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# Life quality as an indicator of sustainable development: international statistical research

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Received: 28.01.2021 Received in revised form: 08.02.2021 Accepted: 11.02.2021 **Abstract.** The purpose of the article is to substantiate the methodology for determining the European quality of life index. The theoretical and methodological basis of research is the ideas of the interdependence of life quality and sustainable development. To achieve the desired goal, the following research methods were used: analysis and synthesis (for

determining theoretical and practical aspects of ensuring the life quality); statistical (for determining standardized indicators and a European Quality of Life Index for Sweden and Ukraine); abstract-logical (for theoretical summarization and conclusion). As a result, the authors created the European Quality of Life Index based on the comparison of the characteristics of international life quality assessment systems (calculation principle, number and composition of indicators, number of countries covered for calculation), as well as systematization of research by Ukrainian and foreign authors. Therefore, the authors selected twelve main indicators. The indicators are divided into two groups: stimulants (prosperity index, basic human needs index, welfare bases, availability of nutrition and basic health care, GDP per capita, population, global competitiveness index, personal security, access to basic knowledge, ecosystem status) and disincentive (government debt, unemployment). To determine the "European life quality index", the authors used the formula for calculating the arithmetic mean, as all selected indicators can be considered equivalent as a result of standardization by the method of "minimummaximum". In addition, for in-depth analysis, the authors calculated the growth rates of indicators, as well as coefficients of variation. The authors made calculations based on data of 2013–2019 for two countries, namely Sweden and Ukraine. Sweden occupies a much better position in achieving the Sustainable Development Goals, so studying the impact of life quality on sustainable development in this country will suggest ways to achieve the chosen strategic priorities for Ukraine.

Keywords: life quality, sustainable development, indicators, Ukraine, Sweden

## Якість життя як індикатор сталого розвитку: міжнародне статистичне дослідження

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Анотація. Метою статті є обґрунтування методології визначення європейського індексу якості життя. Теоретичною та методологічною основою дослідження є ідеї взаємозалежності якості життя та сталого розвитку. Для досягнення бажаної мети використовувались наступні методи дослідження: аналіз та синтез (для визначення теоретичних та практичних аспектів забезпечення якості життя); статистичні (для визначення стандартизованих показників та європейського індексу якості життя для Швеції та України); абстрактно-логічний (для теоретичного узагальнення та висновків). В результаті на основі порівняння характеристик міжнародних систем оцінювання якості життя (принцип розрахунку, кількість та склад індикаторів, кількість охоплених країн для розрахунку), а також систематизації досліджень українських та закордонних авторів біло розроблено власну методику обчислення європейського індексу якості життя. Показники розділено на дві групи: стимулятори (індекс процвітання, індекс основних потреб людини, основи добробуту, доступність харчування та базової медичної допомоги, ВВП на душу населення, чисельність населення, індекс глобальної конкурентоспроможності, особиста безпека; доступ до базових знань, стан екосистеми) та дестимулятори (державний борг, рівень безробіття). Для визначення узагальнюючого показника «європейський індекс якості життя» було використано формулу розрахунку середнього арифметичного значення, оскільки всі обрані індикатори можна вважати рівнозначними між собою в результаті стандартизації за методом «мінімум-максимум». Додатково для поглибленого аналізу автори розрахували темпи приросту індикаторів, а також коефіцієнти варіації. Розрахунки проведено з урахуванням даних за 2013-2019 роки для двох країн, а саме Швеції та України. Швеція займає набагато кращі позиції за індексом досягнення Цілей сталого розвитку, тому вивчення впливу якості життя на сталий розвиток у цій країні дозволить запропонувати шляхи досягнення обраних стратегічних пріоритетів для України.

Ключові слова: якість життя, сталий розвиток, індикатори, Україна, Швеція

### Introduction.

Quality of life can be defined in many ways, that is why it is the center of sociological, economic and political research. For the vast majority of countries, quality of life is a key indicator of sustainable development being «as a desired outcome of service delivery in mainstream and special needs education, health care, social services (particularly for disabled and elderly people) and, increasingly, for crosscutting public sector partnership policy at all levels» (Galloway, 2005). In addition, the UN Sustainable Development Goals (UN, 2020) also work in a spirit of partnership and pragmatism, and aim at the right choice in order to steadily improve the quality of life for future generations.

According to scientists, measuring the life quality in a behavioral economy is much more complicated (Glonti, 2020; Nenkov, 2017). In the context of globalization and digitalization, the priorities of countries' development and the tools to achieve them continue changing. That is why much attention is paid to the social, cultural and environmental living conditions of the population of European countries (Chernega, 2019; Gorina, 2019; Khomenko, 2019; Sushchenko, 2019). At the same time, the existence of democratic mechanisms for the transformation of society (Calinescu, 2018), social dialogue (Calinescu, 2017), a sufficient level of education of the population (Sitnicki, 2018; Trunina, 2019), a developed and powerful education system contribute to the processes of improving the quality of life of the population (Kasych, 2018; Sitnicki, 2020). At the same time, economic factors do not lose their relevance, in particular innovation (Kasych, 2017; Khovrak, 2013), and financial stability of enterprises (Polinkevych, 2016). The economic growth of the state is closely linked to the population life quality (Kaigorodova, 2018). It is also worth remembering that "interpersonal sensitivity and social support satisfaction predicted quality of life" (Wedgeworth, 2017). The empirical studies prove a direct correlation between starting a business and quality of life for late-career individuals (Kautonen, 2017). At that time, workspace design and environmental features effects on an employee's morale and productivity, which, in turn, affects the Quality of Life (Vischer, 2017). The concept of Quality of

Life is significantly impacting research and service delivery in the field related developmental disabilities (Schalock, 2016). Therefore, all the factors that affect the level and Quality of Life of the population should be divided into groups depending on the level of influence: internal (personal characteristics of a person; the desire to work, the level of education, qualifications and income), family (material resources and social status of the family) and external (influence of society, market and state regulatory mechanisms: natural, economic, state managerial mechanism, social, medical prerequisites, etc.). As a result of these changes, society needs to strengthen social responsibility (Glonti, 2020), awareness of the transformation of development priorities of countries (Calinescu, 2018; Onyshchenko, 2020), as well as an effective system of strategic management (Buzko, 2019; Maslak, 2018) and training of highly qualified professionals (Pochtovyuk, 2017; Polishchuk, 2019). The purpose of the article is to substantiate the methodology for determining the European life quality index.

### Materials and methods of research.

Research methods: analysis and synthesis (for determining theoretical and practical aspects of ensuring the quality of life); statistical (for determining standardized indicators and a European Life Quality Index for Sweden and Ukraine); abstract-logical (for theoretical summarization and conclusion). The importance of this paper is confirmed by the review and analysis of scientific publications.

Quality of life can be measured by a set of features that can be weighted by some metric that reflect "well-being", "social welfare" or "sustainable development" (Slottje, 2019). At the same time, the vast majority of scientific publications closely link such concepts as Health, Health-Related Quality of Life, and Quality of Life (Karimi, 2016). The main quality of life assessment systems and indices are the EIU Life Quality Index, the methodology of the European Statistical System Committee, the Better Life Initiative, the International Living Life Quality Index, and the general methodological concept of standards and quality of life (Table 1 (Measuring the life quality in Ukraine, 2013)).

System	Calculation principle	Indicators
EIU Life Quality Index	Equal consideration of	Health, family, social life, financial well-being, political stability and
(Economic Intelligence	quantitative and subjective	security, climate, employment guarantee, political freedom, gender
Unit)	indicators	equality
The methodology of the European Statistical System Committee	Equal consideration of quantitative and subjective indicators	Financial and living conditions, productive or basic activity, health, education, leisure (recreation) and social communications (interaction), economic and physical security, public administration (power) and fundamental rights, nature and environment, general perception of life
Better Life Initiative (OECD)	Integral parameter estimation	Living conditions, income, employment, education, ecology, health, management efficiency, social life, safety, satisfaction with living conditions, work-life balance
The International Living Life Quality Index	Equal consideration of quantitative and subjective indicators	Cost of living, culture, economy, environment, freedom, health, infrastructure, security and risk, climate
The general methodological	Differentiation of macroeconomic	GDP per capita, consumer price index, consumer basket, household
concept of standards and	indicators and sociological	expenditures, GFK basket, poverty rate, income inequality, life and
quality of life	indicators	happiness satisfaction, deprivation, optimism about the future, etc.

Table 1. Characteristics of international quality assessment systems (compiled by the authors)

The systems shown in Table 1, have different indicators, index calculation methods and the number of covered countries. Therefore, we selected twelve main indicators, which were used to obtain a standardized assessment of each indicator and to calculate the life quality index in 2013–2019 for the two countries, namely Sweden and Ukraine. Sweden occupies a much better position in achieving the Sustainable Development Goals, so studying the impact of life quality on sustainable development in this country will suggest the ways to achieve the chosen strategical priorities for Ukraine.

The calculation of indicators according to the proposed methodology was based on open statistics on the socio-economic development of countries (Global Competitiveness Index, 2019; Social Progress Index, 2019; Statistics of the countries of the world, 2019).

To calculate the European Quality of Life Index, we have chosen a method based on the magnitude of variation. The indicators are divided into two groups: stimulants (prosperity index, basic human needs index, welfare bases, availability of nutrition and basic health care, GDP per capita, population, global competitiveness index, personal security, access to basic knowledge, ecosystem status) and disincentive (government debt, unemployment). "The prosperity index" is marked as *I<sub>LP</sub>*, "basic human needs index" – as  $I_{\Delta}$ , "welfare bases" – as  $W_b$ , "availability of nutrition and basic medical care" – as  $A_m^n$ , "GDP per capita" – as  $G_{C}$ , "population" – as P, "global competitiveness index" – with  $I_{GC}$ , "personal security" – as  $S_P$ , "access to basic knowledge" – as  $A_{bK}$ , "ecosystem status" – as *E*; "government debt" – as  $D_G$ , "unemployment" – as  $R_{U}$ . "European quality of life index" is marked as  $E_{i}$ .

The standardized evaluation procedure (X') was performed using the following formulas:

for stimulants:

$$X' = \frac{\max X - X}{\max X - \min X} \tag{1}$$

for disincentive:

J

$$X' = \frac{\max X - X}{\max X - \min X}$$
(2)

where X-is the indicator value, min X and max X-are the minimal and maximal values of the sample indicator respectively.

In order to bring standardized estimates of indicators into a generalized European index (Ei), the arithmetic mean formula was used based on the fact that all selected indicators can be considered equivalent to each other:

$$E_i = \frac{\sum X_i'}{n} \tag{3}$$

where *n* is the number of indicators taken into account, *i* is the segment of the study period and is equal {2013– 2019}.

The following synthetic indicators were used for the analysis of indicators of stimulation and disincentive of life quality: "chain growth rate of prosperity index" –  $T_{gr}^{Lp}$ , "chain growth rate of basic human needs index" –  $T_{gr}^{Lp}$ , "chain growth rate of welfare bases" –  $T_{gr}^{W_b}$ , "chain growth rate of availability of nutrition and basic health care" –  $T_{gr}^{A_m^n}$ , "chain growth rate of GDP per capita" –  $T_{gr}^{C_c}$ , "chain growth rate of population" –  $T_{gr}^p$ , "chain growth rate of global competitiveness index" –  $T_{gr}^{Lg}$ , "chain growth rate of personal security" –  $T_{gr}^{S_r}$ , "chain growth rate of access to basic knowledge" –  $T_{gr}^{A_bK}$ , "chain growth rate of global competitiveness" –  $T_{gr}^{S_r}$ , "chain growth rate of access to basic knowledge" –  $T_{gr}^{A_bK}$ , "chain growth rate of global competitivenes" –  $T_{gr}^{S_r}$ , "chain growth rate of access to basic knowledge" –  $T_{gr}^{A_bK}$ , "chain growth rate of global competitivenes" –  $T_{gr}^{S_r}$ , "chain growth rate of access to basic knowledge" –  $T_{gr}^{A_bK}$ , "chain growth rate of global competitivenes" –  $T_{gr}^{S_r}$ , "chain growth rate of access to basic knowledge" –  $T_{gr}^{A_bK}$ , "chain growth rate of global competitivenes" –  $T_{gr}^{S_r}$ , "chain growth rate of global competitivenes" –  $T_{gr}^{A_bK}$ ,

rate of unemployment"  $-T_{gr}^{R_U}$ , "chain growth rate of European quality of life index"  $-T_{gr}^{E_i}$ .

As a result of the application of the proposed methodology, standardized values of indicators and the European Quality of Life Index for Sweden (Table 2–3) and Ukraine (Table 4–5) were calculated.

## Results and their analysis.

Table 2.	Quality le	evel indicators	in Sweden.	2013-2019	(developed b	w the authors)
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Indicators	2013	2014	2015	2016	2017	2018	2019	min	max	max- min
ILP	77.62	77.61	77.43	77.43	79.20	79.15	79.10	77.43	79.2	1.77
Tgr %	-	-0.01	-0.23	0.00	2.29	-0.06	-0.06		-	
IA	63.61	94.59	94.83	95.42	95.36	96.34	96.39	63.61	96.39	32.78
$T_{qr,0/0}^{I\Delta}$	-	48.70	0.25	0.62	-0.06	1.03	0.05		-	,
Wb	61.73	84.71	86.43	88.61	90.40	88.31	89.88	61.73	90.40	28.67
Tgr %	-	37.23	2.03	2.52	2.02	-2.31	1.78		-	
$A_m^n$	61.52	98.26	99.42	99.43	99.46	98.57	85.84	61.52	99.46	37.94
Tgr %	-	59.72	1.18	0.01	0.03	-0.89	-12.91		-	
G <sub>c. S</sub>	44907	46408	48310	49836	51180	52984	47193	44907	52984	8077
Tgr %	-	3.34	4.10	3.16	2.70	3.52	-10.93		-	
D <sub>G</sub> ,% of GDP	39.8	44.6	42.9	41.7	40.7	38.8	37.7	37.7	44.6	6.9
T <sub>gr</sub> <sup>Dc</sup>	-	12.06	-3.81	-2.80	-2.40	-4.67	-2.84		-	
P, mln	9.645	9.747	9.851	9.995	10.120	10.230	10.330	9.645	10.33	0.685
$T_{gr,\%}^{P}$	-	1.06	1.07	1.46	1.25	1.09	0.98		-	
R <sub>U,%</sub>	8.0	7.9	7.4	7.0	6.7	6.3	6.8	6.3	8.0	1.7
Tgr,%	-	-1.25	-6.33	-5.41	-4.29	-5.97	7.94		-	•
I <sub>GC</sub>	5.48	5.41	5.43	5.53	5.52	5.50	5.50	5.41	5.53	0.12
T <sub>gr</sub> <sup>1</sup> <sub>Gc</sub> ,%	-	-1.28	0.37	1.84	-0.18	-0.36	0.00		-	
Sp	70.28	93.35	93.48	94.04	94.02	88.75	88.91	70.28	94.04	23.76
Tgr,%	-	32.83	0.14	0.60	-0.02	-5.61	0.18		-	
A <sub>bK</sub>	63.68	98.16	98.89	95.68	95.04	92.82	92.37	63.68	98.89	35.21
Tgr <sup>AbR</sup> ,%	-	54.15	0.74	-3.25	-0.67	-2.34	-0.49		-	
E	45.61	60.42	71.54	92.68	92.81	84.29	84.55	45.61	92.81	47.20
$T_{gr,0/0}^{E}$	-	32.47	18.40	29.55	0.14	-9.18	0.31		-	

According to the Table 2 the value of indicator  $I_{LP}$  in 2013 was 77.62, it had the trend of increasing and in 2017 gained maximal value, in 2018 it was 79.15, in 2019–79.10. The same pattern can be found in the change of other indicators:  $W_b$  increased from 61.73 in 2013 to 90.40 in 2017, in 2018 indicator  $T_{gr}^{W_b}$  was equal –2.31, in 2019 was equal 1.78;  $T_{np}^{A_{bK}}$  reached a significant value 54.15%, but since 2016 it ranged –3.25 to –0.49;  $S_P$  in 2013 was equal to 70.28, then gained maximal value 94.04 in 2016, and decreased in 2018 to 88.75, and increased to 0.18 in 2019.

The indicator  $A_m^n$  has changed most significantly: in 2013 it was 61.52, in 2014–98.28, and indicator  $T_{np}^{A_m^n}$  was 59.72, and during 2014–2017 remained almost unchanged, gaining a value of –0.89 in 2018, and 12.91 in 2019.

These indicators have affected the value of indicator P. Despite some reductions in previous indicators, the indicator  $T_{gr}^{P}$  constantly increased and in 2016 has gained maximal value – 1.46%, that indicator P in 2013 was 9.645 million people, and in 2019–10.330 million people.

The positive dynamics can be seen in the growth of the indicator  $G_c$  from 44907 USD in 2013 to 52984 USD in 2018 (the value of indicator  $T_{gr}^{G_c}$  has reached the maximal value in 2015–4.10), but the value of the indicator  $G_c$  in 2019 was 47193 USD and it affected the indicators  $T_{gr}^{G_c} = -10.93$ . The indicator  $D_c$  changed as follows: in 2013–39.8% to GDP, in 2014 has gained maximal value 44.6% to GDP, in 2019 decreased by 37.7% to GDP, which contributed to a decrease in the score of indicator  $R_u$  to 1.7% and increasing  $I_{Gc}$ (maximal value in 2016–5.53, in 2018 and 2019–5.50).

In this regard, the increase in the indicator  $I_{\Delta}$  was explained: in 2013 it was 63.61, in 2014–94.59, and in 2019 has gained maximal value – 96.39.

According to the Table 3 indicators are defined, summarized by a standardized value  $E_i$ , show dynamics to improve life quality index from 0.48 in 2013 to 0.89 in 2017 due to rising socioeconomic indicators, which indicates a better quality of life. Although, in 2019 the value of the indicator  $E_i=0.83$  which indicates a slight decrease in the life quality in Sweden.

Indicators	2013	2014	2015	2016	2017	2018	2019
ILP	0.94	0.94	0.93	0.93	1.00	1.00	1.00
$I_{\Delta}$	0.38	0.97	0.97	0.98	0.98	1.00	1.00
Wb	0.41	0.88	0.92	0.96	1.00	0.96	0.99
Am	0.14	0.97	1.00	1.00	1.00	0.98	0.69
GC	0.82	0.85	0.90	0.93	0.96	1.00	0.87
DG	0.95	0.84	0.88	0.91	0.93	0.97	1.00
Р	0.00	0.00	0.01	0.01	0.01	0.02	0.02
R <sub>U</sub>	0.50	0.53	0.68	0.79	0.88	1.00	0.85
IGC	0.97	0.92	0.93	1.00	0.99	0.98	0.98
Sp	0.41	0.98	0.99	1.00	1.00	0.87	0.87
Abk	0.10	0.98	1.00	0.92	0.90	0.84	0.83
Е	0.16	0.42	0.62	1.00	1.00	0.85	0.85
Ei	0.48	0.77	0.82	0.87	0.89	0.87	0.83

Table 3. Standardized values of living quality indicators in Sweden, 2013–2019 (developed by the authors)

According to the calculations given in the Table 4, the value of the indicator *P* during 2013–2019 has a tendency to a constant decline:  $T_{gr}^{P}$  in 2014 it was 5.49%, in 2019–0.75%. The reason for this was the instability of values  $S_{P}$  (in 2014 was 57.48, in 2016–61.05, in 2019–58.83) and indicator  $A_{bK}$ : the value of indicator  $T_{gr}^{A_{bK}}$  in 2014 was 63.03%, in 2016–0.81%, in 2018 indicator was -8.46%). Educational reforms implemented during 2013–2019 negatively affected the quality of educational services and caused

dissatisfaction among the population, but the results of the study period indicate that education in Ukraine remains at a fairly high level.

An equally important indicator, which affects the decrease of P is  $R_{U}$ : the level of value of this indicator ranges 7.2–9.7%. The reduction of the number of industrial enterprises, and as a consequence – the reduction of jobs, the inability to maintain their own families – all this has led to a decrease in fertility and labor migration of young people.

Table 4. Quality level indicators in Ukraine, 2013–2019 (developed by the authors)

Indicators	2013	2014	2015	2016	2017	2018	2019	min	max	max-min
ILP	54.08	53.53	52.74	52.59	53.65	53.96	53.90	52.59	54.08	1.49
T_FT_,%	-	-1.02	-1.48	-0.28	2.02	0.58	-0.11		-	
$I_{\Delta}$	43.65	77.98	78.28	81.23	79.91	81.93	81.92	43.65	81.93	38.28
$T^{\Delta}_{\mathrm{sp},0/0}$	-	78.65	0.38	3.77	-1.63	2.53	-0.01		-	
Wb	41.93	61.42	61.74	64.29	68.62	64.03	64.22	41.93	68.62	26.69
$T_{gr}^{W_b}$ ,%	-	46.48	0.52	4.13	6.74	-6.69	0.30			

Indicators	2013	2014	2015	2016	2017	2018	2019	min	may	max_min
mulcators	2013	2014	2015	2010	2017	2018	2019		Шал	IIIax-IIIII
$A_m^n$	55.47	95.11	97.84	97.99	98.47	92.87	55.56	55.47	98.47	43.00
T <sup>AI</sup> ,%	-	71.46	2.87	0.15	0.49	-5.69	-40.17		-	
G <sub>C,\$</sub>	8676	8733	7996	8305	8754	9283	7906	7906	9283	1377
Ter,%	-	0.66	-8.44	3.86	5.41	6.04	-14.83		-	
D <sub>G</sub> ,% of GDP	40.50	70.03	79.30	81.20	71.90	63.90	49.50	40.50	81.20	40.70
T_Er_,%	-	72.91	13.24	2.40	-11.45	-11.13	-22.54		-	
P, mln	45.246	42.760	42.591	42.501	42.217	42.047	41.733	41.733	45.246	3.513
T <sup>P</sup> ,%	-	-5.49	-0.40	-0.21	-0.67	-0.40	-0.75		-	
R <sub>U,%</sub>	7.20	9.30	9.10	8.80	9.70	9.00	8.50	7.20	9.70	2.50
TEr,%	-	29.17	-2.15	-3.30	10.23	-7.22	-5.56		-	
I <sub>GC</sub>	4.05	4.14	4.03	4.00	4.11	4.10	4.00	4.00	4.14	0.14
T_gr,%	-	2.22	-2.66	-0.74	2.75	-0.24	-2.44		-	
Sp	53.92	57.48	57.96	61.05	57.32	57.68	58.83	53.92	61.05	7.13
T <sup>5</sup> ,%	-	6.60	0.84	5.33	-6.11	0.63	1.99		-	
A <sub>bK</sub>	59.89	97.64	97.76	96.97	97.52	89.27	89.25	59.89	97.76	37.87
TET %	-	63.03	0.12	-0.81	0.57	-8.46	-0.02		-	
E	44.63	39.13	36.73	44.44	50.37	39.48	40.46	36.73	50.37	13.64
T_5,%	-	-12.32	-6.13	20.99	13.34	-21.62	2.48		-	

The low level of the indicator E:  $T_{gr}^{E}$  in 2014 was -12.32%, in 2016 was 20.99%, in 2018 --21.62%, in 2019 was 2.48. It indicates to a negative impact on the health of the population and also leads to a decrease in value P, even at a sufficiently high level of the indicator  $A_{m}^{n}$ : till 2018 there was an increase in values, and in 2017 the metric reached its maximal value - 98.47, in 2018 – decreased to 92.87, in 2019 – decreased to 55.56. Decreasing the indicator  $A_{m}^{n}$  was due to the poor-quality reforms of the Ministry of Health of Ukraine and low qualification of medical personnel.

Despite the fact that there is an increase in the index  $G_c$ : only in 2015 the indicator  $T_{np}^{G_c}$  was -8.44%, compared to Sweden in Ukraine the indicator  $G_c$  remains at the low level, but a decrease of the indicator  $D_c$  from 2017 (in 2013 the indicator was 40.50% to GDP, in 2016 it has gained maximal value - 81.20% to GDP, in 2017-71.90% to GDP, in 2019-49.50% to

GDP) was probably caused by the devaluation of the national currency.

Thus, against the background of an indicator  $I_{\Delta}$  that had grown (only in 2017 the indicator  $T_{E'}^{\Delta}$ , was -1.63%, in 2018 it was equal to its maximum during the study period – 81.93, but in 2019 there was a slight decrease of indicator to 81.92), but in 2018 the indicator  $W_{b}$ declined sharply ( $T_{np}^{W_{b}}$  in 2014–46.48%, in 2018 – -6.69%, in 2019–0.30), the indicator  $I_{GC}$  almost didn't change (during the study period, the minimal value is 4.00, and maximal – 4.14).

All previous indicators affected the value of indicator  $I_{LP}$ , the values of which also, as in the previous indicators, decline, increasing only by 2017 ( $T_{gr}^{LP}$  in 2015 – -1.48%, in 2017 – 2.02%), which is likely to be associated with a small recovery in values  $A_{bK}$  and  $A_m^n$ . The value of the indicator  $A_m^n$  critically decreased from 92.87 in 2018 to 55.56 in 2019.

Indicators	2013	2014	2015	2016	2017	2018	2019
ILP	0.06	0.04	0.01	0.00	0.04	0.05	0.05
$I_{\Delta}$	0.00	0.65	0.66	0.71	0.69	0.73	0.73
Wb	0.00	0.40	0.41	0.46	0.55	0.46	0.46
Am	0.00	0.90	0.96	0.97	0.98	0.85	0.00
GC	0.02	0.02	0.00	0.01	0.02	0.03	0.00
D <sub>G</sub>	0.94	0.26	0.04	0.00	0.21	0.40	0.73
Р	1.00	0.93	0.93	0.92	0.91	0.91	0.90
Ru	0.74	0.12	0.18	0.26	0.00	0.21	0.35
I <sub>GC</sub>	0.03	0.09	0.02	0.00	0.07	0.07	0.00
Sp	0.00	0.09	0.10	0.18	0.08	0.09	0.12
AbK	0.00	0.97	0.97	0.95	0.96	0.75	0.75
Е	0.14	0.04	0.00	0.14	0.24	0.05	0.07
Ei	0.24	0.38	0.36	0.38	0.40	0.38	0.35

Table 5. Standardized values of living quality indicators in Ukraine, 2013–2019 (developed by the authors)

The data given in the Table 5, show the main problems of Ukraine in recent years, such as a decline in the prosperity index of the country, a decline in GDP per capita, a decrease in population, and deteriorating ecosystem status. The reasons for this decline in the social and economic life of the country were the unstable political situation in eastern Ukraine, the worsening of foreign relations with Russia and the loss of markets, the weakening of the country's position in the world market. However, the negative factors have given impetus to raising the level of basic human needs and availability of nutrition and basic medical care, which shows the  $E_i$  indicator, which during 2013–2019 showed both negative and positive dynamics of the country's development. As of 2019, the value of indicator  $E_i$ was 0.35 (Fig. 1). The results of statistical evaluation of indicators in 2013–2019 are shown in the Table 6.



Fig. 1. Dynamics of the standardized values of European life quality index, 2013–2019 (developed by the authors)

Indicators	min	max	max-min	coefficient of variation
ILP	52.59	79.20	26.61	19.51
IΔ	43.65	96.39	52.74	18.08
Wb	41.93	90.40	48.47	20.88
Am	55.47	99.46	43.99	19.38
GC	7906	52984	45078	73.18
D <sub>G</sub>	37.70	81.20	43.50	30.86
Р	9.645	45.246	35.601	64.52
R <sub>U</sub>	6.30	9.70	3.40	13.78
I <sub>GC</sub>	4.00	5.53	1.53	15.48
Sp	53.92	94.04	40.12	23.55
A <sub>bK</sub>	59.89	98.89	39.00	13.86
Е	36.73	92.81	56.08	36.41
Ei	0.24	0.89	0.65	43.28

Table 6. The results of statistical evaluation of indicators of Sweden and Ukraine for 2013–2019 (developed by the authors)

The results of a statistical study show that the biggest differences between the two countries are observed in such indicators as "GDP per capita", "population", "ecosystem status". Given the relatively high correlation between the index of sustainable development goals and the proposed index (>0.7), it should be argued that there is a close interaction. Considerable attention in Ukraine should be paid, accordingly, to the issue of restoring the country's economic potential, as well as the protection of the natural environment.

#### **Conclusion.**

The proposed methodology is universal and provides an opportunity to determine the life quality

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index for any country, and its application allows to conduct rapid diagnostics and identify trends of further changes in the quality of life of the population. Also, this methodology allows for a comparative analysis of quality of life for selected countries and made it possible to compare the results obtained in dynamics. It is worth adding that the high population life quality is an indicator of sustainable development of the country. That is why active cooperation of the government of the country and the citizens is needed in order to support their own production, improve the infrastructure and create attractive living and working conditions for the population.

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