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Multiplying Effects in the Local Economy through the Sustainable Development of the Cultural and Environmental stock. The Case of Symi

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Abstract: - Sustainable development proposals utilizing the environmental and cultural reserve of remoted areas, help to preserve and maintain the cultural heritage and nature, while further strengthening the local economy, and boosting tourist activity. This article aims to assess the socio-economic effects of the sustainable development proposals for the island of Symi, which utilize the environmental and cultural reserve of the region. The assessment concerns economic values, such as the Gross Domestic Product and the contribution in terms of production value, both at regional and national levels. The scenario has been made based on the increase in tourism expected. For the implementation of the research, bibliographic research was conducted concerning sustainable development and how it is related to investment, tourism, cultural heritage, and the environment. Furthermore, the current situation was identified regarding the touristic scheme on the island. All the above led to the assumptions formed, based on which the input-output model was applied for the socio-economic assessment, which examined the direct and indirect effects on the economy. Sustainable development proposals have positive economic results and depending on the extent of the investments, the economic effects are formulated.

Key-Words: - Symi, Sustainable development, cultural and environmental stock, input-output model, isolated areas

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1 Introduction

Sustainable development as a term may have several definitions and may be related to different areas of research, [1]. In general, economic development, environmental protection, and social equity are the most crucial points that should be addressed through sustainable development, [2], and as the 2005 United Nations World Summit Outcome Document states the pillars of sustainable development are economic development, social development, and the protection of the environment, [3].

Looking closer to the point of environment whether it's about the protection or development, two terms closely related and codependent, environmental sustainability is related to ecosystem integrity and the carrying capacity of the natural environment, [4].

The purpose of sustainable development is the harmonization of man with his environment and the utilization of available resources in the best possible way to achieve the preservation and protection of the environment, economic development, and social well-being, [5].

The environmental reserve can refer to hot springs, beaches and coasts, mountains, lakes and rivers, fields, and anything related to the natural environment that characterizes each region. The environmental reserve can both be mobilized and keep the values of sustainability, while at the same time protecting the natural environment itself.

Moreover, the environmental reserve is closely connected to cultural heritage, like monuments, churches, buildings, and many more that can be found throughout nature.

The management and protection of the cultural and environmental stock can lead to local development, cooperatives, investments in the existing stock, upgrading of facilities, and highlighting of the cultural and environmental assets of the regions, [6].

Cultural heritage and the environmental stock of a region are reasons tourists may choose a destination, and by combining the environment with the cultural heritage, "cultural routes" could come up as a solution that can attract tourists, [7].

In Greece, a country where one of the main industries is tourism, specific areas, like the island Symi, could further increase the touristic period, but in a sustainable way. Acquiring tourism through highlighting cultural and environmental reserves in the context of sustainable development and sustainable tourism is a great deal for islands, which are considered remote areas, [8].

This paper aims to showcase the socio–economic effects of sustainable development on the island of Symi. We develop a regional input-output model to measure the structural effects (in terms of economic benefits) of a series of investments that target to utilize the environmental and cultural stock of the island and upgrade its potential for sustainable tourism.

Sustainable tourism is defined by the UN Environment Program and the UN World Tourism Organization as "tourism that takes full account of its current and future economic, social and environmental impacts, meeting the needs of visitors, industry, the environment and of host communities", [9].

Furthermore, sustainable tourism "refers to the environmental, economic, and socio-cultural aspects of tourism development and an appropriate balance must be struck between these three dimensions to ensure its long-term sustainability", [10].

Tourism has negative and positive impacts, and it is needed to reduce the negative impacts and increase the positive ones. The World Tourism Organization identifies the following principles and practices that should be applied in the context of sustainability and sustainable tourism:

1. To make optimal use of environmental resources
2. To respect the social and cultural authenticity of local communities.
3. To ensure the sustainable economic activity of businesses, providing socio-economic benefits to all stakeholders which are fairly distributed.
4. To ensure stable employment and social services in the host communities, contributing to the fight against poverty, [11].

Based on the above and the 4 specific criteria, Sustainable management, Socioeconomic Impacts, Cultural implications, and Environmental impacts, [12], that The World Council on Sustainable Tourism provides as standards for sustainable tourism, the 'cultural routes' mentioned above, are an excellent solution for Symi, in which the existing routes will be used and the creation of 4 more will be implemented. To measure the socioeconomic activity from this action and the direct and indirect effects on the local and national economy in GDP and production value, due to the sustainable tourism increase and the investment in the environmental and cultural stock, the input-output model will be used (Leontief model).

The methodological framework of input-output analysis was developed by Wassily Leontief. In the 1930s he published 'Quantitative Input-Output Relations in the Economic System of the United States' in the Review of Economics and Statistics, [13], for which he won the Nobel Prize in Economics in 1973. He described the input-output model and developed the model's applications for solving economic problems.

Input-output analysis provides a representation of the output structure of an economic system, which can be as large as the world economy or as small as a region or even an individual firm, [14]. In this case, it will refer to the investment made on the island.

Input-output analysis provides a proper setting to capture the functions and interindustry linkages of an economic system, [15], by showing how domestic production and imports of goods and services in an economy are used by industries for intermediate consumption and final use (EU Science Hub), offering a useful methodological approach to quantify the interdependencies between individual domains, [16].

Quantification is translated through a system of linear equations that quantitatively expresses the relationships of inputs and outputs of the system, [13].

A simpler approach to economically assess the direct impact of a series of investments would be a straightforward cost-benefit analysis, that enables the user to directly compare costs and expected revenues and evaluate the feasibility of a project from its direct outcomes. In detail, this involves adding up all the projected costs and deducting them from the expected benefits or opportunities of the project at hand, often represented as a ratio. If the benefits outweigh the costs, it may be considered a good decision to pursue. However, if the costs exceed the benefits, it may be necessary for the company to reconsider the project or decision.
However, this approach is limited to the production unit/organization that is responsible for the development and implementation of the project (in

this case, the Municipality of Symi), and thus fails to consider additional indirect effects on other actors related to the project, such as suppliers of raw materials, accommodation businesses that may benefit from the upgraded and more tourist-friendly local environment, etc. This limitation motivates the deployment of a regional input-output model, where the different costs related to the project at hand are attributed to corresponding economic activities (i.e., different industries) of the local economy that will implement the required actions, and the model considers the additional benefits that may result from their production linkages and economic transactions towards the completion of the project. Furthermore, the model offers an evaluation of the different types of effects (direct and indirect) in macro-economic terms (GDP, production value) for the regional economy as well as for the national economy, as the regional sectors are not only limited to production linkages with their local economies but also with industries from different regions of the country.

2 Problem Formulation

To formulate the problem, we start by identifying some key characteristics of the Municipality of Symi, including some basic features regarding its environment, important information, and the touristic scheme. Then, based on the proposals of Symi Island (given by the program Sustainable Development of Less Developed Regions and Isolated Areas by Creating New Touristic Resources and Products through Analysis, Documentation, and Modelling of Cultural Assets using Innovative ICT Applications – project code: T2EDK-01278) that are mentioned below, the amount of investment in the cultural and environmental reserve is calculated. Then based on the increase in tourism which is expected to happen in April and November, in other words, an increase in the touristic period which normally is May to October to April to November (assumption) due to the investment and proposals, it is calculated the further investment made by tourism in the sectors of accommodation and food and beverages for April and November.

The total investment, from the proposals and tourism increase, in monetary terms is then inserted in the input-output model.

Specifically, the investment is distributed to the economic activities/sectors that are relevant for each case, according to Rev. Nace 2. Only the two-digit branches are entered in the input-output model. The input-output model through regional tables, calculates the change in GDP and production value.

For this process, the amount of investment per economic activity is needed. An analysis of the financial sectors selected per proposal follows.

Calculating the investment of the above, while also calculating the increase of the tourists, in other words, the rise in accommodation and food and beverages**,** due to the investment in the cultural and environmental reserve of the island, the input-output model was used to determine the multiplying effects in the local economy.

2.1 The case of Symi

Symi is an island of the Dodecanese in Greece, and it is the eighth largest island of the Dodecanese.

It is approximately 22 nautical miles from Rhodes and 230 nautical miles from the port of Piraeus. According to the website of the Municipality of Symi, [17], regular ferries depart from the port of Piraeus and Rhodes to the port of Symi. There is also a connection with 8 more islands. There is no airport on the island.

Its area is 58.1 square kilometers, with a coastline of 85 km. The island is mainly mountainous with many rocks without many high peaks. The tops of the mountains are bare and unrounded and between them are formed deep ravines with steep slopes. Between its heights, there are a few small fertile plains. Today there are 5 settlements on the island: Symi, Emporio, Marathouta, Pedi, and Panormitis, [18].

It has a varied coastline, which features a multitude of headlands, bays, and harbors.

Around the island, there are many islets. The largest is Nimos, followed by Sesklia.

The cypress forest in the interior of the island and the eastern part of Symi have been included in the NATURA 2000 network with code GR4210025, as well as the islets of Kouloundros, Seskli, Trumpetos, Marmaras, Karavolonissi, Megalonissi, Gialesinos, Oxia, Chondros, Platy, Nimos and the sea region of the island of Symi.

Symi Island has already 7 existing trails, and a large part of the old paths of Symi have been preserved and are also used by the inhabitants of the island.

2.1.1 Symi and the Proposals

It is suggested the cleaning, and marking of the 7 existing paths as well as creating 4 more cultural routes and an addition of an info kiosk.

Existing trails:

1. Trail Panormitis – Ormos Faneromenis (2,4 Km)
2. Trail Pedi – beach of Agia Marina (2 Km)
3. Trail Pedi – beach of Saint Nicolas (1,6 Km)
4. Trail Kotika – Saint Aimilianos (4,7 Km)
5. Trail Nera – Sanit Nicolas (2 Km)
6. Trail Symi – Lighthouse Koutsoumpa (3,5 Km)
7. Trail Nera – Ormos Nanou (2,4 Km)

The new routes:

1. Route Mixailides–- Sotirides
2. Route Panagies Symi
3. Route Tour through the history of Symi (2 routes) - (3a) Prehistory of Symi and (3b) Pelasgian and Ancinet traces of Symi.

The proposed cultural routes are intended to connect points of interest (each route is thematic) and mainly use the road network. In some cases, they are also connected to the existing trails. Mostly all the points of interest are accessible via the local road network, which is why an upgrade of the road network should be included.

2.1.2 Symi and the Touristic Scheme

Due to the architecture, nature, and culture, the island is a world-class tourist destination.

In Symi Island and according to recent information from the Hellenic Chamber of Greece [19], the total number of hotel units is 15 and their capacity is 252 rooms / 499 beds.

Specifically, there are no 5-star or 1-star hotels, but there are 6 4-star hotels, 5 3-star hotels, and 4 2-star hotels.

Many tourists visit the island during the tourist months, which are May to October, and based on information from the Symi port authority, as shown in Table 1, the arrivals are the following, which include one-day travelers, habitats, and people from excursions.

Table 1. Arrivals of tourist 2022–- Source: Symi Port Authority

MAY	JUNE	JULY	AUG	SEPT	OCT
10417	35078	36395	50114	19287	24563

2.1.3 Calculation of Proposal Investment

About marking and signs, and to roughly calculate the quantities and types of signs and to capture some basic figures, Y.A. 151344/165/18.01.2017 (Government Gazette B΄ 206/30.01.2017) "Definition of technical specifications for marking, marking, opening, and maintenance of mountain-hiking path", [20], and Y.A. 154551/1839/13.7.2017 (B΄ 2562), [21], and Y.A. 169774/2784/10.05.2018 (B΄ 2004) amendments of no. 151344/165/18-1-2017 of ministerial decision (Government Gazette 206 B), [22], were studied and consulted, which include specific provisions about the types of signs, markings, etc.

The signs calculated in Table 1 concern reception, direction, and information signs. Directional signs based on the above guidelines should be placed all over the route, with a 200 to 300 m distance between them. So, for the total quantity of directional signs for each route, the overall km of the route was divided by 250 m and then the number was rounded up. Reception signs are placed at the beginning and at the end of each route, and information signs at every cultural point of interest that is on the route, as well as at the beginning and end of the path.

For the wooden stakes, one wooden stake is placed at every beginning and end of each path. Upon these wooden stakes, a welcome sign and an information sign are placed. Also, one wooden stake is calculated for every cultural point of interest (an information sign is placed upon the wooden stake). Lastly, directional signs should be applied on a wooden stake if there is an intersection between routes, in this case, intersections exist between the new routes.

Based on records of similar offers for Greek public projects, which are available in digital form from the Greek Ministries of Finance and Digital Governance, research, and communication with experts and companies in the field and by applying a small raise because raw materials have experienced raises lately, the cost regarding the marking of all routes, new and existing, of the signs is approximately 110.000,00€.

Concerning the cleaning, the type of roads of the paths is initially groupe as indicated in Table 3, according to the information of each existing route, into clear paths, unclear paths, and cobblestones. Depending on the type of route and based on purchase prices which were found on old offers via the website diavgeia [23], research and communication with experts and companies of the field and by applying a small raise, the total amount of cleaning is approximately 35.000,00€. The new routes are mainly roads, so there is no cleaning involved, only the cost of upgrading the roads.

Table 2. Number of signs for each route/trail

Route	Reception Sign	Directional Sign	Informative Sign	Wooden Stake
Trail Panormitis – Ormos Faneromenis	2	10	3	3
Trail Pedi – beach of Agia Marina	2	8	3	3
Trail Pedi – beach of Saint Nicolas	2	7	5	5
Trail Kotika – Saint Aimilianos	2	19	5	5
Trail Nera – Sanit Nicolas	2	8	5	5
Trail Symi – Lighthouse Koutsoumpa	2	14	0	2
Trail Nera – Ormos Nanou	2	10	4	4
Route Mixailides - Sotirides	2	3	9	12
Route Panagies Symi	2	2	12	14
Route Prehistory of Symi	2	4	5	9
Route Pelasgian and Ancient Traces of Symi.	3	5	4	9

Table 3. Km of type of path for the trails

Route	Clear Path	Unclear Path	Cobblestone
Trail Panormitis – Ormos Faneromenis	523m		
Trail Pedi – beach of Agia Marina	1266m		
Trail Pedi – beach of Saint Nicolas	867m		227m
Trail Kotika – Saint Aimilianos	4608m		
Trail Nera – Sanit Nicolas	1361m		
Trail Symi – Lighthouse Koutsoumpa	3294m		
Trail Nera – Ormos Nanou		2415m	

The cost of a wooden info kiosk according to purchase prices, after communication with industry experts, is 5.000,00€.

Lastly, the road network works are budgeted according to online research approximately 1.000.000,00€.

2.2 Assumption for the Touristic Increase

Based on information from the police department of the island, the capacity of the island is met throughout the tourist season, from May to October, so it is 100% because the total beds are few and the demand is high. That means that the hotels are fully booked.

The assumption that the analysis of investment for the tourist increase is based, is due to the proposals the tourists will travel for the routes and nature activities that will be available. That said the touristic demand will be higher, and the touristic period will increase from May-October, to April – November. To calculate the increase in accommodation and food and beverages (tourism) for the two extra months, the capacity of their prior months will be used. April will be calculated based on the capacity of May which is 100%, and November will be calculated based on the capacity of October which is 100%.

2.2.1 Calculation of Investment based on the Tourism Increase

Taking a sample of 5 out of the 15 hotels (for the ones it was possible to extract information online on the kind of rooms they provide), the total of rooms is 39, from which 20 are double rooms, 10 are triple rooms, and 9 quadruple rooms. Based on that, 51,3% corresponds to double, 25,6% to triple, and 23,1% to quadruples.

Assuming that the rest of the hotel units follow the percentages as they were calculated above, the total of 252 rooms could be: 129 double rooms, 65 triple rooms, and 58 quadruple rooms.

Based on the above it is possible to calculate the overall number of people that will be visiting the island in April and November, assuming that the capacity is fulfilled 100%. The total number of people is 685 tourists.

To calculate the input the tourists will have in those two months firstly it is needed the amount spent daily by the 685 tourists. A rather mediocre scenario is that the daily spending of each tourist is around 35€ (around 20-25€ for food and the rest for drinks and beverages etc.).

So, the total amount per day is 685X35€= 23.975€ daily.
For April, it is 23975€ X 30 = 719.250€
For November, it is 23975€ X 30 = 719.250€
The total spending is 1.438.500€

Also, the amount spent on accommodation needs to be calculated.

Taking a sample of 9 out of 15 hotels (for the ones it was possible to extract information online on the daily price), firstly the average price of each hotel was calculated based on the differentiation of prices depending on the season, and then the average of all the averages was taken, which is 125€ per night.

To calculate the input of accommodation, the average of 125€ per night was multiplied by the days of April and November, and the number of rooms.

For April, it is 125€ X 252 X 30 = 945.000€

For November, it is 125€ X 252 X 30 = 945.000€

The total spending on accommodation is 1.890.000€.

The above data will be useful in the input-output model. Table 4 showcases the sources for each type of investment.

Table 4. Sources of cost calculations

Type of Investment	Source of cost calculation
Signs and wooden stakes	Cost/budget information from corresponding contracts between private sub-contractors and public offices in Greece and contact with field companies
Cleaning of routes	Cost/budget information from corresponding contracts between private sub-contractors and public offices in Greece and contact with field companies
Infokiosk	Online research and contact with field companies
Road network works	Information is found on the following source: https://rb.gy/dkux3.
Touristic increase	Calculations & assumptions under " 2.2 Assumption of the touristic increase"

3 Problem Solution

Having collected all the data, the investment of the proposals and the monetary increase the tourists will bring, are then distributed to the appropriate economic activities.

3.1 Selection of Economic Sectors

The approach used is based on the I-O framework and incorporates the most recent National Input-Output Table of Greece's economy. I-O models are widely recognized as the most appropriate framework for identifying industrial relationships within an economy, [24].

Each category of proposals was entered in monetary terms in the input model. To enter the data in the model, one needs to know the amount of investment in each economic activity. So, for each kind of investment category, the relevant economic activities were identified according to Nace 2. Rev. In those economic categories the budget of each category was funneled and distributed accordingly.

The amounts were distributed evenly in most cases for the convenience of the process.

The input-output model through the regional tables, estimates the change in GDP and output value. For this process one needs the amount of investment per economic activity. In the input-output model, only the two-digit branches are entered.

The allocation of the budget for each category is as follows:

3.1.1 Marking of Routes

The economic sectors that were selected are showcased in Table 5 as follows:

Table 5. Economic sectors of marking the routes

Marking of Routes (existing and new)			
CDA	CD	DSCR	AMOUNT
A	02	Forestry and logging	8.600€
C	20	Production of chemical substances and products	8.300€
C	24	Production of basic metals	8.300€
C	16	Wood industry and manufacture of wood and cork products, except furniture; manufacture of basketry and seed weaving	8.600€
G	46	Wholesale trade, except for the trade of motor vehicles and motorcycles	16.900€
H	49	Land transport and pipeline transport	16.900€
H	50	Water transport	16.900€
N	81	Activities of provision of services in buildings and outdoor spaces	8.600€
F	43	Specialized construction activities	16.900€
		TOTAL:	110.000€

The signs and stakes are made of wood and the relevant economic activities which were selected and concern the production of timber and the creation of objects are A_02_Forestry and logging and C_16_Wood industry and manufacture of wood and cork products, except furniture; manufacture of basketry and seed weaving.

Metal signs are made of aluminum. The economic activity concerning aluminum is C_24_Production of basic metals, as it includes the four-digit C_24.42_Production of aluminum (aluminum). Also, C_20_Production of chemical substances and products, because it includes the three digits C_20.3_Production of paints, varnishes, and similar coatings, printing inks and mastics, an economic activity related to the coloring of signs.

They are custom-made constructions, so we are interested in the most primary activities related to timber and aluminum and we do not choose economic activities related to the trading of objects.

The appropriate economic activity is wholesale trade, G_46_Wholesale trade, except for the trade of motor vehicles and motorcycles.

To reach Symi, they must be transported. Since Symi is an island, in addition to land transport it also needs water transport, so the corresponding economic activities are H_49_Land transport and pipeline transport and H_50_Water transport.

The economic activity N_81_Activities of provision of services in buildings and outdoor spaces specifically concerns the three-digit N_81.3_Activities of landscape services which aims to place them in the landscape.

The economic activity F_43_Specialized construction activities concern the construction of the sign with the wooden base and aluminum signs, and specifically the four-digit F_43.99_Other specialized construction activities n.e.c.

The total budget was allocated equally except for G46, H49, H50, and F43 which concerns both the wooden and the metallic signs, so it was doubled, the rest are referred to either of the two.

3.1.2 Cleaning of Routes

Concerning the cleaning of the already existing paths in Symi, light cleaning and shaping services will be used on the clear paths, deeper cleaning and shaping on the unclear ones, and some repairs on the cobblestones, as presented in Table 6.

Table 6. Economic sectors of cleaning the routes

Cleaning of Routes (existing)			
CDA	CD	DSCR	AMOUNT
E	37	Wastewater treatment	11.600€
N	77	Rental and leasing activities	11.600€
N	81	Service provision activities in buildings and outdoor areas	11.800€
		TOTAL:	35.000€

The economic activity E_37_Wastewater treatment, due to the deeper cleaning, was chosen. N_77_Rental and leasing activities, specifically the four-digit number N_77.31_Rental and leasing of agricultural machinery and equipment due to the assumption that deep cleaning will require equipment, which will be leased to carry out the tasks.

Cleaning complies with N_81_Service provision activities in buildings and outdoor areas.

The total budget was allocated equally.

3.1.3 InfoKiosk

Table 7. Economic sectors of info kiosk

Infokiosk			
CDA	CD	DSCR	AMOUNT
A	02	Forestry and logging	625€
C	16	Wood industry and manufacture of wood and cork products, except furniture; manufacture of basketry and seed weaving	625€
C	20	Production of chemical substances and products	625€
C	24	Production of basic metals	625€
G	46	Wholesale trade, except for the trade of motor vehicles and motorcycles	625€
H	49	Land transport and pipeline transport	625€
H	50	Water transport	625€
F	43	Specialized construction activities	625€
		TOTAL:	5.000€

The wooden infokiosk has 2 parts, the wooden and the aluminum (Map). Concerning the wooden, the economic activities that were selected and concern the production of timber and the creation of an object are A_02_Forestry and logging, C_16_Wood industry and manufacture of wood and cork products, except furniture; manufacture of basketry and seed weaving.

About the aluminum part of the license plate, the economic activities selected are C_24_Production of basic metals, as it includes aluminum, specifically in the third digit C_24.42_Production of aluminum (aluminum). In this case, wholesale trade is chosen, even though it is one piece, as it is also a custom-made production and cannot be created by retailers. So the appropriate economic activity is G_46_Wholesale trade, except trade in motor vehicles and motorcycles

For the wooden info kiosk to reach its installation point, it must be transported. Since Symi is an island, in addition to land transport, water is

also needed. The relevant economic activities are H_49_Land and pipeline transport H_50_Water transport

The economic activity F_43_Specialized construction activities concern the construction of the sign with the wooden base with the information sign, and specifically the four-digit F_43.99_Other specialized construction activities, etc.

The total budget was allocated equally, as presented in Table 7.

3.1.4 Works on the Road Network

Table 8. Economic sectors of road network work

Road network works			
CDA	CD	DSCR	AMOUNT
G	46	Wholesale trade, except for the trade of motor vehicles and motorcycles	160.000€
H	49	Land transport and pipeline transport	160.000€
H	50	Water transport	160.000€
N	81	Service provision activities in buildings and outdoor areas	160.000€
F	42	Civil engineering projects	160.000€
F	43	Specialized construction activities	200.000€
		TOTAL:	1.000.000€

The works must be drafted and scheduled, so that is why the F_42_Civil engineering projects were chosen to realize the materials are needed which are bought wholesale so the economic sector G_46_Wholesale trade, except trade in motor vehicles and motorcycles.

The materials must be transported and since Symi is an island, in addition to land transport, water is also needed. The relevant economic activities are H_49_Land and pipeline transport H_50_Water transport

The economic activity F_43_Specialized construction activities concern the construction of the roads and N_81_Service provision activities in buildings and outdoor areas since it is an outdoor project.

The total budget was allocated equally, as presented in Table 8.

3.1.5 Increase in Tourism

Regarding tourism, the sectors affected are I - accommodation and I - services activities, based on the calculation mentioned above, the numbers are allocated accordingly, as shown in Table 9.

Table 9. Economic sectors of increase in tourism

Increase of tourism			
CDA	CD	DSCR	AMOUNT
I	55	Wastewater treatment	1.890.000€
I	56	Rental and leasing activities	1.438.000€
		TOTAL:	3.328.000€

3.2 Input-output Results

The data of the overall table, shown in Table 10, are then inserted in the regional EUREGIO input-output model at the region of South Aegean, where Symi belongs, and data were obtained about the change in GDP and the contribution in terms of output value, both regionally and nationally.

Table 10. Overall economic sectors

TOTAL			
CDA	CD	DSCR	AMOUNT
I	55	Wastewater treatment	1.890.000€
I	56	Rental and leasing activities	1.438.000€
A	02	Forestry and logging	9.225€
C	20	Production of chemical substances and products	8925€
C	24	Production of basic metals	8.925€
C	16	Wood industry and manufacture of wood and cork products, except furniture; manufacture of basketry and seed weaving	9.225€
G	46	Wholesale trade, except for the trade of motor vehicles and motorcycles	177.525€
H	49	Land transport and pipeline transport	177.525€
H	50	Water transport	177.525€
N	81	Activities of provision of services in buildings and outdoor spaces	180.400€
F	43	Specialized construction activities	217.525€
E	37	Wastewater treatment	11.600€
N	77	Rental and leasing activities	11.600€
F	42	Civil engineering projects	160.000€
		TOTAL:	4.478.000€

3.2.1 Production Value Results in the South Aegean

According to Figure 1 "Multiplier effects in the South Aegean Region in terms of production value", the direct effect of all investments in Symi resulted in an effect on the value of production of products and services of almost €4.478.000 million in the South Aegean Region. The indirect effect reached €1.151.00 million and total direct and indirect results reached €5.629.100 million.

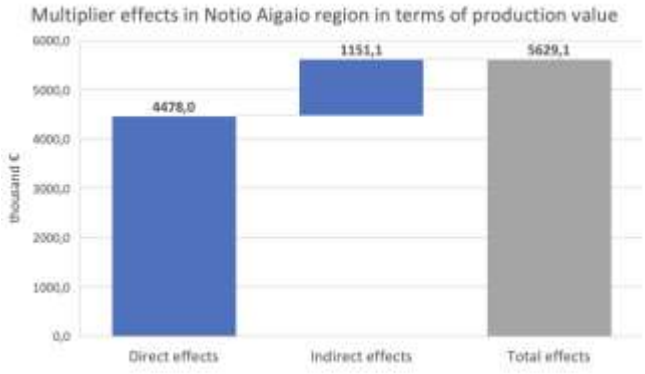

Fig. 1: Multiplier effects in the South Aegean Region in terms of production value

The economic activities to which the project budget was channeled were directly affected, while indirectly the economic activities that are interdependent with the direct ones were therefore affected due to the investments.

This means that the set of sustainable development proposals that focused on the cultural and environmental reserve of Symi, with a total investment of €4.478.000 million, had the effect of offering the economy in terms of production value a total of €5.629.00 million in the South Aegean.

Multiplicatively, the value created in production is greater.

3.2.2 Production Value Results in the Greek Economy

The projects do not only affect the region in which they are carried out but also affect the national economy of the entire country.

According to Figure 2 "Multiplier effects in the Greek Economy in terms of production value ", the total effect on the production value of products and services is €6.312.600 million.

The direct effects always refer to the impact on the South Aegean region, as the projects were carried out there so the direct effects are reflected only in this region. So, whether at the national or regional level, the number is the same and essentially only concerns the South Aegean Region.

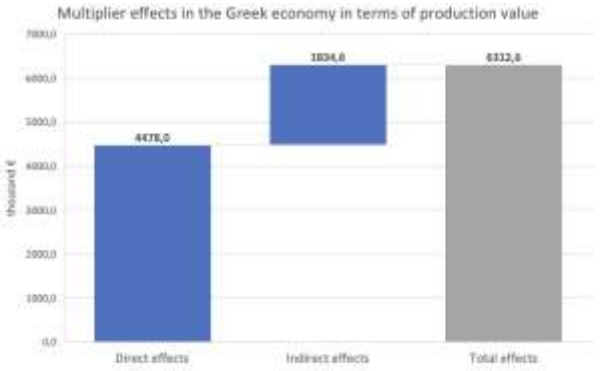

Fig. 2: Multiplier effects in the Greek Economy in terms of production value

However, the indirect ones amount to €1.834.600 million. If the indirect effects related to the South Aegean Region are removed, as stated in the Table Multiplicative effects of the project in the South Aegean Region", which are 1.151.000 million €. There remain the indirect effects in the rest of Greece which are equal to €683,6 thousand. This means that to carry out the promotion proposals, structurally in areas in the rest of Greece (except the South Aegean region) the production value was affected by €683,6 thousand.

3.2.3 GDP Results in the South Aegean

Through the sustainable development proposals, and their implementation in Symi, a change in GDP is caused in the South Aegean. So the branches of economic activity that were directly related to the projects, will contribute directly to the region's GDP (€2.198.200 million).

The indirect effect amounts to €495,5 thousand and concerns the connections with the rest of the sectors of the project economy.

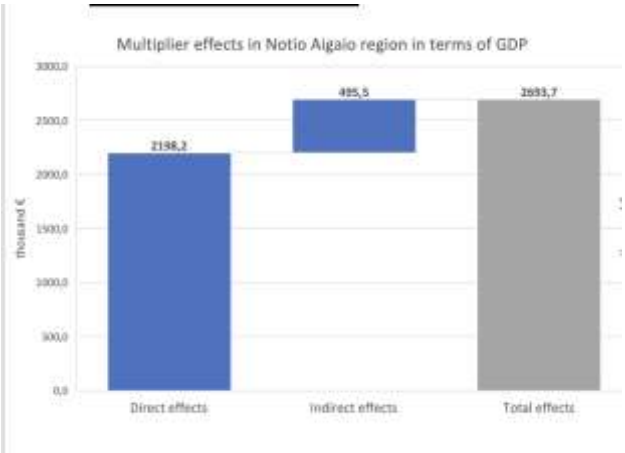

Fig. 3: Multiplier effects in the South Aegean in terms of GDP

However, the overall economic impact is even greater. The total contribution of the projects to the total GDP of the South Aegean is almost €2.693.700 million, as presented in Figure 3.

3.2.4 GDP Results in the Greek Economy

According to the graph " Multiplier effects in the Greek economy in terms of GDP ", the direct impact of all investments in Symi resulted in an impact on the GDP of €2.198.200 million in Greece. The indirect effect reached €750,00 thousand and in total the direct and indirect results reached €2.948.200 million, as presented in Figure 4.

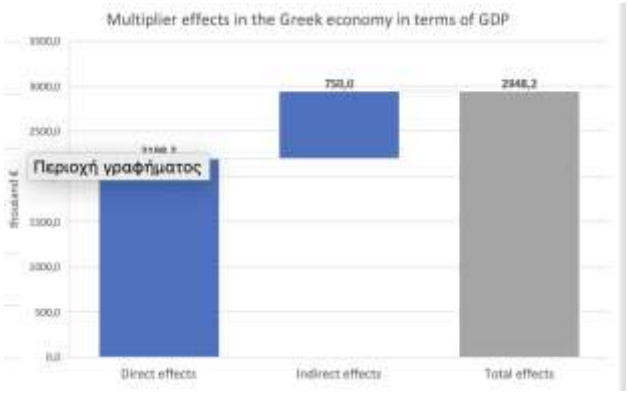

Fig. 4: Multiplier effects on the Greek economy in terms of GDP

The direct effects always refer to the impact on the South Aegean region, as the projects were carried out there so the direct effects are reflected only in this region. So, whether at the national or regional level, the number is the same and essentially only concerns the South Aegean Region.

However, the indirect amount results in €750,00 thousand. If the indirect effects of the South Aegean which are 495,5 thousand € are removed, the indirect effects in the rest of Greece remain which are equal to 254,5 thousand €. This means that to carry out the proposals and the increase in tourism due to that, in regions in the rest of Greece (except the South Aegean region), the GDP changed by 254,5 thousand €.

Therefore, the total of direct and indirect effects in Greece leading to a change in GDP is €2.948.200 million.

4 Conclusion

In conclusion, the input-output analysis is a very useful tool for evaluating the economic dimensions of investments. It is detailed and captures in complexity the impact of investments, productive interdependencies, how the local economy is impacted, and ultimately how it affects economic measures nationally.

Investments concerning the cultural and environmental stock of isolated areas appear to affect GDP and production value indicators to a large extent. The regions that are affected go beyond the limits of the investment region and this implies interdependence of economic activities throughout Greece and thus the results of the Greek economy.

Sustainable development proposals that use already existing resources, wanting to stimulate the local economy, creating infrastructure and solutions for tourism, but without exceeding the carrying capacity of the regions are achievable and have positive economic results.

By raising the touristic period due to the environmental investments and activities available for the tourists there is a high rise of income that positively affects the regional economy and employment.

The limitation of this paper related to the Input-Output model is that some assumptions need to be made for the system to work. Also, the model itself did not take into consideration the employment in the area, so it was not possible to know the increase in employment.

In the future and once the investments are made, it will be possible to further improve this research and compare the real numbers, the real impact, with the forecast that has been made. Moreover, regarding the forecast an improvement could be as well to examine different scenarios, with different budgeting allocations to economic sectors, and compare between them the results.

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Conflict of Interest

The authors have no conflicts of interest to declare.