

1. Economic Disparities for the Territorial Administrative Units Bordering the Sulina Branch Based on the Analysis of Endogenous Economic Factors

BALAIKAN Dragoș, NICHERSU Iulian, NICHERSU Iuliana, SIMIONOV Matei, TUDOR Marian

Danube Delta National Institute for Research and Development: 165 Babadag street, Tulcea – 820112, Romania; e-mail: office@ddni.ro

E-mail address for correspondence: dragos.balaican@ddni.ro

Abstract: Danube Delta is a place where the environment, economic activities, traditions and culture form the identity of the place. Changes in the development of economic activities are determined by seasonal dynamics, directly influencing the daily life of the inhabitants in the area. This aspect also contributed to a demographic decline of local communities and the emergence of significant disparities between the administrative territorial units. This study presents the statistical analysis on a series of endogenous economic factors related to the administrative territorial units bordering Sulina branch (Maliuc, Crisan and Sulina). In order to calculate the regional development grade and to highlight the local economic disparities, a series of performance indicators based on endogenous economic-financial factors were identified as follows:

- Availability of productive capital based on capital and labor
- Employed population interpreted by labor force
- The quality of human capital interpreted according to labor and investment
- Public spending on infrastructure based on the public capital factor and at the same time influencing private physical capital

The endogenous factors selected to be interpreted in this analysis highlighted differences in the evolution of the studied territorial administrative units. These differences were not related to the geographical location, area or population.

Keywords: Danube Delta, endogenous factors, economic disparities, sustainability

INTRODUCTION

After 1965 and especially after 1968-1970, the typical delta phenomenon is demographic decline, determined by a sharp decrease in the local capacity to use human potential and the migration of the population to industrialized urban centers - especially Tulcea. Therefore, the Delta becomes an excess area, some localities such as Uzlina disappearing, and most of them diminishing their population 2-3 times (Blanovschi 2014).

Danube Delta is perhaps one of the least inhabited regions of temperate Europe, with only about 10,000 people in one town (Sulina) and about 20 scattered villages. Life for the residents of the core Delta is challenging and access to essential social and economic services is limited.

Acute isolation and harsh conditions of living, based mainly on subsistence characterize the Delta. Water transport is often the only option to reach and travel from destinations in the core Delta. The area has lower access to basic services, such as piped water and sewerage, than the neighbouring rural areas (***** 2014).

Regional development is the result of both exogenous factors and especially of endogenous ones. their impact being different in time and space. From a chronological point of view, exogenous factors are especially important in the early stages of regional growth, their effects being relatively difficult to estimate and control. In the later stages of actual development, the importance of regional endogenous factors increases significantly, being also influenced by the quality of technologies, regional supply (export), and demand (ability to attract domestic and foreign capital, work, etc.).

Generally, the instruments of a sustainable economic growth are materialized in the promotion of activities that involve innovation and creativity, the continuous training of the highly qualified workforce, the result of professional education, the existence of an adequate infrastructure for the requirements (Zaman, et al. 2015).

In this study, the territorial administrative units bordering the Sulina branch were chosen to be statistically analysed. These are Maliuc, Crişan, and Sulina (Figure 1).

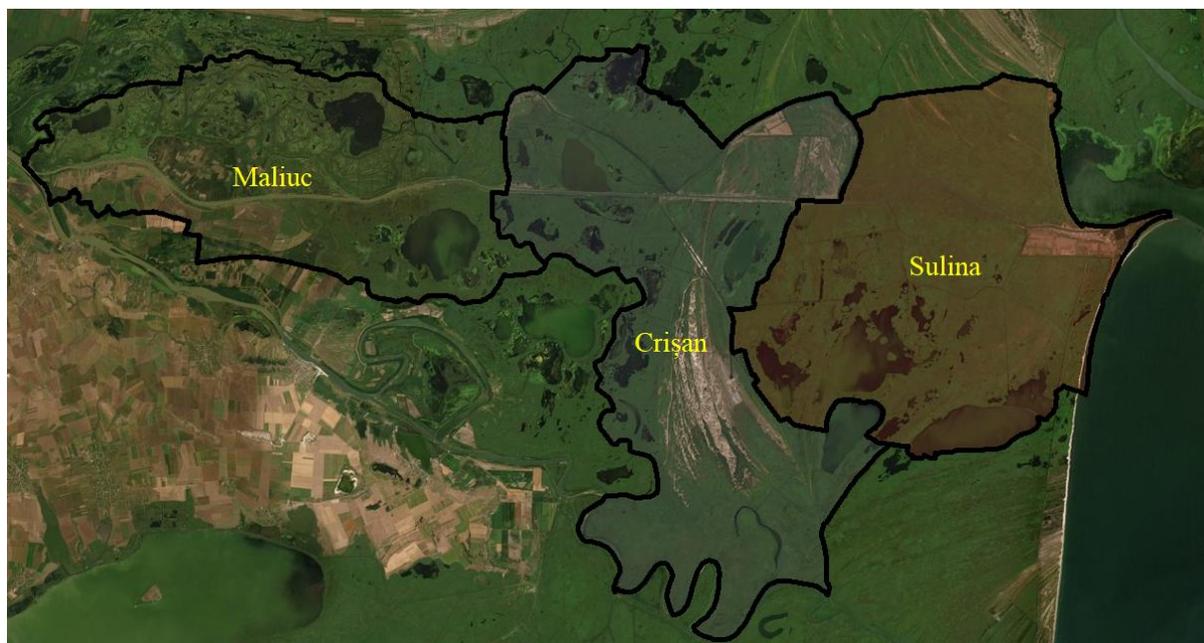


Figure 1. Geographical positioning of the 3 studied ATU's

The administrative territorial unit Maliuc includes the localities of Gorgova, Ilgani de Sus, Maliuc (residence), Partizani and Vulturu; has a population of 889 people on January 1, 2020 and an area of 263.72 km². The administrative territorial unit Crişan consists of the villages Caraorman, Crişan (residence) and Mila 23; has a population of 1134 people on January 1, 2020 and an area of 380.7 km². The administrative territorial unit Sulina includes only the city of Sulina; has a population of 3830 people on January 1, 2020 and an area of 327.3 km².

Endogenous development incorporates the idea of a flexible economy, able to adapt to the external environment and is an alternative to the economy based on large units (this type of development based on large units depends on the power to plan and predict the future). Endogenous development can generate economic growth and achieve high productivity (Antonescu 2015)

The endogenous factors used in this study are:

- Capital is an economic category that includes all stable sources of financing, which by association with other factors of production (nature and labor) participate in the realization of new economic goods, in order to obtain profit (Carp and Toma 2019).
- Labor Force Labor itself is the process of producing the goods necessary to meet the growing needs of men, and labor force is the totality of physical and intellectual skills that exist in the body, in the living personality of human, and which he puts into operation when he creates goods of some kind (Blanovschi 2014).
- Public capital is a form of physical capital, corresponding to communication and transport infrastructures, the result of investments made by the central and local state administration. Public capital also includes investments in the education sector and all research (Zaman, et al. 2015).

- Investment. According to studies quoted by René A. Hernández in Neoclassical and Endogenous Growth Models: Theory and Practice regions “high growth rates are entirely due to increasing investment, higher labour participation and improvements in labor’s skills” (Hernández 2003).

In order to calculate the degree of regional development and to highlight the local economic disparities, a series of performance indicators based on the selected endogenous economic-financial factors were identified as follows:

- Availability of productive capital determined on the basis of capital and labor force
- Employed population interpreted by the endogenous factor labor force
- The quality of human capital interpreted by labor force and investment factors
- Public spending on infrastructure based on the public capital factor

In order to define and calculate some of the performance indicators, the Lucas model was taken into account (Lucas 1988).

The economic growth model, developed by Lucas (1988), focuses on the fact that investments in human capital lead to the spread of growth technological and not those in physical capital.

The economic growth model developed by Lucas (1988) has the function of production shaped as follow: $Y = K\alpha(hL)^{1-\alpha}$

where: Y = income; K- physical capital; h- human capital per inhabitant

The evolution of human capital has the formula:

$$\delta h = (1-y) h$$

in which: y = time allocated for work;

1-y= time allocated for professional development

Time allocated for professional development (1-y) has the consequence of increasing the rate of increase in human capital, respectively $(1-y) = \delta h/h$ and also increasing income.

MATERIALS AND METHODS

For the Availability of productive capital, the labor productivity ratio was calculated based on the factors Turnover of active enterprises and the Average number of employees for the three territorial administrative units, the data available was collected for 2016, 2017, and 2018. The indicator had the following formula:

$$\text{Labor productivity ratio} = \frac{\text{Turnover of active enterprises}}{\text{Average number of employees}}$$

For the employed population, the data available for the indicators Average number of employees and Active population were used (age groups between 20 and 65 years were selected from the total population by residence on January 1)

The employed population is one of the most important potential factors of endogenous growth at the regional or county level. The analysis on the evolution of the employed population by counties in Romania, highlights a series of aspects and problems that must be taken into account by decision-makers in general, those in the field of labor market and employment policies, in particular (Zaman, et al. 2015).

The employed population performance indicator has the following formula:

$$\text{Employed population} = \frac{\text{Average number of employees} * 100}{\text{Active population}}$$

The performance indicator quality of human capital was calculated based on the report between Expenditures for education from the local budget per financial year (data available for the years 2016 and 2017) and Total expenditures (execution of the local budget).

The Lucas model emphasizes the idea that the engine of endogenous economic growth is the accumulation of human capital, individual productivity depending on the productivity of the team in which it operates. (Lucas 1988)

The report has the next formula:

$$\text{quality of human capital} = \frac{\text{Expenditures for education from the local budget per financial year} * 100}{\text{Total expenditures}}$$

Public capital is a form of physical capital, corresponding to communication and transport infrastructures, the result of investments made by the central and local state administration. Public capital also includes investments in education and research sector. The engine of endogenous growth is represented by public investments in infrastructure which becomes a factor of production, a source of accumulation. (Zaman, et al. 2015);

The Public Expenditure on Infrastructure indicator was highlighted by the public capital factors provided by TULCEA County Statistics Directorate for the three administrative territorial units, reported to 10 equivalent inhabitants: Total length of the simple drinking water distribution network/km;

Amount of drinking water distributed to consumers / thousand cubic meters; The amount of drinking water distributed to consumers / thousand cubic meters; The amount collected of household and assimilated waste/kg.

For better graphical highlighting and to use a common denominator for the three units of different sizes as area, population, and component localities, the analysis presents results reported to 10 equivalent inhabitants (e.i.) (Figure 4, Figure 5, Figure 6). All data available is presented in Romanian LEU(RON), the national currency. The formula for reporting to 10 e.i is as follow:

$$x = \left(\frac{\text{Endogenous factor}}{\text{Total ATU population}} \right) * 10$$

The statistical data available on different indicators for the three administrative territorial unit (ATU) were obtained from TULCEA County Directorate of Statistics (Figure 2). From these data, initial tables with raw data (Figure 3) were prepared for the performance indicators selected as representative in the analysis based on the representative endogenous factors.

AN REFERINTA	LOCALITATE	DOMENIU	INDICATOR	CRITERIU	UM	VAL_INDICATOR
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - Total	Numar persoane	952
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - Total	Numar persoane	527
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - Total	Numar persoane	425
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 0- 4 ani	Numar persoane	30
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 0- 4 ani	Numar persoane	15
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 0- 4 ani	Numar persoane	15
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 5- 9 ani	Numar persoane	24
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 5- 9 ani	Numar persoane	13
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 5- 9 ani	Numar persoane	11
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 10-14 ani	Numar persoane	56
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 10-14 ani	Numar persoane	28
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 10-14 ani	Numar persoane	28
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 15-19 ani	Numar persoane	47
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 15-19 ani	Numar persoane	25
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 15-19 ani	Numar persoane	22
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 20-24 ani	Numar persoane	48
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 20-24 ani	Numar persoane	24
2016	MALIUC	Populație	POP 107D - POPULATIA DUPA DOMICILIUL la 1 ianuarie pe grupe de varsta si sexe	Grupe de varsta - 20-24 ani	Numar persoane	24

Figure 2 Sample of data provided by TULCEA County Statistics Directorate

MALIUC							
Capital	Venituri totale la bugetul local (Lei)	Capacitatea de cazare turistica existenta/focuri	Locuințe existente la sfârșitul anului	Numărul întreprinderilor active	Cifra de afaceri a întreprinderilor active	TURISM+REG HOTELIER	AGRICULTURA
2016	3370187	180	551	20	4284655	3777902	109055
2017	2071947	180	551	21	4571985	2965626	915555
2018	3636779	323	551	25	8294991	4921270	2723224
Infrastructura	Lungimea totală a rețelei simple de distribuție a apei potabile/km	Cantitatea de apă potabilă distribuită consumatorilor/mii	Lungimea totală simplă a conductelor de canalizare/km	Cantitatea colectată de deșeuri menajere și asimilabile/kg			
2016	11,00	18	2	78224			
2017	9,50	17	2	236720			
2018	9,50	22	2	94530			
Forța de muncă	Numar mediu de salariați	POPULATIA DUPA DOMICILIUL	Someri înregistrați la sfârșitul anului	Ponderea somerilor înregistrați la sfârșitul anului în totalul		Investiții	Cheltuieli totale cu investițiile de la bugetul
2016	106	952	26	4,10		2016	5608134
2017	122	945	28	4,50		2017	122913
2018	134	927	12	1,90		2018	2134685

Figure 3 Initial tables with raw data for the selected indicators - Maliuc

Maliuc								
	2016	2017	2018	/ 10 equivalent inhabitants	2016	2017	2018	
Total populations	952	945	927					
Total accomodation capacity [vacancy]	180	180	323			1.89	1.90	3.48
Total number of households	551	551	551			5.79	5.83	5.94
Number of local businesses	20	21	25			0.21	0.22	0.27
Employed	106	122	134			1.11	1.29	1.45
Unemployed	26	28	12			0.27	0.30	0.13
Water supply network length [km]	11	9.5	9.5			0.12	0.10	0.10
Annual water consumption [thousand cubic meters]	18	17	22			0.19	0.18	0.24
Sewage network length [km]	2	2	2			0.02	0.02	0.02
Total household and assimilable waste [tones]	78.2	236.7	94.5			0.82	2.50	1.02
Total Annual Turnover of local businesses [RON]	4284655	4571985	8294991			45007	48381	89482
Total annual income from turism [RON]	3777902	2965626	4921270			39684	31382	53088
Total annual income from agriculture [RON]	109055	915555	2723224			1146	9688	29377
Total income to local buget [RON]	3370187	2071947	3636779			35401	21925	39232
Investments in education [RON]	939923	569110	-			9873	6022	-
Investment from local budget [RON]	5608134	122913	2134685		58909	1301	23028	

Figure 4 Report indicators interpreted per 10 equivalent inhabitants for Maliuc

Crişan								
	2016	2017	2018	/ 10 equivalent inhabitants	2016	2017	2018	
Total populations	1235	1214	1189					
Total accomodation capacity [vacancy]	146	144	686			1.18	1.19	5.77
Total number of households	771	771	771			6.24	6.35	6.48
Number of local businesses	39	40	42			0.32	0.33	0.35
Employed	176	266	283			1.43	2.19	2.38
Unemployed	33	45	27			0.27	0.37	0.23
Water supply network length [km]	11.6	11.6	11.6			0.09	0.10	0.10
Annual water consumption [thousand cubic meters]	70	68	71			0.57	0.56	0.60
Sewage network length [km]	7.3	7.3	7.3			0.06	0.06	0.06
Total household and assimilable waste [tones]	0	12.3	9.3			0	0.10	0.08
Total Annual Turnover of local businesses [RON]	16657322	19086476	24828669			134877	157220	208820
Total annual income from turism [RON]	5606466	6186438	7158905			45396	50959	60209
Total annual income from acvaculture [RON]	4207081	2361766	3123368			34065	19454	26269
Total income to local buget [RON]	3662593	3718503	4076374			29657	30630	34284
Investments in education [RON]	383345	920681	-			3104	7584	-
Investment from local budget [RON]	640149	222957	736594		5183	1837	6195	

Figure 5 Report indicators interpreted per 10 equivalent inhabitants for Crisan

Sulina								
	2016	2017	2018	/ 10 equivalent inhabitants	2016	2017	2018	
Total populations	4104	4044	3988					
Total accomodation capacity [vacancy]	319	313	874			0.78	0.77	2.19
Total number of households	1992	1992	1992			4.85	4.93	4.99
Number of local businesses	72	76	84			0.18	0.19	0.21
Employed	562	480	648			1.37	1.19	1.62
Unemployed	75	97	45			0.18	0.24	0.11
Water supply network length [km]	23.9	23.9	23.9			0.06	0.06	0.06
Annual water consumption [thousand cubic meters]	188	184	193			0.46	0.45	0.48
Sewage network length [km]	30.6	30.6	30.6			0.07	0.08	0.08
Total household and assimilable waste [tones]	509	327	236.2			1.24	0.81	0.59
Total Annual Turnover of local businesses [RON]	26282359	27402151	27120655			64041	67760	68006
Total annual income from turism [RON]	4578666	4620938	5393233			11157	11427	13524
Total annual income from fisheries [RON]	1966057	2060981	2058424			4791	5096	5162
Total income to local buget [RON]	11075430	9173980	8055656			26987	22685	20200
Investments in education [RON]	2377300	2809770	-		5793	6948	-	
Investment from local budget [RON]	3265200	1946220	1084570		7956	4813	2720	

Figure 6 Report indicators interpreted per 10 equivalent inhabitants for Sulina

RESULTS AND DISCUSSION

Availability of productive capital determined based on capital and labor

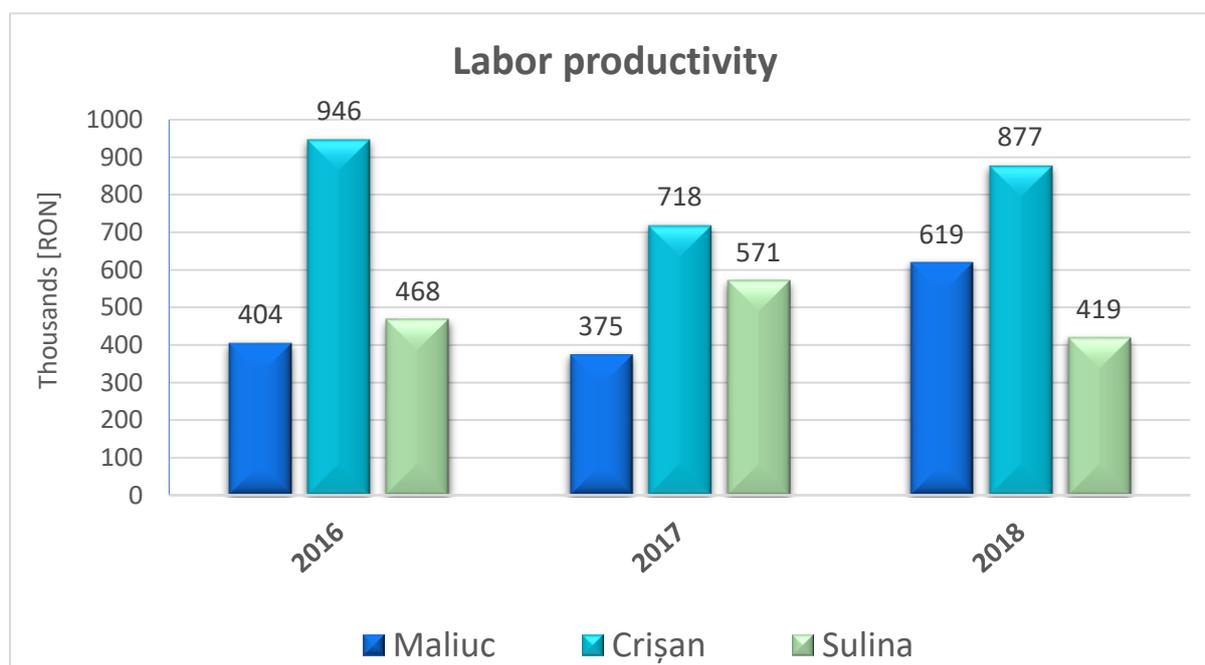


Figure 7 Labor productivity report for ATU Maliuc, Crişan, Sulina

The labor productivity graphic is realised by comparing the average annual number of employees with the turnover of active enterprises. This representation shows that ATUs Sulina and Crişan registered a higher labor productivity than ATU Maliuc in 2016 and 2017, with an increase registered for ATU Maliuc for 2018. (Figure 7)

Employed population interpreted through labor force

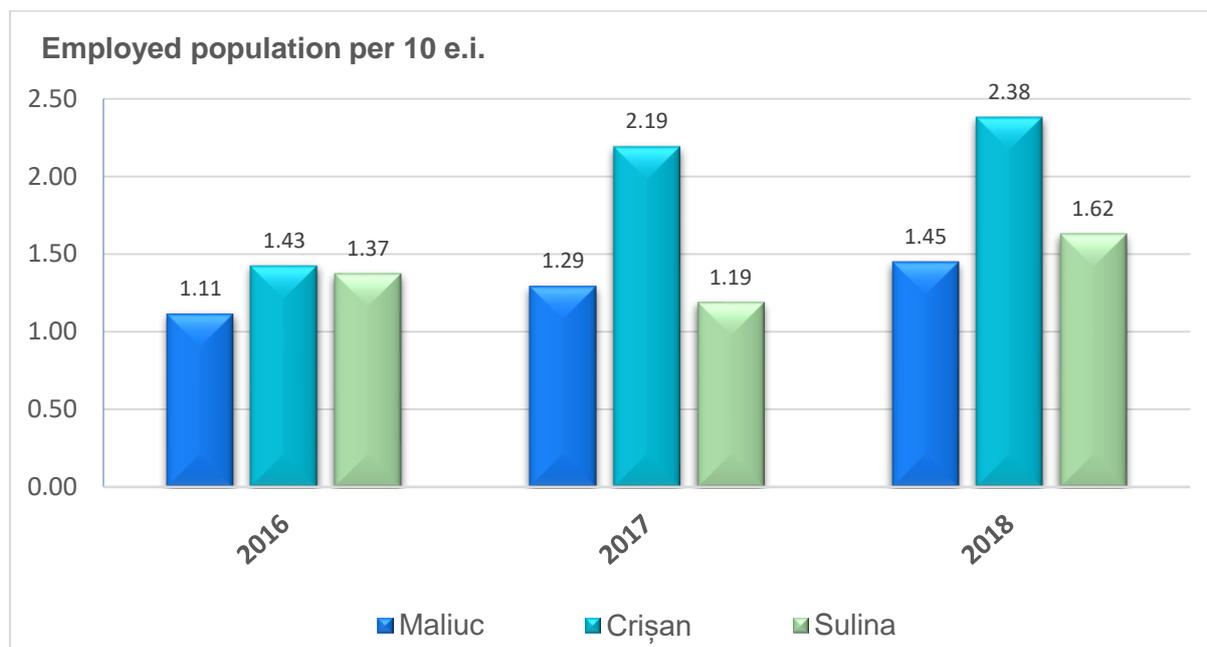


Figure 8 Employed population in the three ATUs

The employed population (Figure 8) graphic shows a relatively close percentage between the three administrative units for 2016 and in 2017 and 2018. ATU Crișan successively recorded an increase in the employed population, indicating an economic growth of this territorial administrative unit.

The quality of human capital interpreted by endogenous factors labor and local investment in education

Quality of human capital increases through education, specialization, professional training; local investment in human capital can have a continuous impact on employment evolution, being a factor that ensures productivity at regional level.

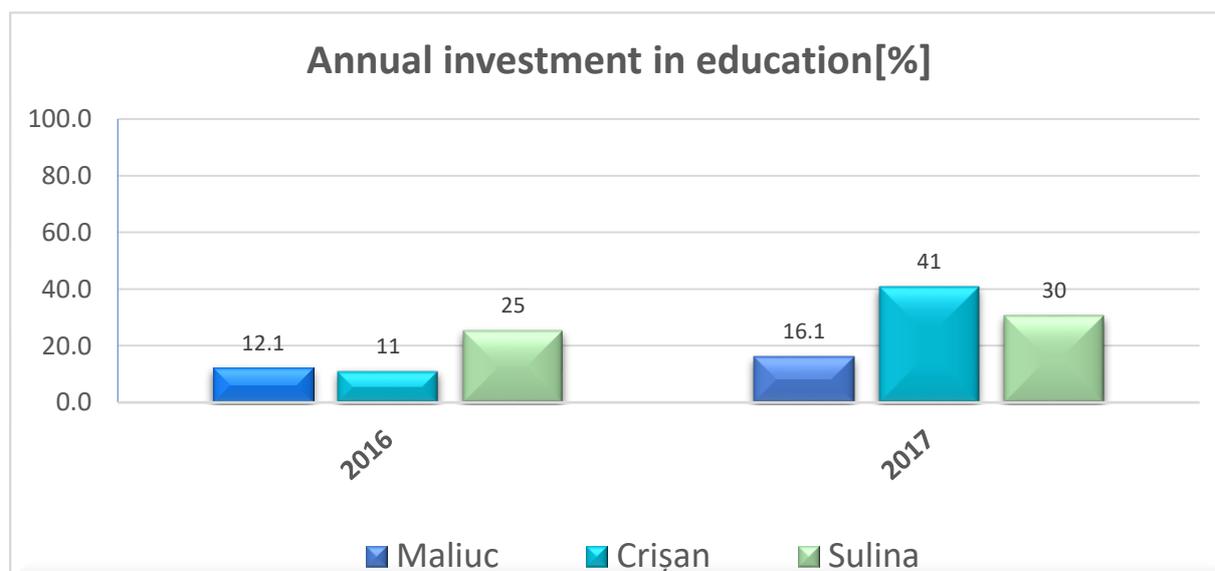


Figure 9 Education expenditures from total local expenditures

The graphic of the percentage allocated for education from total local expenditures shows an increase of approximately 30% for ATU Crişan in 2017 compared to 2016. (Figure 9). This is significantly higher compared to ATUs Maliuc and Sulina which register increases below 5%.

Public spending on infrastructure based on the public capital factor

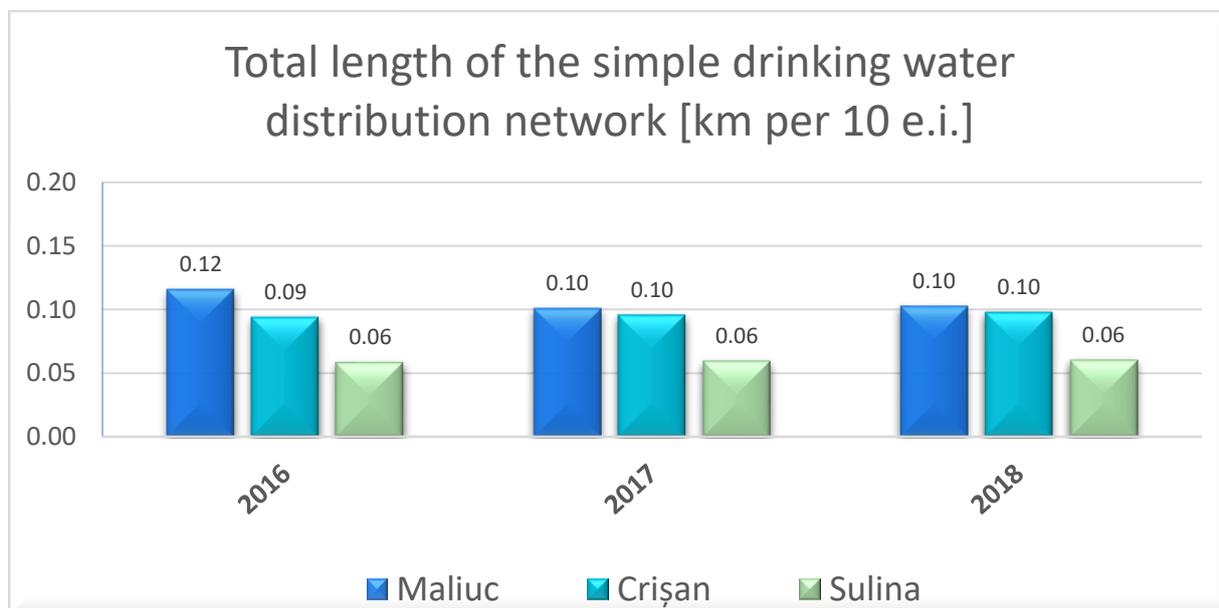


Figure 10 Total length of the simple drinking water distribution network

The graphical interpretation of the existing data shows a close value of distribution network reported for Crişan ATU and Maliuc ATU, Sulina ATU has a value reduced by half compared to the other two units when the data are reported to 10 equivalent inhabitants (Figure 10).

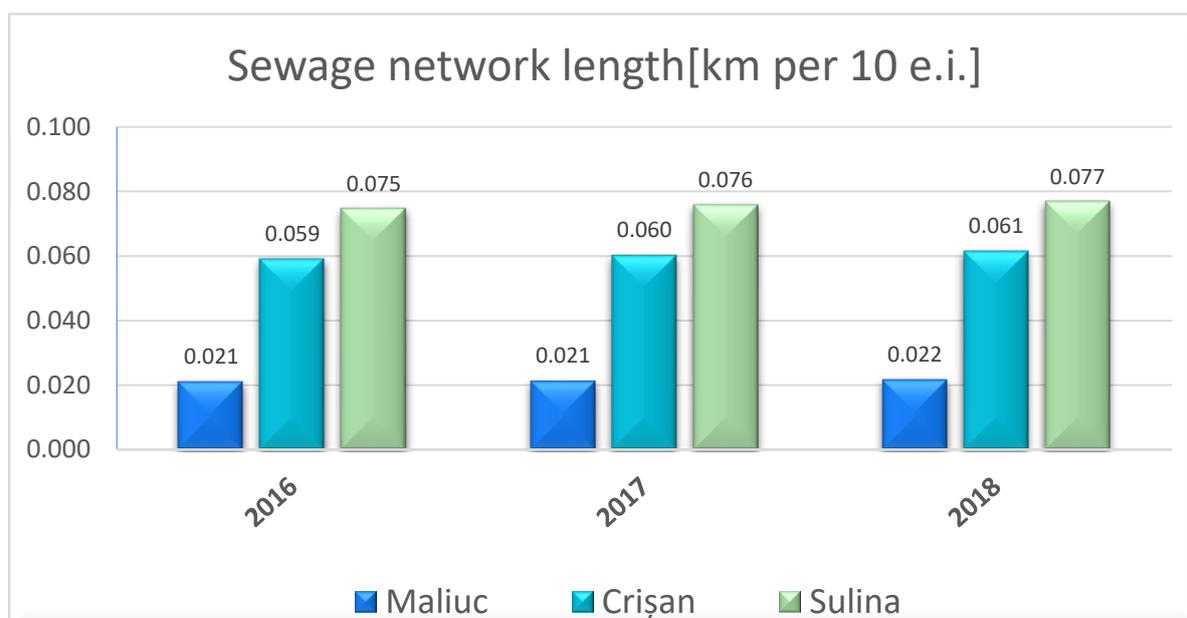


Figure 11 Graphic representing the total length of sewer pipes

In the case of the graph representing the simple total length of the sewer pipes it is observed that ATU Maliuc has a short network length compared to the other two territorial units analysed (Figure 11).

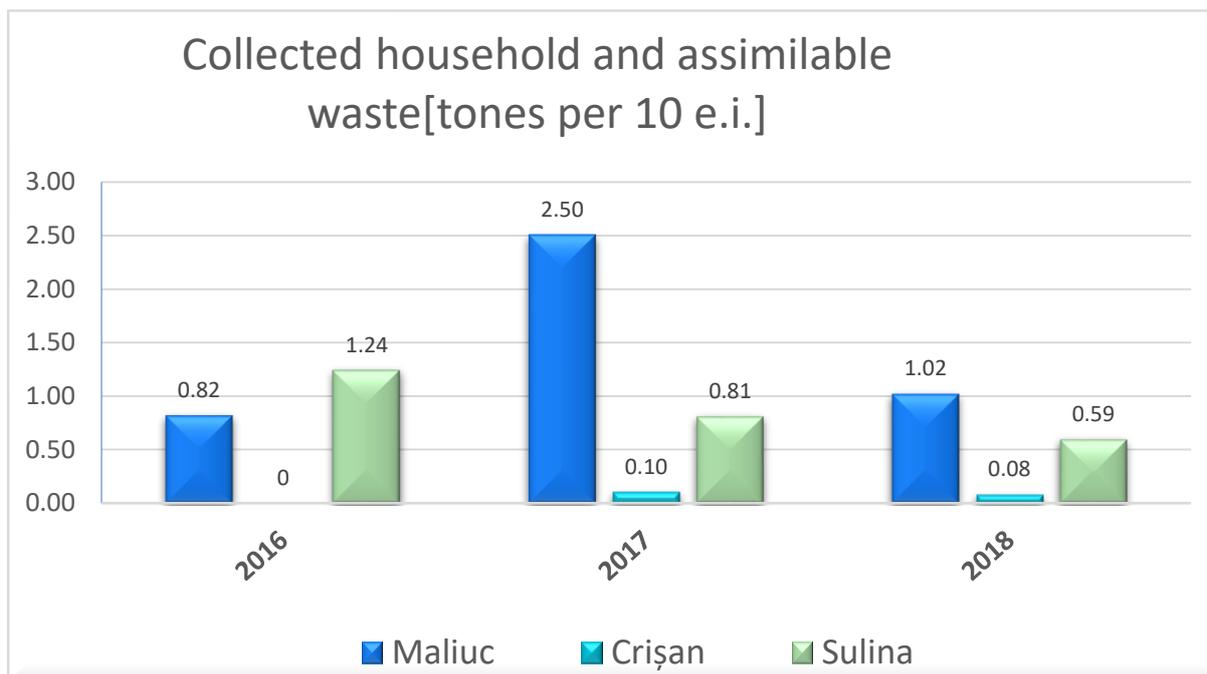


Figure 12 Graphic representing the amount of household and similar waste collected

The graphic of the quantity collected of household and assimilated waste shows differences between the three selected units, the lowest quantity collected being in Crişan ATU, followed by Sulina with a decreasing trend, and the highest amount of waste collected reported was in ATU Maliuc in 2017, with a decrease in 2018 (Figure 12).

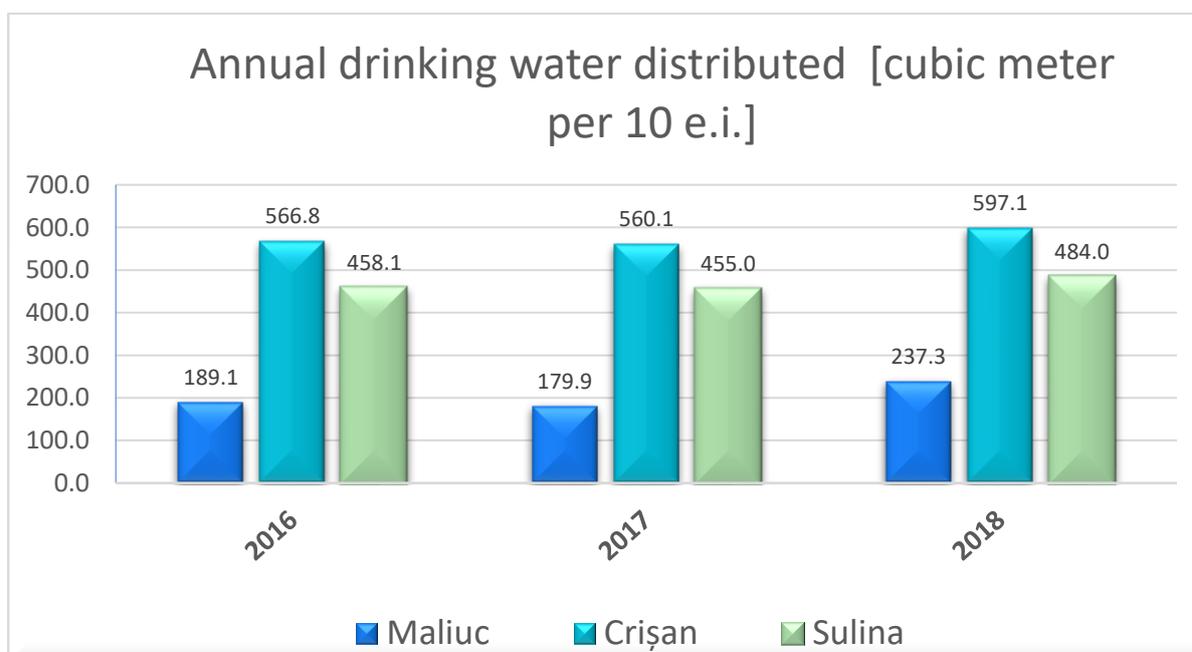


Figure 13 Graphic representing the amount of drinking water distributed

The graph of the quantity of drinking water distributed to consumers shows a reduced consumption by over 50% in ATU Maliuc compared to ATU Crișan and ATU Sulina (Figure 13).

CONCLUSIONS

The article presents the outcome of the study on the relationship between endogenous factors and the development capacity of partially isolated areas in the Danube Delta, as well as on the discrepancies in the development of these areas. For this, the following endogenous factors were used in the analysis: Capital, Labor force, Public capital, Investments.

The calculated performance indicators based on selected endogenous factors highlighted differences in the evolution of the studied ATUs (Sulina, Maliuc, Crisan). These differences were not related to the nature of the geographical location, area or population, but in strict connection to local specificities. The labor productivity ratio showed an important influence on the positive regional evolution, along with the increase of productivity and the employed population.

Considering the study period, as well as the available data, the study revealed a correspondence between the values of investments made in education and employed population in the sense that regions who spent more on education and professional training of labor force tend to register a boost in the number of employed inhabitants resulting also in a better regional development grade. Public spending on infrastructure showed that in areas with a positive development trend, the public capital factor determines the evolution of the region.

ACKNOWLEDGEMENTS

Research was funded by "Danube Delta 2022" Nucleu Program, under the Project "Research on the status and conservation of biodiversity, habitats, sustainable exploitation of natural resources, impact of species non-native and the socio-economic implications of the Danube Delta Biosphere Reserve. - Contract 41N/2019"

REFERENCES

- ****. 2020. *CONSUMATORUL SI COMPORTAMENTUL SAU RATIONAL*. Accessed Mai 27, 2020.
- . 2005. "Master Plan for Danube Delta Biosphere Reserve." *Master Plan for Danube Delta Biosphere Reserve*. page 126- page 146. september. Accessed october 2020.
- . 2014. "Romania: Danube Delta Integrated Sustainable Development Strategy." *worldbank.org*. 17 december. Accessed october 2020.
- Antonescu, Daniela. 2015. "Munich Personal RePEc Archive." <https://mpra.ub.uni-muenchen.de/57728/>. 57728. Accessed 15.10.2020 Romanian's regional development policy in the context of integration into the structures of the European Union. <https://mpra.ub.uni-muenchen.de/57728/>.
- Blanovschi, Andrei. 2014. "Există sau nu deosebire între conceptele "muncă" și "forță de muncă," "piața muncii" și "piața forței de muncă"." *Administrarea Publică*, 2 ed.
- Carp, Mihai, and Constantin Toma. 2019. "INFLUENȚA CALITĂȚII INFORMAȚIILOR FINANCIARE ASUPRA COSTULUI." *Accounting and accounting education in the digital society*., ed. a 8-a ed.
- Hernández, René Antonio. 2003. "Neoclassical and Endogenous Growth Models: Theory and Practice." *reseachgate.net*. researchgate. article page no 28 may. Accessed 2020.
- Lucas, R. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics* 22: 3-42.
- Zaman, G, G Georgescu, Z Goschin, D Antonescu, and F Popa. 2015. *Dezvoltarea Economică Endogenă La Nivel Regional. Cazul Romaniei*. București: EXPERT.

