3, is the survival vs. self-expression values index (where positive values denote self-expression) (see Fig. 2e). A similar positive correlation has been obtained by other researchers as well (Smith et al., 2016; Tausch, 2015). The outliers above the line in Fig. 2e are Japan and Saudi Arabia (as in Fig. 2c); those below the line are India and Philippines. There does not appear to be any basis for the above commonality, apart from the facts that those above the line were never colonized by European nations and are also largely temperate zone nations, while those below are tropical nations that were colonized. Once again, climatological and cultural factors may explain these groupings as suggested above.

Apart from the survival vs. self-expression values, there are other indices for which EFpc also does not show a desired maximum but increases montonically, for example the EI ($r = 0.743$ in Table 3). In addition, EFpc decreases with the GII ($r = -0.719$ in Table 3). This highlights again the

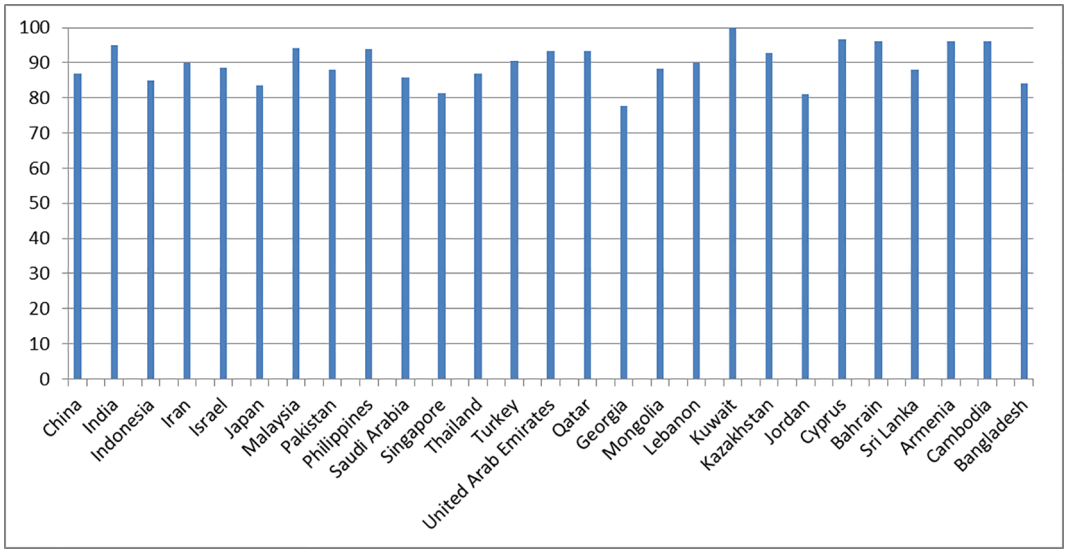

Fig. 3. The NUMBEO and COPRAS techniques results for ranking 27 nations by percentage.

tension between ecological sustenance and quality of human life.

The correlation (r = 0.742) between EFpc and QLI is reflected in Fig. 2f. Positive correlations have also been reported by Khan and Hussain (2017) and Thompson et al. (2007), but a negative one was reported by Tarte (2009). The outliers above the line in Fig. 2f are Iran, Malaysia, Saudi Arabia and Israel, with no perceptible commonality among them; those below the line are India, Pakistan and Cyprus, which we have seen before as well, the first two being post-colonial tropical South Asian states and the last an almost European island, cultural factors that could correspondingly increase their QLI.

Fig. 2g and 2 h emphasize that factors such as CPI and GI have relationships with QLI, with high positive (r = 0.8537) and high negative (r = –0.7391) directions, respectively (see Table 3). Positive correlations for the QLI vs. CPI have also been obtained by Absalyamova et al. (2016) and Hajduová et al. (2014). Negative correlations for the QLI vs. GII have been obtained by Hajduová et al. (2014) and Bibi et al. (2017). The outliers above the line in Fig. 2g are Saudi Arabia and Cyprus; those below the line are Georgia and Bangladesh. In Fig. 2h, the outliers above the line are Japan, Saudi Arabia and India; those below the line are China and Bangladesh. It is interesting that of the two most populous nations in the world, both in Asia, China has a very low GII but a QLI that is lower than would be anticipated, while the reverse is true for India although there is not much difference between their absolute QLI values.

From the obtained results (Fig. 2a–h), it is possible to perform an analysis of the relative performance of Asian nations. It can be observed that nations that have both correspondingly low EFpc values and high QLI ones can be said to be performing well with good human-ecological balance. The outlier nations are only India (Fig. 2d–f for EFpc and Fig. 2h for QLI) and Cyprus (Fig. 2b and f for EFpc and Fig. 2g for QLI). Japan performs both relatively poorly (Fig. 2c and e) and well (Fig. 2b) for EFpc and also well for QLI (Fig. 2h). Saudi Arabia performs correspondingly poorly for EFpc (Fig. 2c–f) but well for QLI (Fig. 2g). Georgia performs well for EFpc (Fig. 2b and d) but poorly for QLI (Fig. 2g).

Some nations are only relatively poor on their EFpc, namely Bhutan and Mongolia (Fig. 2a and b, with Mongolia in Fig. 2d too), with their landlocked status being the common factor; also Qatar, United Arab Emirates and Kuwait (Fig. 2b and d) and Iran (Fig. 2c, f), all oil-producing West Asian nations. Other nations perform relatively well with respect to EFpc, namely Philippines (Fig. 2c, e) and Pakistan (Fig. 2c, f). Bangladesh performs relatively poorly with respect to QLI (Fig. 2g, h). As a whole, three South Asian nations with a colonial past (India, Pakistan, Sri Lanka) perform relatively well with respect to EFpc (Fig. 2b, f), while India performs well with respect to QLI (Fig. 2h) but Bangladesh (another nation in the same grouping) performs poorly (Fig. 2g, h).

If the 19 or 40 nations want reach better EFpc, EPI and QLI indicators, it is enough to improve other less analyzed indicators, such as reducing GII (Heshmati and Tausch, 2018; The Environment and Gender Index, 2013; McKinney and Fulkerson, 2015; Shaker, 2015; Yorulmaz, 2016; Bibi et al., 2017), reducing CPI (Gallego-Álvarez et al., 2014; Mavragani et al., 2016; Luzzati and Gucciardi, 2015; Hajduová et al., 2014; Morse, 2006; Shaker, 2015; Lang, 2012; Alves et al., 2017), improving HI (Heshmati and Tausch, 2018; Zidanšek, 2007; Caldas, 2010; Frugoli et al., 2015; Medvedev and Landhuis, 2018), EI (Gallego-Álvarez et al., 2014; Hajduová et al., 2014; Fuentes-Nieva and Pereira, 2010; Morse and Vogiatzakis, 2014; Heshmati and Tausch, 2018; Frugoli et al., 2015; Aceleanu, 2012; Van Hiel et al., 2018; Smith et al., 2016) and SPI (Liu et al, 2016; Hajduová et al., 2014; Saisana and Philippas, 2012).

When HDI, QLI and HI are concerned, in this study correlations with EFpc are positive, and in those of many others authors too. However, a few report negative correlations. In fact, the work of Tarte (2009) is important as it considers nations where the HDI is > 0.8 and shows that some of them, over time, reduce their EFpc while increasing HDI and QLI. It should be noted that his analysis is based on an indexed EFpc, where a higher value reflects lower ecological damage. One Asian nation that performs well in his analysis is Singapore (identified in this study too), while Norway and Germany are European nations that perform well. Engelbrecht (2013) also reports negative correlation between EFpc and the Happy Planet Index, although the latter is different from HI. This finding was obtained for OECD nations, which also have high levels of human development.

3.4. Sensitivity analyses (Step 7)

In Step 7, the sensitivity investigation is performed by comparing ranks obtained using the NUMBEO and COPRAS methods for the evaluated 27 nations as per the QLI (Purchasing Power Index, Safety Index, Health Care Index, Cost of Living Index, Property Price to Income Ratio, Traffic Commute Time Index, Pollution Index) over the period investigated (2012–2018). The ranks are presented in Table 7 while positions of the nations are presented graphically in Fig. 3. Sensitivity results are outlined in the bottom line of the table. The results suggest that the best correspondence among the nations where data were available for every year was in India (95.07%), Malaysia (94.17%), Philippines (93.77%), and United Arab Emirates (93.39%). In the table, we can observe rather good correspondence of the ranks obtained by both methods. In fact, for India the differences between ranks were at most 1 for five years, which yielded the best sensitivity. For Malaysia, the difference between the ranks is 1 in every year. This yielded the second best sensitivity. The difference by 2 ranks for Philippines in 2015 induced a slightly larger value of the criterion of sensitivity, even when other ranks matched (2012, 2016) or differed by 1 in all four remaining years. In the case of United Arab Emirates, the difference by 2 ranks was observed in two years, with full

Table 8
The 2015 or 2016 macro-level success indicators for 40 Asian nations—correlational analysis results.

	Success of the nation (SON)	GDPpc in 2016 (2015)	Unemployment rate in 2016 (UNR)	Labor productivity per employee in 2016 (LPE)	Public debt in 2016 (or 2015) (PBD)	Fiscal balance in 2016 (or 2015) (FIB)	EDB ranking in 2016 (EDB)	CPI in 2016	HDI in 2015	GII in 2015	EI in 2015	EPI in 2016	EFpc in 2013
SON	–												
GDPpc in 2016 (2015)	0.756**	–											
UNR	−0.424**	−0.124	–										
LPE	0.689**	0.951**	−0.006	–									
PBD	−0.079	0.184	−0.002	0.144	–								
FIB	0.128	0.015	−0.044	−0.071	−0.179	–							
EDB	−0.591**	−0.651**	0.07	−0.541**	−0.143	−0.066	–						
CPI in 2016	0.607**	0.745**	−0.218	0.677**	0.304	−0.054	−0.694**	–					
HDI in 2015	0.727**	0.933**	−0.036	0.885**	0.138	0.053	−0.749**	0.730**	–				
GII in 2015	−0.628**	−0.612**	0.036	−0.503**	−0.049	−0.111	0.743**	−0.516**	−0.710**	–			
EI in 2015	0.410**	0.595**	0.171	0.551**	0.184	0.054	−0.748**	0.489**	0.802**	−0.722**	–		
EPI in 2016	0.616**	0.868**	−0.067	0.824**	0.167	0.13	−0.770**	0.760**	0.913**	−0.633**	0.732**	–	
EFpc in 2013	0.862**	0.869**	−0.156	0.855**	0.127	0.016	−0.693**	0.667**	0.841**	−0.626**	0.580**	0.808**	–

* – Correlation is successful at the 0.05 level (2-tailed).
** – Correlation is successful at the 0.01 level (2-tailed).

Table 9
The 1991–2016 macro-level success correlation coefficients of 40 Asian nations – correlational analysis results.

	Success of the nation (SON)	Average annual growth of GDPpc in PPP terms in 1991–2016 (AAG of GDPpc in PPP)	Average inflation in 1995–2016 (AINF)	Average UNR in 1991–2016 (AUNR)	Average LPE in 2015 USD in 1991–2016 (ALPE)	Average PBD in 2004–2016 (APBD)	Average FIB in 2011–2016 (AFIB)	Average EDB ranking in 2006–2016 (AEDB)	Average CPI in 2004–2016 (ACPI)	Average HDI in 1991–2015 (AHDI)	Average GII in 1995–2015 (AGII)	Average HI in 2012–2016 (AHI)	Average EI in 1995–2015 (AEI)
SON	–												
AAG of GDPpc in PPP	−0.278	–											
AINF	−0.527**	0.361*	–										
AUNR	−0.405**	−0.223	0.347*	–									
ALEP	0.630**	−0.520**	−0.424**	0.11	–								
APBD	−0.292	0.22	−0.131	0.035	−0.117	–							
AFIB	0.393*	−0.175	−0.024	−0.125	0.246	−0.331*	–						
AEDB	−0.594**	0.368*	0.536**	0.043	−0.624**	0.101	−0.085	–					
ACPI	0.645**	−0.303	−0.680**	−0.133	0.676**	0.067	0.159	−0.754**	–				
AHDI	0.675**	−0.492**	−0.536**	0.108	0.844**	−0.077	0.286	−0.779**	0.791**	–			
AGII	−0.575**	0.112	0.404**	0.004	−0.359*	0.085	−0.16	0.612**	−0.467**	−0.660**	–		
AHI	0.744**	−0.450**	−0.567**	−0.146	0.709**	−0.194	0.344*	−0.631**	0.688**	0.726**	−0.584**	–	
AEI	0.073	−0.189	−0.1	0.237	0.211	0.034	0.166	−0.397*	0.232	0.415**	−0.342*	0.197	–

* – Correlation is successful at the 0.05 level (2-tailed).
** – Correlation is successful at the 0.01 level (2-tailed).

matching in four years, and the difference by 1 rank in the single year of 2015. This combination of differences, again, brought a slightly larger value of the criterion of sensitivity. For the remaining nations, the same logic is retained: the differences between ranks obtained by both methods are accumulated into the sensitivity criterion. The larger differences affect the result parabolically as the differences are squared before they are being summed up. In 13 nations, 27 values of the sensitivity index were above 90%. This makes 48% of the group of 27 nations selected for the investigation.

4. Success models of Asian nations

This chapter presents the statistical correlation analysis between the success of 19 and 40 Asian nations analysed by the INVAR method and macroeconomic, well-being and human development, values-based, environmental and quality of life criteria of the nations. The data are condensed, and the matrix contributes to further progressive data examination (extraction of interesting and hidden knowledge and patterns). The table is symmetrical.

Table 1 formed the basis for the correlation matrix of 40 Asian nations. The results of its analysis with the SPSS software are presented in Table 8. The correlational analysis presented in Table 8 can serve as the basis for drawing a conclusion that the meanings of all the annual (2015 or 2016) macrolevel indicators of the Asian nations under analysis correlate with one another, as well as with the success of the nation, excepting 2016 (or 2015) Public debt (hereafter PBD) and 2016 (or 2015) Fiscal balance (hereafter FIB). The strongest and statistically significant indicators have been established between success of the nation and the EFpc, 2013 ($rs = 0.862$, $p < 0.01$), GDPpc, 2016 or 2015 ($rs = 0.756$, $p < 0.01$), and Human Development Index (hereafter HDI), 2015 ($rs = 0.727$, $p < 0.01$). A negative correlation has also been established between success of the nation and the Unemployment rate (hereafter UNR), 2016 ($rs = -0.424$, $p < 0.01$), Easy of doing business (hereafter EDB) ranking, 2016 ($rs = -0.591$, $p < 0.01$), and GII, 2015 ($rs = -0.628$, $p < 0.01$). The weakest correlational relationship has been established between success of the nation and the EI, 2015 ($rs = 0.410$, $p < 0.01$).

Compilation of the linear regression success model of 40 Asian nations (see below) was an endeavor to establish the dependency of the success of a nation relevant to the macro-level indicators under analysis. The linear regression success model of 40 Asian nations (4) contains the following:

$$SON = 1.24 + 0.00001 \cdot GDPpc - 0.13 \cdot UNR + 0.00001 \cdot LPE - 0.02 \cdot \cdot CPI - 0.012 \cdot HDI - 0.268 \cdot GII - 0.026 \cdot EI - 0.002 \cdot EPI + 0.119 \cdot \cdot EFpc \quad (4)$$

The determination was made that the multiple regression success model between the success of a nation and its macro-level indicators is fit upon performing the fitness test relevant to 40 Asian nations, because $p < 0.001$ (4). The determination coefficient R^2 indicates that 92.8 percent of the independent variables in the model under analysis (the macrolevel indicators of 40 Asian nations) explain the weight dispersion of the dependent variable, success of the nation. Upon calculating the linear regression coefficients (4), a conclusion can be drawn that the independent variables at p < 0.05 significantly influence the dependent variable, success of the nation. These independent variables were UNR, 2016, and EFpc, 2013. Meanwhile, the macrolevel indicators of the nations include those such as the GDPpc, 2016 (2015), Labor productivity per employee (hereafter LPE), 2016, EDB ranking, 2016, CPI, 2016, HDI, 2015, GII, 2015, EI, 2015, and EPI, 2016. These do affect the success of the nation variable; however, their influences are insignificant.

According to the correlational analysis results provided in Table 9, success of the nation correlates with all the variables (the averages of the nation macrolevel indicators), except for the variables the Average annual growth (hereafter AAG) of GDPpc in PPP terms, 1991–2016; Average public debt (hereafter APBD), 2004–2016, and Average education index (hereafter AEI) in 1995–2015. The relationships of these exceptions with the success of the nation are at $p > 0.05$. The strongest relationships with the success of the nation variable were determined as the Average happiness index (hereafter AHI), 2012–2016 ($rs = 0.744$, $p < 0.01$), Average human development index (hereafter AHDI), 1991–2015 ($rs = 0.675$, $p < 0.01$); average CPI (hereafter ACPI), 2004–2016 ($rs = 0.645$, $p < 0.01$), and Average labor productivity per person employed (hereafter ALPE) in 2015 USD, 1991–2016 ($rs = 0.630$. $p < 0.01$). Negative, statistically significant relationships with success of the nation have been established as the Average inflation grow (hereafter AINF), 1995–2016 ($rs = -0.527$, $p < 0.01$); Average unemployment rate (hereafter AUNR), 1991–2016 ($rs = -0.405$, $p < 0.01$); Average ease of doing business (hereafter AEDB) ranking, 2006–2016 ($rs = -0.594$, $p < 0.01$), and Average gender inequality index (hereafter AGII), 1995–2015 ($rs = -0.575$, $p < 0.01$). The compilation of the linear regression success model of 40 Asian nations (5), as shown below, is for testing the dependency of the dependent variable (success of the nation) on the independent variables (the average macro-level indicators of the nation over a certain period). The model is the following:

$$SON = 1.412 + 0.001 \cdot AINF - 0.02 \cdot AUNR + 0.00005 \cdot ALPE + 0.02 \cdot AFIB - 0.001 \cdot \cdot AEDB + 0.005 \cdot ACPI - 0.221 \cdot AHDI - 0.32 \cdot AGII + 0.014 \cdot AHI \quad (5)$$

Upon performing the fitness test of 40 Asian nations multiple regression success model and the average macrolevel indicators during a certain period, it was determined that the model is fit for deliberation, because $p < 0.001$. The determination coefficient (R^2) indicates, in the model under analysis of the independent variables regarding the average macrolevel indicators of 40 Asian nations during a certain period, that 90.7 percent of them explain the weight dispersions relevant to the dependent variable, success of the nation. Upon calculating the linear regression coefficients shown in (5), a conclusion can be drawn that the independent variables at p < 0.05, which significantly impact the dependent variable, success of the nation, are the AUNR, 1991–2016; ALPE in 2015 USD, 1991–2016, and Average fiscal balance (hereafter AFIB), 2011–2016. Meanwhile, the macrolevel indicators of nations, which influence the success of the nation variable, include the AINF, 1995–2016; AEDB ranking, 2006–2016; ACPI, 2004–2016; AHDI, 1991–2015; AGII, 1995–2015; AHI, 2012–2016. However, these indicators insignificantly affect this variable.

A conclusion can be drawn upon performing the correlational analysis on the success of 19 Asian nation macrolevel indicators and upon posting these results in Table 10. Then, it can be said the success of the nation correlates statistically significantly with 14 of these 19 indicators. No significant correlation was established between the success of the nation and the INFG, 2016 (or 2015, 2014); UNR, 2016; PBD, 2016 (or 2015); FIB, 2016 (or 2015), and World values survey: Traditional values versus Secular-rational values (hereafter WVST), 2006 (or 2000, 1995). The strongest correlational relationships were established between the success of the nation and the GDPpc in PPP terms, 2016 ($r = 0.952$, $p < 0.01$); EFpc, 2013 ($r = 0.938$, $p < 0.01$); GDPpc, 2016 (2015) ($r = 0.849$, $p < 0.01$). A negative, statistically significant relationship exists between the success of the nation and the GII, 2015 ($r = -0.786$, $p < 0.01$), and between success of the nation and the EDB ranking, 2016 ($r = -0.535$, $p < 0.05$). The compilation of 19 Asian nations linear regression success model (6) is for double-checking the dependency of success of the nation on the macrolevel indicators. This model (6) is the following:

$$SON = 0.701 - 0.00003 \cdot GDPpc + 0.00003 \cdot GDPpcinPPP - 0.00001 \cdot LPE + 0.004 \cdot EDB + 0.015 \cdot \cdot CPI + 0.601 \cdot HDI - 1.614 \cdot GII - 0.022 \cdot EPI + 0.398 \cdot EFpc + 0.013 \cdot SPI + 0.061 \cdot \cdot WVSS + 0.008 \cdot QLI + 0.087 \cdot HI \quad (6)$$

Upon performing the fitness test of the model relevant to the multiple regression between the success of 19 nations and the macrolevel indicators, it was determined that the model is suitable for deliberation, because $p < 0.001$. The determination coefficient R^2 indicates that, of the independent variables (the macrolevel indicators of 19 Asian nations) in the model under analysis, 99.7 percent of them explain the weight dispersion of the dependent variable, success of the nation. A conclusion can be drawn that, upon calculating the linear regression coefficients presented in (6), the independent variables where p < 0.05 have a significant impact on the dependent variable, success of the nation. These independent variables are the GDPpc, 2016 (2015); GDPpc in PPP terms, 2016; EDB ranking, 2016;

Table 10
The 2015 or 2016 macro-level success correlation coefficients for 19 Asian nations – correlational analysis results.

	Success of the nation (SON)	GDPpc in 2016 (2015)	GDPpc in PPP terms in 2016	Inflation grow in 2016 (2015, 2014) (INFG)	UNR in 2016	LPE in 2016	PBD in 2016 (2015)	FIB in 2016 (2015)	EDB ranking in 2016	CPI in 2016	HDI in 2015
SON	–										
GDPpc in 2016 (2015)	0.849**	–									
GDPpc in PPP terms in 2016	0.952**	0.830**	–								
INFG	−0.232	−0.387	−0.155	–							
UNR in 2016	−0.3	−0.183	−0.163	−0.176	–						
LPE in 2016	0.805**	0.661**	0.922**	0.005	0.024	–					
PBD in 2016 (2015)	0.257	0.601**	0.3	−0.448	−0.034	0.144	–				
FIB in 2016 (2015)	−0.102	0.018	−0.231	0.064	−0.167	−0.427	0.074	–			
EDB ranking in 2016	−0.535*	−0.463*	−0.458*	0.401	0.022	−0.237	−0.235	−0.335	–		
CPI in 2016	0.694**	0.786**	0.574*	−0.437	−0.16	0.36	0.585**	0.257	−0.655**	–	
HDI in 2015	0.825**	0.809**	0.818**	−0.361	0.03	0.677**	0.377	0.141	−0.752**	0.750**	–
GII in 2015	−0.786**	−0.804**	−0.704**	0.497*	0.122	−0.453	−0.384	−0.179	0.749**	−0.718**	−0.842**
EI in 2015	0.686**	0.686**	0.653**	−0.39	0.112	0.511*	0.316	0.223	−0.788**	0.750**	0.953**
EPI in 2016	0.751**	0.725**	0.762**	−0.436	0.096	0.627**	0.394	0.153	−0.786**	0.682**	0.927**
EFpc in 2013	0.938**	0.806**	0.959**	−0.184	−0.142	0.907**	0.226	−0.189	−0.527*	0.602**	0.852**
SPI in 2017	0.706**	0.776**	0.622**	−0.499*	−0.065	0.388	0.511*	0.382	−0.796**	0.877**	0.891**
WVST	0.286	0.521*	0.255	−0.397	−0.119	0.044	0.600**	0.04	−0.487*	0.468*	0.449
WVSS	0.669**	0.498*	0.583**	−0.014	−0.446	0.436	0.168	0.219	−0.347	0.476*	0.481*
QLI in 2018	0.804**	0.851**	0.775**	−0.429	−0.026	0.605**	0.599**	0.018	−0.615**	0.854**	0.783**
HI in 2016	0.758**	0.683**	0.685**	−0.319	−0.477*	0.556*	0.138	0.119	−0.418	0.517*	0.599**

	GII in 2015	EI in 2015	EPI in 2016	EFpc in 2013	SPI in 2017	WVST	WVSS	QLI in 2018	HI in 2016
SON									
GDPpc in 2016 (2015)									
GDPpc in PPP terms in 2016									
INFG									
UNR in 2016									
LPE in 2016									
PBD in 2016 (2015)									
FIB in 2016 (2015)									
EDB ranking in 2016									
CPI in 2016									
HDI in 2015									
GII in 2015	–								
EI in 2015	−0.769**	–							
EPI in 2016	−0.782**	0.891**	–						
EFpc in 2013	−0.691**	0.718**	0.807**	–					
SPI in 2017	−0.824**	0.899**	0.879**	0.652**	–				
WVST	−0.632**	0.446	0.354	0.229	0.472*	–			
WVSS	−0.376	0.372	0.469*	0.561*	0.556*	−0.072	–		
QLI in 2018	−0.739**	0.717**	0.786**	0.733**	0.816**	0.459*	0.538*	–	
HI in 2016	−0.598**	0.460*	0.614**	0.735**	0.582**	0.06	0.603**	0.519*	–

WVST - WVS: Traditional values versus Secular-rational values in 2006 (2000, 1995), WVSS - WVS: Survival values versus Self-expression values in 2006 (2000, 1995).
* – Correlation is successful at the 0.05 level (2-tailed).
** – Correlation is successful at the 0.01 level (2-tailed).

GII, 2015, and EFpc, 2013. Meanwhile, the macrolevel indicators that influence the success of the nation, albeit insignificantly, include the LPE, 2016; CPI, 2016; HDI, 2015; EI, 2015; EPI, 2016; SPI, 2017; World values survey: Survival values versus Self-expression values (hereafter WVSS), 2006 (or 2000, 1995); QLI, 2018, and HI, 2016.

According to the correlational analysis results provided in Table 11, the success of the nation variable correlates with all the variables relevant to the macrolevel indicators averages, except for the Average GDP growth by annual %, 1991–2016; AAG of GDPpc in PPP terms, 1991–2016; AUNR, 1991–2016; APBD, 2004–2016, and AFIB, 2011–2016, which are at $p > 0.05$ relationships with the success of the nation variable. The strongest relationships with the success of the nation variable have been established for the AEI, 1995–2015 ($rs = 0.796$, $p < 0.01$); AGII, 1995–2015 ($rs = -0.718$, $p < 0.01$); ACPI, 2004–2016 ($rs = 0.737$, $p < 0.01$), and AHDI, 1991–2015 ($rs = 0.784$, $p < 0.01$). Negative, statistically significant relationships have been established between the success of the nation and the AGII, 1995–2015 ($rs = -0.718$, $p < 0.01$); AEDB ranking, 2006–2016 ($rs = -0.647$, $p < 0.01$), and AINF, 1995–2015 ($rs = -0.548$, $p < 0.05$). The compilation of the 19 Asian nations linear regression success model (7) is for double-checking the dependency of the dependent variable, success of the nation, on the independent macrolevel averages variables over a certain time. This compiled model (7) is the following:

$$\begin{aligned} SON &= 3.575 - 0.005 \bullet AINF + 0.00002 \bullet ALPE - 0.002 \bullet AEDB - 0.002 \\ &\bullet ACPI - 3.667 \bullet \\ &\bullet AHDI - 2.392 \bullet AGII - 0.028 \bullet AHI + 0.461 \bullet AEI - 0.075 \bullet ASPI \end{aligned} \quad (7)$$

The determination coefficient R^2 indicates that 95.5 percent of the independent variables of macrolevel indicator averages relevant of 19 Asian nations over a certain period in the model under analysis explain weight dispersions by the dependent variable, success of the nation. A conclusion can be reached upon calculating the linear regression coefficients presented in (7) that the independent variables at $p < 0.05$, which significantly impact the dependent variable, success of the nation, are the ALPE in 2015 USD, 1991–2016; AGII, 1995–2015. Meanwhile, the nation macrolevels indicators influencing the success of the nation variable, albeit insignificantly, include the AINF, 1995–2016; AEDB ranking, 2006–2016; ACPI, 2004–2016; AHDI, 1991–2015; AHI, 2012–2016; AEI, 1995–2015, and Average social progress index (hereafter ASPI), 2014–2017.

5. Happiness models of Asian nations

This chapter presents the descriptive statistics and normal distribution test results of the variables analyzed in this research.

It can be claimed, based on the performed correlational analysis results (see Table 12), there was no correlation established at $p > 0.05$ between the HI, 2016, and the AG of GDP (by annual %), 1991–2016; AAG of GDPpc in PPP terms, 1991–2016; INFG, 2016 (or 2015, 2014); AUNR, 1991–2016; PBD, 2016 (or 2015); APBD, 2004–2016; FIB, 2016 (or 2015); AFIB, 2011–2016; EDB, 2016, and WVST, 2006 (or 2000, 1995). The strongest relationships established were between the HI, 2016, and AHI, 2012–2016 ($r = 0.988$, $p < 0.01$); EFpc, 2013 ($r = 0.988$, $p < 0.01$), and GDPpc in PPP terms, 2016 ($r = 0.685$, $p < 0.01$). The weakest relationship established was between the HI, 2016, and the EI, 2015 ($r = 0.460$, $p < 0.05$). Furthermore, the negative correlations established were between the HI, 2016, and the INFG, 2016 (or 2015, 2014) ($r = -0.462$, $p < 0.05$); UNR, 2016 ($r = -0.477$, $p < 0.05$); AEDB, 2006–2016 ($r = -0.575$, $p < 0.05$); GII in 2015 ($r = -0.598$, $p < 0.01$), and AGII, 1995–2015 ($r = -0.545$, $p < 0.05$) (see Table 12).

The compilation of 19 Asian nations linear regression happiness model (8) is for double-checking the dependency of the HI, 2016, on those variables that statistically significantly correlate with the HI, 2016. This model (8) is the following:

$$\begin{aligned} HI &= 0.273 - 0.00005 \bullet GDPpc - 0.00002 \bullet GDPpcinPPP - 0.011 \bullet UN \\ &R + 0.00003 \bullet \\ &\bullet ALPE + 0.002 \bullet EDBA + 0.234 \bullet CPI - 0.217 \bullet ACPI + 1.759 \bullet AHDI - 0.966 \\ &\bullet GII + 0.902 \bullet \\ &\bullet AHI - 3.265 \bullet EI + 0.016 \bullet EPI + 0.133 \bullet EFpc + 0.018 \bullet ASPI - 0.001 \\ &\bullet WVSS - 0.004 \bullet QLI \end{aligned} \quad (8)$$

A determination was made that the model is fit for deliberation upon performing the fitness test on the multiple regression happiness model of 19 Asian nations between HI, 2016 and the dependent variables, because $p < 0.001$.

The determination coefficient R^2 indicates that 99.5 percent of the independent variables in the model under analysis explain the dispersion of weights for the dependent variable, the HI, 2016.

It is possible to draw a conclusion upon calculating the linear regression coefficients, shown in (8), that the independent variables at $p < 0.05$ have a significant impact on the dependent variable, HI, 2016. These independent variables are the GII, 2015; AHI, 2012–2016; QLI, 2018, and GDPpc, 2016 (2015). Meanwhile, the independent variables influencing the HI, 2016, albeit insignificantly, include the AEDB ranking, 2006–2016; CPI, 2016; ACPI, 2004–2016; AHDI, 1991–2015; EI, 2015; EPI ranking, 2016; EFpc, 2013; ASPI, 2014–2017; WVSS, 2006 (or 2000, 1995); GDPpc in PPP terms, 2016; UNR; 2016; ALPE in 2015 USD, 1991–2016.

The Multiple linear regression happiness model of 40 Asian nations was then developed. The model links with the 2012–2016 AHI, a single dependent variable, with the other independent variables X_1, X_2 ,..., X_{26} (see Table 13). The regression equation makes a forecast of the values of the dependent variable AHI possible based on the values of the independent variables. Table 13 presents an overview of the 26 variables analyzed in our research.

The correlation analysis showed that AHI correlates with all variables considered, with the exception of AG of GDP, INFG, UNR, AUNR, PBD, APBD, FIB, and AEI. The strongest correlation was between AHI and GDPpc ($r = 0.759$, $p < 0.01$), EFpc ($r = 0.747$, $p < 0.01$) and GDPpc in PPP terms ($r = 0.746$, $p < 0.01$); the weakest correlation was between AHI and AFIB ($r = 0.344$, $p < 0.05$) and EI ($r = 0.435$, $p < 0.01$); and a negative statistically significant relationship was found between AHI and AAG of GDPpc in PPP terms ($r = -0.450$, $p < 0.01$), AINFG ($r = -0.567$, $p < 0.01$), EDB ($r = -0.578$, $p < 0.01$), AEDB ($r = -0.631$, $p < 0.01$), GII ($r = -0.597$, $p < 0$ 0.01) and AGII ($r = -0.548$, $p < 0.01$). The 8 variables that showed no correlation with the average happiness index were discarded, and the remaining 18 correlating variables were analyzed.

To determine how the AHI was dependent on the 18 correlating variables, a Multiple linear regression happiness model of 40 Asian nations (9) has been created.

$$\begin{aligned} AHI &= 6.854 + 0.00001 \bullet GDPpc - 0.00002 \bullet GDPinPPP - 0.125 \bullet AGDPinPP \\ &P - 0.019 \bullet \\ &\bullet AINFG + 0.00002 \bullet LPE + 0.00001 \bullet ALPE - 0.003 \bullet AFIB - 0.009 \\ &\bullet EDB + 0.005 \bullet \\ &\bullet AEDB + 0.157 \bullet CPI - 0.225 \bullet ACPI + 7.188 \bullet HDI - 2.131 \bullet AHDI + 0.886 \\ &\bullet GII - 3.253 \bullet \\ &\bullet AGII - 4.161 \bullet EI \pm 0.017 \bullet EPI + 0.031 \bullet EFpc \end{aligned} \quad (9)$$

The validity of the multiple regression between the AHI of 40 Asian nations and the model of 18 independent variables was verified, and the results show that the model was fit for analysis because $p < 0.001$ (Table 13). The coefficient of determination (R^2) shows that the model's independent variables explain the distribution of the values of the dependent variable (AHI in 2012–2016) in 78.3% of cases.

6. Discussion and conclusion

The levels of happiness in nations correlate with a respective nation's achievements in areas like economics, technology, productivity, GDP, religion, social help, morality, well-being, energy savings, environment,

health, social matters, education, housing and transportation, politics, law, government and reduced corruption along with the citizenry's freedom to make choices for everyday decisions (Sachs et al., 2018; Tofallis, 2019; Fanning and O'Neill, 2019). This study sought to establish the dependency of environmental sustainability and happiness in Asian nations on the macroeconomic, human development, well-being and the values-based, quality of life (QOL) and environmental indicators pertinent to each nation based on various statistical sources (see Section 2). Compilations were performed of decision-making matrices for 40 Asian nations and a subset of 19 Asian nations. These decision-making matrices then served as the basis for performing various multiple criteria and statistical analyses discussed in the section on methodology.

Multiple criteria analysis of 40 Asian nations revealed that the best performing nations in terms of Environmental Sustainability and Happiness Index are Kuwait, Qatar and United Arab Emirates. The three worst performing nations are Yemen, Armenia and Pakistan. More detailed analysis of 19 Asian nations revealed that the best performing nations are Israel, Japan and Saudi Arabia. The three worst performing nations among the 19 nations are Pakistan, Bangladesh and Iraq. The highest ranked nations are strong economies with favorable macroeconomic conditions (low inflation and unemployment, high labor productivity, positive or slightly negative fiscal balance), high human development and well-being indicators. The reverse is true for poorly performing nations. Analysis also allowed coming to the conclusion that highly developed nations have higher EPI. However, with an economic development, EFpc tends to increase.

Analysis of relations among EFpc, QLI and macroeconomic, well-being, human development and value-based indicators revealed positive correlations, meaning that EFpc will increase (i.e., there will be greater demands on ecology) with the increase of the various parameters that are commonly considered to constitute human progress and development. The only negative ones are those related to the EDB ranking and GI. These indicators reflect lower human development, which contributes to lower EFpc, and are also negatively correlated with QLI.

Nations that have both correspondingly low EFpc values and high QLI can be said to be performing well with good human-ecological balance. Outlier nations are only India and Cyprus. Japan performs both relatively poorly and well for EFpc and also well for QLI. Saudi Arabia performs correspondingly poorly for EFpc but well for QLI. Georgia performs well for EFpc but poorly for QLI.

Some nations are only relatively poor on their EFpc, namely Bhutan and Mongolia, with their landlocked status being the common factor; also Qatar, United Arab Emirates and Kuwait and Iran, all oil-producing West Asian nations. Other nations perform relatively well with respect to EFpc, namely Philippines and Pakistan. Bangladesh performs relatively poorly with respect to QLI. As a whole, three South Asian nations with a colonial past (India, Pakistan, Sri Lanka) perform relatively well with respect to EFpc, while India performs well with respect to QLI but Bangladesh (another nation in the same grouping) perfoms poorly. There is statistical evidence that turning points above a certain level of human development (HDI $>$ 0.8) could in fact reverse the increase in EFpc, which is valid for Cyprus, Israel, Japan and Singapore.

A comparison was undertaken by first taking the available, modern research covering nations' environmental sustainability and happiness (see Introduction). The INVAR technique (Kaklauskas, 2016), with all its capabilities, was then applied to expand on the capacities of EPI, EFpc and HI. These expanded capacities included supplying digital tips for the different studied nations involving such criteria, as well as validating EPI, EF, and HI and setting the values for these criteria, so each considered nation could improve its respective rating to a projected scale. Applications of the rankings gained by the NUMBEO and COPRAS methods were used for sensitivity investigation. These rankings were compared among all the 27 Asian nations evaluated with their respective QLI for the 2012–2018 period. Fig. 3 shows the graphic positions of these nations. Up to 13 nations ranked the 27 values of the sensitivity index at over 90%, so 48% of the group of 27 nations selected for the investigation. The underpinning for the development of rational macro-environments in the reviewed Asian nations is specific to the INVAR Method. These nations are realistically able to transform into environmentally sustainable and happy communities due to such macro-environments.

After establishing the level of priority and utility, the INVAR technique was validated by determining the macroeconomic, well-being and human development, values-based, quality of life and environmental indicators to analyze the correlations between EPI, EFpc, and QLI for the respective nations. These analyses pertained, on the one hand, to the priorities and utility degrees obtained by the EPI, EFpc, QLI, and the INVAR method and, on the other hand, to the macroeconomic, well-being and human development, values-based, quality of life and environmental indicators. Analysis indicated that the correlations under deliberation were average and strong.

An average of 40 Asian nations (average GDPpc in PPP terms = 23402.7, where the average HI = 5.31) and, according to 2016 GDP per capita in PPP terms, more affluent nations, such as Qatar (GDPpc in PPP terms = 127480.48, HI = 6.507), Kuwait (GDPpc in PPP terms = 74264, HI = 6.289), the United Arab Emirates (GDPpc in PPP terms = 72399.65, HI = 6.817), and Israel (GDPpc in PPP terms = 37258.22, HI = 7.264), tend to be happier compared to poorer nations, such as Tajikistan (GDPpc in PPP terms = 2979.31, HI = 4.801), Yemen (GDPpc in PPP terms = 2507.47, HI = 3.862), Nepal (GDPpc in PPP terms = 2477.9, HI = 4.606), and Afghanistan (GDPpc in PPP terms = 1944.12, HI = 3.692). However, this effect seems to weaken with increased prosperity. The correlation coefficient was found to be 0.716. Other researchers also found similar results.

The 40 Asian nations linear regression success model (5) established the determination coefficient R^2, which showed that nine independent variables explained 90.7% variance. The 19 Asian nations multiple regression happiness model (8) showed that 16 independent variables explained 99.5% of the happiness index dispersion variance. The Multiple linear regression happiness model of 40 Asian nations (9), of 40 Asian nations, indicated that 18 independent variables explained 78.3% of the significant variance from the average happiness index (AHI). The results of the analysis suggest that the greatest focus is needed on the macroeconomic, well-being, quality of life and human development factors when endeavoring to develop success and happiness in these nations. Upon performing the fitness test for these three models, these models were found to be suitable for deliberation, because $p < 0.001$.

The 40 Asian nations linear regression success model (5) established that, as predicted, the AHI relationship weakens when the growths in average GDP (AG of GDP), inflation (INFG), unemployment rate (UNR), average unemployment rate (AUNR), public debt (PBD), average public debt (APBD), fiscal balance (FIB), and average education index (AEI) are taken into consideration. Upon eliminating the 8 variables that do not correlate with the AHI, the analysis proceeded with the remaining 18 correlational variables. The number of variables in analogical deliberations was also reduced in the other two models: from 22 to 16 in the second model (of happiness in 19 Asian nations) and from 12 to 10 in the third model (of significances for 40 Asian nations). Upon performing the fitness test for these three models, they were found suitable for deliberation, because $p < 0.001$.

Nevertheless, the EFpc, EPI, HI, and QLI indicators for the respective Asian nations could still be improved, because there could be more considerations than the economy and other customary measures. Measures that have received less attention can be distinguished for further analysis, and the third innovation of this study was highlighting these areas, which included gender equality assurance, reduction of corruption and improvements in happiness, education and social progress indices.

Our research revealed several trends that some in the West might find unexpected. Happiness in some nations, for instance, goes up when the gender inequality index score increases and when the nation falls in the ease of doing business (EDB) index. Happiness is a single dimension affected by a range of micro, meso, and macro factors, so the impact on happiness/efficiency can be simultaneously positive and negative. Given the unexpected outcomes for these two indicators, their effect on happiness is briefly discussed here.

Research by Kaklauskas et al. (2018) has shown that as women's rights improve in Western nations, so to do environmental sustainability and QOL. This has affected how women's rights have been considered in the literature. Women in Iran, however, are limited in what they can and cannot wear, and this practice has a long history. Following the Iranian revolution in 1979, the nation moved to Islamic rule in the early 1980s, and all women were then required by Iranian authorities to wear the hijab (Iran, 2018). Things that

Table 11
The 1991–2016 macro-level success correlation coefficients of 19 Asian nations – correlational analysis results.

	Success of the nation (SON)	Average GDP growth (by annual %) in 1991–2016 (AG of GDP)	AAG of GDPpc in PPP terms in 1991–2016	Average inflation in 1995–2016 (AINF)	Average UNR in 1991–2016 (AUNR)	Average LPE in 2015 USD in 1991–2016 (ALPE)	Average PBD in 2004–2016 (APBD)	Average FIB in 2011–2016 (AFIB)	Average EDB ranking in 2006–2016 (AEDB)	Average CPI in 2004–2016 (ACPI)	Average HDI in 1991–2015 (AHDI)	Average GII in 1995–2015 (AGII)	Average HI in 2012–2016 (AHI)	Average EI in 1995–2015 (AEI)	Average SPI in 2014–2017 (ASPI)
SON	–														
AG of GDP	−0.298	–													
AAG of GDPpc in PPP terms in 1991–2016	−0.409	0.632**	–												
AINF	−0.548*	0.166	0.501*	–											
AUNR	−0.268	−0.225	−0.047	0.538*	–										
ALPE	0.637**	−0.272	−0.567*	−0.206	0.175	–									
APBD	−0.04	0.049	−0.205	−0.283	0.067	0.184	–								
AFIB	0.261	−0.03	0.068	0.294	0.075	0.193	−0.781**	–							
AEDB	−0.647**	0.481*	0.323	0.521*	0.307	−0.247	0.027	0.015	–						
ACPI	0.737**	−0.298	−0.482*	−0.664**	−0.098	0.398	0.381	−0.235	−0.654**	–					
AHDI	0.784**	−0.553*	−0.643**	−0.453	0.142	0.656**	0.13	0.077	−0.662**	0.751**	–				
AGII	−0.718**	0.300	0.189	0.492*	0.104	−0.347	−0.081	−0.091	0.713**	−0.642**	−0.730**	–			
AHI	0.677**	−0.165	−0.579**	−0.639**	−0.377	0.656**	0.193	0.054	−0.534*	0.602**	0.498*	−0.488*	–		
AEI	0.796**	−0.539*	−0.575**	−0.618**	−0.1	0.519*	0.177	0.009	−0.824**	0.865**	0.889**	−0.789**	0.677**	–	
ASPI	0.682**	−0.553*	−0.432	−0.504*	−0.005	0.389	0.209	−0.023	−0.794**	0.800**	0.834**	−0.837**	0.525*	0.958**	–

* – Correlation is successful at the 0.05 level (2-tailed).
** – Correlation is successful at the 0.01 level (2-tailed).

Table 12
The 1991–2016 macro-level happiness correlation coefficients of 19 Asian nations – correlational analysis results.

	HI in 2016	AG of GDP (by annual %) in 1991–2016	GDPpc in 2016 (2015)	GDPpc in PPP terms in 2016	AAG of GDPpc in PPP terms in 1991–2016	INFG in 2016 (2015, 2014)	AINFG in 2016 (2015, 2014)	UNR in 2016	AUNR in 1991–2016
HI in 2016	1								
AG of GDP (by annual %) in 1991–2016	−0.099	1							
GDPpc in 2016 (2015)	0.683**	−0.365	1						
GDPpc in PPP terms in 2016	0.685**	−0.296	0.830**	1					
AAG of GDPpc in PPP terms in 1991–2016	−0.425	0.779**	−0.417	−0.423	1				
INFG in 2016 (2015, 2014)	−0.319	0.163	−0.387	−0.155	0.079	1			
AINFG in 2016 (2015, 2014)	−0.462*	0.078	−0.362	−0.206	0.31	0.507*	1		
UNR in 2016	−0.477*	−0171	−0.183	−0.163	0.032	−0.176	0.453	1	
AUNR in 1991–2016	−0.427	−0.150	−0.165	−0.195	0.055	−0.186	0.506*	0.903**	1
LPE in 2016	0.556*	−0.189	0.661**	0.922**	−0.386	0.005	0.021	0.024	0.034
ALBPE in 2015 USD in 1991–2016	0.550*	−0.245	0.635**	0.910**	−0.482*	−0.022	−0.091	0.005	0.000
PBD in 2016 (2015)	0.138	−0.352	0.601**	0.3	−0.252	−0.448	−0.298	−0.034	−0.084
APBD in 2004–2016	0.145	−0.243	0.585**	0.285	−0.186	−0.390	−0.218	−0.049	−0.026
FIB in 2016 (2015)	0.119	−0.138	0.018	−0.231	−0.134	0.064	−0.115	−0.167	−0.285
AFIB in 2011–2016	0.117	0.042	−0.152	0.194	0.041	0.386	0.316	−0.055	0.024
EDB ranking in 2016	−0.418	0.472*	−0.463*	−0.458*	0.217	0.401	0.183	0.022	0.07
AEDB ranking in 2006–2016	−0.575*	0.520*	−0.564*	−0.579**	0.376	0.460*	0.368	0.157	0.215
CPI in 2016	0.517*	−0.490*	0.786**	0.574*	−0.474*	−0.437	−0.531*	−0.16	−0.186
ACPI in 2004–2016	0.589**	−0.404	0.852**	0.643**	−0.454	−0.483*	−0.533*	−0.118	−0.214
HDI in 2015	0.599**	−0.44	0.809**	0.818**	−0.403	−0.361	−0.225	0.030	0.008
AHDI in 1991–2015	0.584**	−0.509*	0.806**	0.775**	−0.467*	−0.472*	−0.224	0.104	0.103
GII in 2015	−0.598**	0.218	−0.804**	−0.704**	0.109	0.497*	0.362	0.122	0.182
AGII in 1995–2015	−0.545*	0.189	−0.730**	−0.532*	0.025	0.557*	0.36	0.179	0.211
AHI in 2012–2016	0.988**	−0.113	0.729**	0.718**	−0.439	−0.34	−0.478*	−0.458*	−0.423
EI in 2015	0.460*	−0.537*	0.686**	0.653**	−0.429	−0.39	−0.21	0.112	0.129
AEI in 1995–2015	0.624**	−0.532*	0.783**	0.650**	−0.489*	−0.497*	−0.448	−0.1	−0.161
EPI in 2016	0.614**	−0.525*	0.725**	0.762**	−0.524*	−0.436	−0.255	0.096	0.032
EFpc in 2013	0.735**	−0.293	0.806**	0.959**	−0.451	−0.184	−0.23	−0.142	−0.123
SPI in 2017	0.582**	−0.548*	0.776**	0.622**	−0.489*	−0.499*	−0.447	−0.065	−0.126
ASPI in 2014–2017	0.564*	−0.539*	0.750**	0.619**	−0.453	−0.491*	−0.419	−0.076	−0.152
WVST in 2006 (2000, 1995)	0.060	−0.116	0.521*	0.255	0.272	−0.397	−0.112	−0.119	−0.034
WVSS in 2006 (2000, 1995)	0.603**	−0.237	0.498*	0.583**	−0.464*	−0.014	−−0.502*	−0.446	−0.561*
QLI in 2018	0.519*	−0.516*	0.851**	0.775**	−0.486*	−0.429	−0.356	−0.026	−0.103

	LPE in 2016	ALPE in 2015 USD in 1991–2016	PBD in 2016 (2015)	APBD in 2004–2016	FIB in 2016 (2015)	AFIB in 2011–2016	EDB ranking in 2016	AEDB ranking in 2006–2016
HI in 2016								
AG of GDP (by annual %) in 1991–2016								
GDPpc in 2016 (2015)								
GDPpc in PPP terms in 2016								
AAG of GDPpc in PPP terms in 1991–2016								
INFG in 2016 (2015, 2014)								
AINFG in 2016 (2015, 2014)								
UNR in 2016								
AUNR in 1991–2016								
LPE in 2016	1							
ALBPE in 2015 USD in 1991–2016	0.980**	1						
PBD in 2016 (2015)	0.144	0.128	1					

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Table 12 (*continued*)

	LPE in 2016	ALPE in 2015 USD in 1991–2016	PBD in 2016 (2015)	APBD in 2004–2016	FIB in 2016 (2015)	AFIB in 2011–2016	EDB ranking in 2016	AEDB ranking in 2006–2016
APBD in 2004–2016	0.203	0.173	0.942**	1				
FIB in 2016 (2015)	−0.427	−0.468*	0.074	−0.1	1			
AFIB in 2011–2016	0.263	0.241	−0.666**	−0.706**	0.029	1		
EDB ranking in 2016	−0.237	−0.183	−0.235	−0.065	−0.335	−0.18	1	
AEDB ranking in 2006–2016	−0.359	−0.357	−0.256	−0.109	−0.119	−0.048	0.885**	1
CPI in 2016	0.36	0.361	0.585**	0.495*	0.257	−0.232	−0.655**	−0.685**
ACPI in 2004–2016	0.439	0.427	0.675**	0.594**	0.252	−0.323	−0.602**	−0.662**
HDI in 2015	0.677**	0.633**	0.377	0.269	0.141	0.236	−0.752**	−0.706**
AHDI in 1991–2015	0.642**	0.605**	0.448	0.355	0.114	0.135	−0.731**	−0.691**
GII in 2015	−0.453	−0.409	−0.384	−0.249	−0.179	−0.086	0.749**	0.744**
AGII in 1995–2015	−0.24	−0.176	−0.467*	−0.323	−0.333	0.012	0.751**	0.693**
AHI in 2012–2016	0.587**	0.588**	0.175	0.192	0.078	0.066	−0.376	−0.558*
EI in 2015	0.511*	0.480*	0.316	0.177	0.223	0.288	−0.788**	−0.689**
AEI in 1995–2015	0.414	0.397	0.499*	0.362	0.368	0.032	−0.797**	−0.756**
EPI in 2016	0.627**	0.608**	0.394	0.242	0.153	0.163	−0.786**	−0.766**
EFpc in 2013	0.907**	0.885**	0.226	0.214	−0.189	0.224	−0.527*	−0.646**
SPI in 2017	0.388	0.373	0.511*	0.365	0.382	0.014	−0.796**	−0.746**
ASPI in 2014–2017	0.376	0.356	0.512*	0.366	0.376	0.032	−0.807**	−0.745**
WVST in 2006 (2000, 1995)	0.044	−0.039	0.600**	0.523*	0.04	−0.193	−0.487*	−0.382
WVSS in 2006 (2000, 1995)	0.436	0.465*	0.168	0.167	0.219	0.093	−0.347	−0.387
QLI in 2018	0.605**	0.608**	0.599**	0.523*	0.018	−0.176	−0.615**	−0.665**

	CPI in 2016	ACPI in 2004–2016	HDI in 2015	AHDI in 1991–2015	GII in 2015	AGII in 1995–2015	AHI in 2012–2016	EI in 2015
CPI in 2016	1							
ACPI in 2004–2016	0.940**	1						
HDI in 2015	0.750**	0.774**	1					
AHDI in 1991–2015	0.764**	0.785**	0.977**	1				
GII in 2015	−0.718**	−0.755**	−0.842**	−0.796**	1			
AGII in 1995–2015	−0.676**	−0.712**	−0.768**	−0.746**	0.947**	1		
AHI in 2012–2016	0.534*	0.617**	0.607**	0.593**	−0.598**	−0.535*	1	
EI in 2015	0.750**	0.707**	0.953**	0.948**	−0.769**	−0.716**	0.455	1
AEI in 1995–2015	0.855**	0.883**	0.895**	0.897**	−0.831**	−0.807**	0.623**	0.888**
EPI in 2016	0.682**	0.737**	0.927**	0.919**	−0.782**	−0.696**	0.607**	0.891**
EFpc in 2013	0.602**	0.657**	0.852**	0.810**	−0.691**	−0.529*	0.754**	0.718**
SPI in 2017	0.877**	0.890**	0.891**	0.894**	−0.824**	−0.800**	0.584**	0.899**
ASPI in 2014–2017	0.827**	0.861**	0.879**	0.883**	−0.824**	−0.810**	0.559*	0.879**
WVST in 2006 (2000, 1995)	0.468*	0.439	0.449	0.424	−0.632**	−0.714**	0.073	0.446

(*continued on next page*)

Table 12 (*continued*)

	CPI in 2016	ACPI in 2004–2016	HDI in 2015	AHDI in 1991–2015	GII in 2015	AGII in 1995–20-15	AHI in 2012–2016	EI in 2015
WVSS in 2006 (2000, 1995)	0.476*	0.561*	0.481*	0.424	−0.376	−0.293	0.623**	0.372
QLI in 2018	0.854**	0.865**	0.783**	0.785**	−0.739**	−0.616**	0.568*	0.717**

	AEI in 1995–2015	EPI in 2016	EFpc in 2013	SPI in 2017	ASPI in 2014–2017	WVST in 2006 (2000, 1995)	WVSS in 2006 (2000, 1995)	QLI in 2018
CPI in 2016								
ACPI in 2004–2016								
HDI in 2015								
AHDI in 1991–2015								
GII in 2015								
AGII in 1995–2015								
AHI in 2012–2016								
EI in 2015								
AEI in 1995–2015	1							
EPI in 2016	0.886**	1						
EFpc in 2013	0.676**	0.807**	1					
SPI in 2017	0.996**	0.879**	0.652**	1				
ASPI in 2014–2017	0.994**	0.872**	0.635**	0.989**	1			
WVST in 2006 (2000, 1995)	0.454	0.354	0.229	0.472*	0.475*	1		
WVSS in 2006 (2000, 1995)	0.590**	0.469*	0.561*	0.556*	0.577**	−0.072	1	
QLI in 2018	0.805**	0.786**	0.733**	0.816**	0.780**	0.459*	0.538*	1

* Correlation is successful at the 0.05 level (2-tailed).

** Correlation is successful at the 0.01 level (2-tailed).

Table 13
The 1991–2016 macro-level happiness correlation coefficients of 40 Asian nations – correlational analysis results.

	HI in 2016	AG of GDP (by annual %) in 1991–2016	GDPpc in 2016 (2015)	GDPpc in PPP terms in 2016	AAG of GDPpc in PPP terms in 1991–2016	INFG in 2016 (or 2015, 2014)	AINFG in 2016 (2015, 2014)	UNR in 2016	AUNR in 1991–2016	LPE in 2016	ALPE in 2015 USD in 1991–2016	PBD in 2016 (2015)	APBD in 2004–2016
HI in 2016	1												
AG of GDP (by annual %) in 1991–2016	−0.132	1											
GDPpc in 2016 (2015)	0.759**	−0.052	1										
GDPpc in PPP terms in 2016	0.746**	−0.03	0.974**	1									
AAG of GDPpc in PPP terms in 1991–2016	−0.450**	0.614**	−0.328*	−0.311	1								
INFG in 2016 (2015, 2014)	−0.306	0.034	−0.444**	−0.330*	0.11	1							
AINFG in 2016 (2015, 2014)	−0.567**	−0.051	−0.537**	−0.465**	0.361*	0.517**	1						
UNR in 2016	−0.208	−0.532**	−0.124	−0.149	−0.236	−0.104	0.324*	1					
AUNR in 1991–2016	−0.146	−0.563**	−0.049	−0.077	−0.223	−0.105	0.347*	0.929**	1				
LPE in 2016	0.712**	−0.071	0.951**	0.971**	−0.379*	−0.329*	−0.419**	−0.006	0.067	1			
ALBPE in 2015 USD in 1991–2016	0.709**	−0.159	0.908**	0.923**	−0.520**	−0.313*	−0.424**	0.053	0.11	0.972**	1		
PBD in 2016 (2015)	−0.025	0.021	0.184	0.102	0.029	−0.448**	−0.278	−0.002	0.076	0.144	0.162	1	
APBD in 2004–2016	−0.194	0.122	−0.085	−0.176	0.220	−0.371*	−0.131	−0.027	0.035	−0.114	−0.117	0.767**	1
FIB in 2016 (2015)	0.066	0.049	0.015	−0.012	0.050	0.110	−0.033	−0.044	−0.073	−0.071	−0.087	−0.179	−0.019
AFIB in 2011–2016	0.344*	0.051	0.302	0.326*	−0.175	0.158	−0.024	−0.168	−0.125	0.287	0.246	−0.313*	−0.331*
EDB ranking in 2016	−0.578**	0.358*	−0.651**	−0.625**	0.188	0.384*	0.322*	0.07	−0.003	−0.541**	−0.473**	−0.143	0.125
AEDB ranking in 2006–2016	−0.631**	0.372*	−0.732**	−0.692**	0.368*	0.448**	0.536**	0.095	0.043	−0.651**	−0.624**	−0.207	0.101
CPI in 2016	0.649**	−0.069	0.745**	0.713**	−0.214	−0.406**	−0.576**	−0.218	−0.161	0.677**	0.607**	0.304	0.088
ACPI in 2004–2016	0.688**	−0.084	0.800**	0.747**	−0.303	−0.438**	−0.680**	−0.195	−0.133	0.723**	0.676**	0.327*	0.067
HDI in 2015	0.721**	−0.255	0.933**	0.915**	−0.423**	−0.391*	−0.492**	−0.036	0.065	0.885**	0.836**	0.138	−0.154
AHDI in 1991–2015	0.726**	−0.279	0.923**	0.890**	−0.492**	−0.467**	−0.536**	0.007	0.108	0.876**	0.844**	0.218	−0.077
GII in 2015	−0.597**	0.288	−0.612**	−0.588**	0.169	0.353*	0.398*	0.036	−0.035	−0.503**	−0.414**	−0.049	0.141
AGII in 1995–2015	−0.584**	0.218	−0.578**	−0.541**	0.112	0.386*	0.404**	0.108	0.004	−0.434**	−0.359*	−0.156	0.085
EI in 2015	0.435**	−0.467**	0.595**	0.571**	−0.29	−0.342*	−0.190	0.171	0.316*	0.551**	0.478**	0.184	−0.026
AEI in 1995–2015	0.197	−0.450**	0.315*	0.248	−0.189	−0.259	−0.100	0.201	0.237	0.238	0.211	−0.031	0.034
EPI in 2016	0.690**	−0.251	0.868**	0.841**	−0.389*	−0.441**	−0.475**	−0.067	0.005	0.824**	0.793**	0.167	−0.086
EFpc in 2013	0.747**	−0.046	0.869**	0.887**	−0.358*	−0.362*	−0.433**	−0.156	−0.11	0.855**	0.818**	0.127	−0.179

	FIB in 2016 (2015)	AFIB in 2011–2016	EDB ranking in 2016	AEDB ranking in 2006–2016	CPI in 2016	ACPI in 2004–2016	HDI in 2015	AHDI in 1991–2015	GII in 2015	AGII in 1995–2015	EI in 2015	AEI in 1995–2015	EPI in 2016	EFpc in 2013
FIB in 2016 (2015)	1													
AFIB in 2011–2016	0.506**	1												
EDB ranking in 2016	−0.066	−0.22	1											
AEDB ranking in 2006–2016	0.149	−0.085	0.865**	1										
CPI in 2016	−0.054	0.164	−0.694**	−0.715**	1									
ACPI in 2004–2016	−0.048	0.159	−0.678**	−0.754**	0.957**	1								
HDI in 2015	0.053	0.306	−0.749**	−0.790**	0.730**	0.777**	1							
AHDI in 1991–2015	0.056	0.286	−0.726**	−0.779**	0.736**	0.791**	0.979**	1						
GII in 2015	−0.111	−0.18	0.743**	0.652**	−0.516**	−0.518**	−0.710**	−0.673**	1					
AGII in 1995–2015	−0.188	−0.16	0.716**	0.612**	−0.443**	−0.467**	−0.673**	−0.660**	0.926**	1				
EI in 2015	0.054	0.158	−0.748**	−0.664**	0.489**	0.486**	0.802**	0.783**	−0.722**	−0.674**	1			
AEI in 1995–2015	0.317*	0.166	−0.386*	−0.397*	0.232	0.232	0.404**	0.415**	−0.375*	−0.342*	0.525**	1		
EPI in 2016	0.13	0.355*	−0.770**	−0.785**	0.760**	0.790**	0.913**	0.911**	−0.633**	−0.578**	0.732**	0.480**	1	
EFpc in 2013	0.016	0.335*	−0.693**	−0.666**	0.667**	0.706**	0.841**	0.832**	−0.626**	−0.583**	0.580**	0.151	0.808**	1

* Correlation is successful at the 0.05 level (2-tailed).
** Correlation is successful at the 0.01 level (2-tailed).

Western people perceive as normal and common (such as the rapid reduction of gender disparity under Mohammad Reza Pahlavi, Iran's pro-Western shah, and women wearing European-style clothes with their arms and necks exposed, instead of traditional Islamic clothing) conservative Muslims see as an unforgivable sin (Vitkunas, 2019). Shari'ati (1979) believes that "cultural imperialism" was the main reason for women's oppression and also argues that because the perceived freedom of women began in the West – with its misleading consequences – many Muslim thinkers are afraid of gender parity. Ghandeharion and Badrlou (2018) believe that avoiding Western fashion and hegemony is the way for Muslim women to protect their honor. Religious life and its intensity within selected states thus seem to make a significant impact on the level of gender inequality, and that effect is felt in social, political, and economic ways. This correlation could have fuelled a great degree of religiosity in many Muslim states and, in turn, higher levels of gender inequality (Klingorova and Havlíček, 2015).

Concerning the ease of doing business index, when a nation ensures effective business regulation, micro and small firms can grow, innovate and move from the informal to the formal sector of an economy. A firm operating in the informal sector is less likely to pay taxes. Research has found that excessively regulated entry leads to more informal businesses and employment (Doing Business, 2019). Contrary opinions, however, exist on this issue. Maldeikienė (2013) believes that someone paid a minimum wage and not eligible for benefits has several options: poverty and undernourishment or emigration; there is also a third option – extra income from the shadow economy (e.g., illegal work). Talk about fighting the shadow economy must begin with a very simple question: what will happen if the shadow economy suddenly disappears? How many people will no longer be able to make ends meet? In some nations, the shadow economy is sometimes a pillar of their economic system and the source of livelihood for many people. A fight against the shadow economy would thus be impossible while labor remains undervalued (i.e., while many people's incomes are below the level that makes honest survival possible (Maldeikienė, 2013).

The mass media provides people with information and data about various nations, as well as their development levels and products; d'Astous and Boujbel (2007) believe that people are likely to perceive nations by making mental representations of them in their minds, just as they do for other objects in their environment such as individuals or brands. The mass media thus serves as the source for popular opinions about nations in general, as travel destinations, and as producers of consumer goods (d'Astous and Boujbel, 2007). Information about a nation's macroeconomic, happiness, well-being and human development, values-based, quality of life and environmental scores can draw the interest of potential buyers. The results of this study can thus help potential buyers arrive at a decision regarding the nation for their product purchases.

The results of the analysis suggest that the accuracy of the Asian nations success and happiness forecast depends on the number of macroeconomic, well-being and human development, values-based, quality of life and environmental indicators employed in the models. It is thus necessary to distinguish the indicators with a combination that maximally reflects the success and happiness index of each nation to maximize models accuracy. Future studies should employ historical data as broadly as possible to analyze the indicators, which would provide a more accurate evaluation of changes to the success and happiness index based on the changes in the respective weights of the indicators. Studies on sustainable developments in African and American nations are planned for future use of the INVAR Method. A multiple criteria analysis of environmental sustainability, happiness and QOL indicators is foreseen that would include provisions of specific recommendations.

The results of the performed analysis can serve, as the basis for arriving at an assumption that the greater the number of nations under investigation and the lower the number of independent variable applied the better is the explanation regarding the dispersion of dependent variable significances. Therefore, when the endeavor is to reflect the dependent variable better, it is necessary to accumulate independent variables common to all the nations and equally significant for forecasting the dependent variable. At the same time, to achieve a more accurate level of forecasting, it is necessary to accumulate as much data as possible on variables during a historical period. Thereby it is necessary to select independent variables scrupulously and employ them over as great a period as possible for weighting these variables in order to arrive at the most qualitative forecast of a Happiness index.

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CRediT authorship contribution statement

A. Kaklauskas: Conceptualization, Investigation, Formal analysis, Writing - original draft, Methodology, Software, Supervision. **W.P.S. Dias:** Data curation, Investigation, Writing - original draft. **A. Binkyte-Veliene:** Software, Data curation, Formal analysis, Writing - review & editing, Visualization, Investigation. **A. Abraham:** Visualization, Supervision. **I. Ubarte:** Software, Data curation, Formal analysis, Writing - review & editing, Visualization, Investigation. **O.P.C. Randil:** Writing - review & editing. **C.S.A. Siriwardana:** Writing - review & editing. **I. Lill:** Visualization, Supervision. **V. Milevicius:** Software, Validation. **A. Podviezko:** Software, Validation. **R. Puust:** Visualization, Supervision.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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