Environmental end mathematical model of united communities' (UTC) sustainable development

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SUMMARY

It has been illustrated that among the most important environmental and economic instruments of environmental protection in Ukraine are the environmental tax and the environmental pollution fee. It has been proved that emissions have recently decreased according to the analysis results of the environmental pollution fee dynamics. It has been confirmed that the growth of the environmental tax revenue in local budgets in 2015 was due to the beginning of decentralization and changes in the Tax Code. It has been defined that the slowdown in the environmental tax revenue growth rate in local budgets is caused by inefficient system of united territorial communities` (UTG) budgets and local budgets` pumping up. It has been proved that the rate of national budget funding is ebbed accompanied by the growing funding from local budgets. This gave grounds to claim that the established UTCs have a more balanced approach to environmental policy and the need to fund environmental activities. The analysis of the dynamics and sources of environmental capital and current investment funding have revealed that capital investment in environmental activities is unstable, without radical changes in national environmental situation. It has been proved that the growth rate of current investment is insignificant and equals the inflation rate, which reduces its economic efficiency.

Introduction

In the context of decentralizing governance, the issue of territorial sustainable development needs to be solved. It is based on both economic and social components, and environmental one too. Thus, there is a need for the formation of organizational and economic mechanisms and regulators of the process of environmental policy in Ukraine amid decentralizing governance. That is why the issue of territorial environmental funding and management is worth serious consideration.

Method

In the analysis, general-scientific methods (analysis and synthesis, induction and deduction) and special methods of phenomena and processes analysis (abstraction, econometric and econometric-mathematical modelling) have been used.

Results

National sustainable development cannot be ensured without creating conditions for sustainable development of its administrative-territorial units. That is why there is a need to build the model of united territorial communities` (UTCs) sustainable development. The main components of this model, in our opinion, are economic, social and environmental components.

One of the most important environmental and economic instruments of environmental protection in Ukraine is the environmental tax and pollution fee (the system of relevant funds formed on its basis). Tables 1 - 2 show the data on the dynamics of environmental tax and pollution fee revenues in the budgets of different levels in Ukraine during 2012 - 2018.

Table 1 *Environmental tax and pollution fee revenues in the budgets of different levels in Ukraine*

Year	Environmental tax (consolidated budget), million UAH	Environmental tax (national budget), million UAH	Environmental tax (local budget), million UAH	Pollution fee (consolidated budget), million UAH
2012	2816,00827795	1263,5661176	1552,4431603	42,6976062
2013	3899,48699600	2364,9265094	1534,5604870	16,9346611
2014	4830,90870700	3614,4809841	1216,4277230	6,21910521
2015	2691,04014100	1105,4138181	1585,6263232	8,72057723
2016	4987,43524500	1619,1701273	3368,2651186	11,98535279
2017	4698,43846100	1720,7890443	2977,6494168	1,94888500
2018	4921,50361100	2779,6176683	2141,8859433	1,02112770

Table 2 *Dynamics of environmental tax and pollution fee revenues in the budgets of different levels in Ukraine*

Year	Growth rate of environmental tax (consolidated budget), %	Growth rate of environmental tax (national budget), %	Growth rate of environmental tax (local budget), %	Growth rate of a pollution fee (consolidated budget), %
2013	138,48	187,16	98,85	39,66
2014	123,89	152,84	79,27	36,72
2015	55,70	30,58	130,35	140,22
2016	185,33	146,48	212,42	137,44
2017	94,21	106,28	88,40	16,26
2018	104,75	161,53	71,93	52,40

The analysis of the above data shows that during 2015 – 2016, there was acceleration of the growth rate of the pollution fee; during 2017 – 2018, it significantly ebbed. This may be the evidence of the emissions` recent contraction. Environmental tax rates increased during 2014 – 2018; they grew on 01.04.2014, 01.01.2016, 01.01.2017 and 01.01.2018. The revenue growth rates of consolidated and national budget fully correspond to these periods. The boost of total environmental tax revenue in local budgets in 2015 can be explained by the beginning of decentralization and the Tax Code

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adjustments. Table 2 demonstrates that there is slowdown in growth rate of environmental tax revenue in local budgets during 2017 – 2018. We consider, this can be explained by the current inefficiency of UTCs and local budgets` pumping up, as most communities do not have big polluting enterprises on their territory and, accordingly, they lack the revenue source.

Table 3 analyzes the dynamics of environmental protection expenditure changes.

Table 3 *Dynamics of budget environmental protection expenditure changes, million UAH*

Year	Budget environmental protection expenditure	Growth rate, %	National budget environmental protection expenditure	Growth rate of national budget expenditure,%	Local budgets environmental protection expenditure	Growth rate of local budgets expenditure, %
2007	2241,3		1809,1		432,2	
2008	2764,7	123,35	2230,2	123,28	534,5	123,67
2009	2538,8	91,83	1824,3	81,80	714,5	133,68
2010	2872,4	113,14	2292,7	125,68	579,7	81,13
2011	3890,7	135,45	3008,40	131,22	882,30	152,20
2012	5297,9	136,17	4135,40	137,46	1162,50	131,76
2013	5594,2	105,59	4595,00	111,11	999,20	85,95
2014	3481,7	62,24	2597,00	56,52	884,70	88,54
2015	5529,7	158,82	4053,00	156,06	1476,70	166,92
2016	6255,4	113,12	4771,60	117,73	1483,80	100,48
2017	7349,3	117,49	4739,90	99,34	2609,30	175,85

Table 4 analyzes the dynamics and sources of funding of capital and current investment in environmental protection.

As one can see, the growth rates of capital investment are volatile; the slowdown was observed in 2013, 2015 and 2017, acceleration, on the contrary, in 2014 and 2016. This approach cannot be considered systemic and, as a result, there is lack of radical changes in the environmental situation in the country.

The rates of current investment have been increasing since 2015, but not significantly, at the official inflation rate, which reduces their economic efficiency.

Tables 6 and 7 analyze the structure of the funding sources of environmental capital and current investment.

As one can see, the largest share of total investment belongs to the equity capital. Growth of another source share during 2011-2013 can be explained by the international financial assistance for environmental activities. The share of national budget expenditures has been declining in recent years and amounted to only 3.5% in 2017. Nevertheless, in the past few years, the share of local budgets` funding has slightly increased. The obtained results confirmed the conclusions made about the ineffectiveness of environmental national policy of capital investment.

Table 7 demonstrates that both capital investment and current investment originate from equity capital. If capital investment is funded by businesses at 40-50%, then current investment is covered at 95% on average. Another source is not significant for current investment (less than 1%). Public funding of current investment is also not significant – at about 2%. Current financing from local budgets is even of less importance.

Thus, among the issues which could be solved due to the managerial impact are the following: improvement of environmental tax mechanisms (it is received only by UTCs with big industrial enterprises located in their territories); introduction of the mechanism of united territorial communities` environmental tax revenue accumulation aimed at their efficient application for purpose; ensuring the receipt of the part of national standing subsurface use tax into UTCs budgets, as subsurface use causes environmental damage at the local level; introduction of a number of taxes,

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namely a) for businesses managing waste disposal or storage facilities located within a community, b) for the use of natural resources of local standing - forest and water resources, mining of local importance (sand, gravel) , fertile soil, peat, etc.), if they are exported outside the district.

Table 4 *Dynamics and sources of funding of capital investment in environmental protection, million UAH*

Year	Capital investment in environmental protection	Growth rate, %	i.a. from national budget	i.a. from local budgets	i.a. equity capital	i.a. form another source	Local budgets and another source together
2007	3080,7		297,90	357,50	2291,50	133,80	491,30
2008	3731,4	121,12	707,80	569,90	2269,00	184,70	754,60
2009	3040,7	81,49	276,40	346,70	2325,90	91,70	438,40
2010	2761,500	90,82	240,50	261,30	2145,10	114,60	375,90
2011	6451,035	233,61	285,00	347,60	4297,60	1520,80	1868,40
2012	6589,300	102,14	89,50	371,50	3893,00	2235,30	2606,80
2013	6038,800	91,65	78,70	350,20	3593,50	2016,40	2366,60
2014	7959,900	131,81	39,80	no data	3924,54	no data	3995,56
2015	7675,600	96,43	314,70	no data	2692,25	no data	4668,65
2016	13390,500	174,46	374,93	no data	3896,90	no data	9118,67
2017	11025,600	82,34	385,90	no data	5132,10	no data	5507,60

Table 5 *Dynamics and sources of funding of current investment in environmental protection, million UAH*

Year	Current investment in environmental protection	Growth rate, %	i.a. from national budget	i.a. from local budgets	i.a. equity capital	i.a. form another source	Local budgets and another source together
2007	6610,30		146,00	58,10	6386,60	19,60	77,70
2008	8444,60	127,75	200,90	68,60	8144,50	30,60	99,20
2009	8032,70	95,12	250,40	75,50	7699,30	7,50	83,00
2010	10366,60	129,05	280,20	93,20	9983,10	10,10	103,30
2011	12039,40	116,14	314,30	113,00	11598,80	13,30	126,30
2012	13924,70	115,66	343,20	116,10	13452,40	13,00	129,10
2013	14339,10	102,98	375,80	137,50	13815,50	10,30	147,80
2014	13965,70	97,40	279,31	no data	13509,18	no data	177,21
2015	16915,50	121,12	304,48	no data	16382,10	no data	228,92
2016	19098,20	112,90	553,85	no data	18172,70	no data	371,65
2017	20466,40	107,16	470,73	no data	19114,50	no data	881,17

Conclusions

The study proves that country`s sustainable development cannot be ensured without building conditions for sustainable development of its administrative-territorial units on the basis of the model, having economic, social and environmental components. It has been illustrated that among the most important environmental and economic instruments of environmental protection in Ukraine are the environmental tax and the environmental pollution fee.

The necessity of developing methodological approaches to substantiate effective trends of national policy implementation in the field of environmental protection for UTCs, recommendations on their scientific support, elaboration of the set of instruments for their implementation and improvement of current organizational and legal framework have been proved. Analysis of dynamics and funding sources of capital and current investment in environmental protection has been carried out. It has been

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demonstrated that the dynamics of capital investment growth is unstable, as a result there are no radical changes in the national environmental situation. It has been found out that the growth rates of current investment are insignificant, almost coincide with the official inflation rate, which reduces its economic efficiency. The analysis of the structure of funding sources of capital and current investment in environmental activities has been made. The obtained results have confirmed the conclusions made about national policy ineffectiveness referring to capital investment in environmental protection activities.

Table 6 *Structure of funding sources of environmental capital investment*

Year	Share of national budget in total capital investment, %	Share of local budgets in total capital investment, %	Share of equity capital in total capital investment, %	Share of another source in total capital investment, %	Share of local budgets and another source together in total capital investment, %
2007	9,67	11,60	74,38	4,34	15,95
2008	18,97	15,27	60,81	4,95	20,22
2009	9,09	11,40	76,49	3,02	14,42
2010	8,71	9,46	77,68	4,15	13,61
2011	4,42	5,39	66,62	23,57	28,96
2012	1,36	5,64	59,08	33,92	39,56
2013	1,30	5,80	59,51	33,39	39,19
2014	0,50	no data	49,30	no data	50,20
2015	4,10	no data	35,08	no data	60,82
2016	2,80	no data	29,10	no data	68,10
2017	3,50	no data	46,55	no data	49,95

Table 7 *Structure of funding sources of environmental current investment*

Year	Share of national budget in total current investment, %	Share of local budgets in total current investment, %	Share of equity capital in total current investment, %	Share of another source in total current investment, %	Share of local budgets and another source together in total current investment, %
2007	2,21	0,88	96,62	0,30	1,18
2008	2,38	0,81	96,45	0,36	1,17
2009	3,12	0,94	95,85	0,09	1,03
2010	2,70	0,90	96,30	0,10	1,00
2011	2,61	0,94	96,34	0,11	1,05
2012	2,46	0,83	96,61	0,09	0,93
2013	2,62	0,96	96,35	0,07	1,03
2014	2,00	no data	96,73	no data	1,27
2015	1,80	no data	96,85	no data	1,35
2016	2,90	no data	95,15	no data	1,95
2017	2,30	no data	93,39	no data	4,31