MANAGEMENT IMPLICATIONS OF IMPLEMENTATION OF DANUBE STRATEGY IN REFLOATING OF SHIPS

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ABSTRACT
The work analyses the main management problems generated by the implementation of Danube Strategy on the Romanian sector in the operations for removal of shipwrecks which restrain the circulation of ships and tourism development. Along the Danube from Km 0 Sulina to Km 1075 Bazias, the riverbed is "populated" by a series of obstacles among which shipwrecks are hundreds. A part of them are loaded with explosive since the Second World War, which represents a danger for the local Danube communities and the safety of traffic. This work is a synthesis of the authors' preoccupation in recent years.

KEYWORDS*: Danube Strategy, ship refloating, shipwreck, critical areas, floating islands, navigation channel, efficiency.*

JEL CLASSIFICATION: *R58*

1. INTRODUCTION

Danube represents for the entire Europe a geographical area insufficiently put to good use in favour of people. It is enough to follow its navigable route throughout Europe and realize that it can be the cheapest transport corridor which connects Constanta to Rotterdam. Hence the connection with tourism, with development of Danube towns and creation of inner networks of channels on the navigable rivers which connect them to the Danube (Popescu & Lazar, 2015).
At the same time, Danube is a source of disasters if the water is polluted with certain substances or if floods take place.
In overview, the Danube sector implies investments to reduce the risks mentioned above and to revive the economy of the local Danube communities along with the world economy.
European Union considered the opportunities offered by the Danube for the economy of its member states first of all by launching a vast investment programme called The Danube Strategy.
EU Strategy for Danube (EUSRD) represents **a community mechanism which aims at intensifying the cooperation of the states from The Danube Basin, in order to achieve the economic and social development of the Danubian macro-region.** This is the second macro-regional strategy for EU (Langer, P. 2011).
EUSRD is based on the **political initiative of Romania and Austria since** June 2008**.**

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In the Danube Strategy are involved fourteen states: **nine EU Member States** (Austria, Romania, Bulgaria, Czech Republic, Croatia, Germany – as a federal state and also through the lands Baden-Württemberg and Bavaria, Slovakia, Slovenia, Hungary) and **five EU non-Member States** (Bosnia-Herzegovina, Montenegro, Serbia, Republic of Moldova and Ukraine).
The main **objectives of the Strategy are** (Langer et al., 2015):

- interconnection of the Danube region;
- consolidation of the Danube region
- increasing the prosperity in the Danube region
- environment protection in the Danube region

For each Strategy objective there are specific fields of action grouped on 11 priority areas and each priority area is coordinated by 2 states/lands in the region as follows:

2 OBJECTIVES AND OPPORTUNITIES GENERATED BY THE REFLOATING OF SHIPS

Improving the potential of the Danube region on economic and social level implies ensuring ship traffic throughout the year (except the periods of frost) and arranging the shores so that in case of increasing the water flows to avoid the overflow over the arable lands. Achieving this objective requires overcoming the obstacles caused by:

- The existence of critical, dangerous areas with sunk ships that restrains the possibilities of the naval transport
- The existence of war ships from the Second World War
- The existence of floating islands which "strangle" the navigation channel

The main works necessary for solving the problems reported above consist of removing the shipwrecks from the bottom of the Danube for the safety of inner waterways, dredging works, hydro technical works and shore consolidation works, where necessary from BAZIAS 1075 KM. to SULINA 0 KM.
Thus will be ensured:

- Fluidization of water drainage and naval traffic, especially in shallow waters, allowing naval traffic on Danube inner ways during the drought season also, from Danube to the sea
- Elimination of explosion dangers of unexploded munition from the sunk war ships
- Elimination of dangers of hydrocarbon residues pollution from sites and shipwreck tanks
- Normalization of Danube hydraulic conditions, in order to avoid the negative effects especially during floods and shallow waters
- The horizontal and vertical stability of the Danube riverbed trail
- Protection of flora and fauna and keeping the water clean in the working and intervention areas throughout the Danube, creating the possibility that Lower Danube becomes again a tourist area

The targeted effects are:

- Rehabilitation and development of navigable river infrastructure of Lower Danube and the provision of an adequate economic and organizational frame for re-establishing trade and navigation (merchandise and passengers) on Danube by using an integrated water management approach, producing energy, controlling the floods and environmental aspects.
- Identification of acceptable options from technical, ecological, legislative and economic point of view to increase the tourist attractiveness of cross-border region by developing the leisure navigation on Danube.
- Increasing the transports of merchandise and passengers by 20% until 2020,

- Connection closure between Rotterdam and Constanta on the shortest European navigable route
- Creating new jobs; allowing the economic development of Danube cities and boundary areas
- Reducing the cost of transportation on waterways, the risk of floods and the reduction of the damages caused by them
- Removal of unexploded devices (UXO) from Danube in Bazias-Sulina Sector
- Ensuring a sustainable improvement of Danube as an international waterway by engaging within the parameters (navigation conditions) recommended by the Danube Commission, allowing the transition of ships throughout the year.
- Elimination of the 36 critical points from 845.650 km. - 374.100 km and also the critical point from Portile de Fier II to 845.650 km., of high risk areas marked by the presence of German sunk ships loaded with explosive and other ferrous and non-ferrous metals;
- Allowing an adequate water regime to protect the river shores from erosion and to avoid fundamental morphological changes in the riverbed.

Achieving this kind of a project requires running over some stages such as: technical documentation elaboration (preliminary feasibility study, feasibility study, environmental impact studies, hydrological study which grounds the investment necessity and opportunity based on technical and economic data and advances the intervention works for the safety of inner waterways), works financing from European funds and own resources and project implementation.

3 MANAGEMENT IMPLICATIONS OF THE PROJECT

1. EU ensures the financing of these works in percentage of 85% (Priority axis A10), the rest reverts to the project's beneficiary as co-financing.

The refloating and shores arranging works can be funded also for the private projects of national interest exonerating the public institutions of assuring the difficult co-financing. The reconstruction works of navigation channel are funded only if the beneficiary is a public institution, as in AFDJ Galati.

Note: Elaborating a project for refloating the sunken ships requires significant financial, human and technical resources and outlasts for years when the financing is completely uncertain. Usually the public institutions do not afford such an initiative. The only way is engaging a private company in the project for taking the risks and elaborating a *private project of national interest*. This impediment is encountered in any sector of our economy. But the approval of the preliminary feasibility study by the Ministry of Transportation requires a guarantee letter for 15% of the project value to prove the existence of co-financing. For a project of 500 million euro the private institution has to guarantee with 75 mil euro. In most cases it is impossible to be accomplished; that is why it has to associate with other institutions with the necessary financial potential.

2. The arrangement of navigation channel requires the refloating of ships from both river banks because its route on some sections crosses only one side of the river alternating from one bank to another. Therefore, it has to get a consortium with the institutions from the Danube riverside countries on the section Sulina Bazias, blend in the documentations and identifying of financing sources because Serbia, Ukraine and Republic of Moldova are not EU members states. On the riverside sections of these countries it has to be identified other financing sources than PA10 axis.

3. The removal of ships will be done successively on different sections or simultaneously on more sections (6 sections). The project implementation time will be considerably reduced subject to existing financing opportunities. It is usually easier to transport by water the machinery from one area to another than to transport them on land to a new site, but there is a technical problem: some cranes cannot cross under the bridge Giurgiu Ruse requiring to be dismembered.

4. The legal framework has to clearly confirm that the ships removed together with their content will become the property of the project's beneficiary. Here interferes the problem of the German war ships that can contain undamaged war captures. What if there are submarines among the ships? What will be their legal ownership regime? Beyond the necessary approvals of such an operation from MAPN, MAI, SRI and border police it's possible to operate with classified information which requires the involvement in the project of at least one participant who holds a ORNIS Certificate. The legal framework includes:

- The Belgrade Convention on navigation regime on Danube;
- The Development Memorandum of Transport Corridor No. 7, from year 2000;
- The Rotterdam Declaration of Transportation Ministers, adopted in the year 2000;
- The Romanian national legislation and the other Danubian countries.

1. **The financing sources** of the project are:

- EU Cohesion Funds - 85% Priority Axis PA10;
- Self-financing (Public / private Partnership) - 15%

It is likely that at the country level it won't be able to obtain the full financing of the project from the funds allocated to Romania even if the project will be carried out for 3-4 years. In this case it must be restrained the project on certain areas of the Danube (for example, the riverbank with Bulgaria) and must be identified other financing sources offered by the Danube Strategy on other priority axes or even from cross-border funds. The problem of project segmentation on different financing sources involves getting a consortium with the eligible public institutions for the targeted operations. The highest difficulty is that very few alternative priority axes have the eligible operation of ship refloating. The most delicate problems occur at financing of operations for the ships on Serbian, Moldavian and Ukrainian banks. Here turns up another strategic problem: when cleaning the Danube on Chilia branch you neglect Sulina branch which is totally Romanian, and you will be forced to integrate also this navigation corridor in the project.

2. **Identifying the shipwrecks' location**

The shipwrecks are dissipated across the Danube, some of them dating back from the beginning of this century. The identification of their location, weight, size, content involves the elaboration of a vast documentation. The sources of information concerning the location of shipwrecks are:

- The records of Harbour Master's Offices,
- The data from the Danube's Book
- The records from MAN archive

Based on this information and the data provided by AFDJ (Lower Danube Administration Galati R.A.) it can be drawn up the map with: critical areas, location of shipwrecks and floating islands and the navigation channel route. To elaborate the feasibility study we have to identify the positions of the ships with sound and ranging navigation (SONAR), magnetometers, underwater photography or filming. Depending on their position, the technical study can be elaborated regarding the method of removing the shipwrecks and the cost of operations.

3. **Analysis of environmental impact**

The removal of shipwrecks can have a major impact on the environment, especially in the unfortunate hypothesis of water pollution with the fuel residues inside of them, degradation and spreading in the water of explosive load from the war ships and disturbance of phenomena such as migration of sturgeons. There are areas populated with shipwrecks in which sturgeons take refuge to deposit the spawn. The removal of shipwrecks will have an impact on the migration of sturgeons, reason for which it is necessary the analysis of short and long term effects on Danube

fauna. There are also other risk factors generated by the operations made, factors which are analysed and quantified in the elaborated studies.

a. The recovery of scrap from the shipwrecks

For the recovery of scrap there are several action strategies:

- Putting together a metallic platform by connecting barges so that the shipwrecks are dismembered on the Danube surface thus reducing the risk of their theft
- Storage it in certain arranged places on the Danube bank especially for dismemberment
- Storage it in harbours in arranged places for dismemberment

The chosen solution depends on the exploitation strategy of the resulted scrap. If it can be sold directly from the platform or transported in the harbour, we'll choose the first variant and if there are no procurement contracts for the whole extracted quantity we'll choose the other variant.

The operative management of ship refloating involves apart from a series of technical actions, also the resolution of management problems such as:

1. Allocation of technical resources on ships so that the refloating costs and working times are minimal
2. Scheduling of activities in time with maximum revaluation of available resources
3. The operative allocation of human resources on objectives so as to maximize their degree of simultaneous achievement
4. Management of risks generated by external and internal factors
5. Dismemberment of ships in correlation with the schedule of scrap delivery to beneficiaries
6. Securing refloating operations against the possible intervention of scrap "seekers", against extreme economic phenomena
7. Allocation of human resources on ships compared to their degree of training and licensing
8. Assurance of financial, human and technical resources for the project period
9. Comparative evaluation of operations costs in different work hypotheses: with rented equipment, owned or purchased (leasing, instalments or directly)

Applications for some of these problems are developed in the work of Andreica, M., 2011; Andreica, M. E., 2011.

4. EFFICIENCY OF REFLOATING OPERATIONS

Evaluation of incomes

By analysing the efficiency of ship refloating operations and their revaluation we will see that the incomes come from the exploitation of scrap and the subsidy offered by EU for each shipwreck. Therefore:

1. Incomes which come from scrap exploitation can be represented as follows:

$$Vfv = N \times GM \times Q \times P, \quad (1)$$

Where: N - number of ships; GM - average weight, Q scrap rexploitation coefficient from ship weight, P - price per scrap tone.

For example: for sector Sulina 0 km – Braila 175 km for a number of 60 ships with an average weight of 300 tones and a exploitation coefficient of 0.8, at the price of 250 dollars/tone we obtain 3.6 million dollars. To turn them into Euro, we will divide to Euro-dollar ratio (about 1.12).

2. On the supposition that the incomes which come from EU financing for a shipwreck are:

- barges = 60,000 euro
- average ships = 300,000 euro
- military ships = 650,000 euro

The formula is:

$$Vue = N \times PM = 60 \times 300{,}000 = 18{,}000{,}000 \quad (2)$$

where PM is the average value which EU will finance for a shipwreck

Total incomes:

Vtot = Vfv + Vue = 18,000,000 + 3,214,285 = 21, 214,285 euro (3)

Evaluation of costs

The removal costs have two components:

a) Actual removal specific to each shipwreck noted with CM (average cost). We operate with average cost to be able to make the analysis for the whole operation

b) general expenses with elaboration of documentation, getting the approvals and authorization, organization of sites, travels, taxes and duties, expenses with the operation of beneficiary company, supervision, etc. which we will note with K.

The total cost (CT) will be:

$$CT = N \times CM + K \quad (4)$$

The efficiency of operation will start when the incomes outrun the expenses: V > CT (Parvu & Andreica, 2003).

We are practically interested in how many ships have to be removed at a given set of parameters so that the operation is efficient. So the Net Income (Vn) should be positive. The unknown is the number of ships that must be removed to cover the total costs:

$$Vn = N \times GM \times Q \times P + N \times PM - N \times CM - K > 0 \quad (5)$$

It results that:

$$\mathbf{N > K / (GM \times Q \times P + PM - CM)} \quad (6)$$

If we replace the difference between the average price and the average cost by the average net income Vnm, we have:

$$\mathbf{N > K / (GM \times Q \times P + Vnm)} \quad (7)$$

Mathematically, solving the in-equation, depends on the quantification modality of the right member parameters. In practice it's very difficult to make this kind of estimations especially for the parameters K and CM. The difficulty arise when the machines are rented on a specific period of time and also the divers and the rest of the operations participant personnel are hired for a specific time interval and not per shipwreck. The experience of the Serbian partners shows the fact that there are ships for which removal took one month whereas for others took only a few days.

The calculation relations which we will operate with will pursue the identification of the minimal subvention necessary for being obtained from EU on each removed ship to cover the total costs decreased by the collection from scrap exploitation:

$$NxPM > CT - Vfv \quad (8)$$

It results that the minimum obtained value from EU for one ship must be higher than the proportion between the total costs and the number of ships:

$$PM > (CT - Vfv) / N \quad (9)$$

There are situations when the scrap exploitation is not a concern for the beneficiary because of the difficulty of the shipwreck dismembering actions and the afferent costs, therefor the shipwrecks are delivered at very low prices.

Within this context, the estimated costs for the mentioned sector are 15 854 928 euro. This includes the camel rent, fuel, cables, motorboats, divers and other machines and instalations. It will be added 2% for consultancy, 2% for technical assistance, 8% for organizing the site and 6% for miscelanous costs. In the end the total costs per sector (work center) will be 18,708,816 euro per year.

Considering the time for finalizing the operation to be 3 years, on 6 working centers, the total costs will be 336,758, 688 euro to which we add the VAT of 24% resulting the total of 417,580,773.12 euro

Practically, the total estimated profit will be (in the hypothesis that it is not estimated on 3% and the dismember costs are included in the estimate) equivalent to the value of the scrap resulted from the exploitation of 182 shipwrecks with a medium weight of 300 tones:

182 ships x 300 t x 0.8 x 250 USD/ 1.12 = 9 750 000 euro

The profitableness of the operation will be about 2,33% under the hypothesis that the refloating costs will be totally financed from European founds. If it will be included in the estimate a profit of 3%, then the profit will increase with 10 359 610,56 euro, and the operation profitableness will be about 6%.

Note: Taking into account the fact that the project beneficiary must guarantee a 15% co-financing from the project value (about 65 mil. euro), then it's refloating operation it is not profitable. That's why for analyzing the efficiency of the refloating operations of the shipwrecks we will identify the EU minimum subvention necessary for covering the costs generated by the operation for a certain number of shipwrecks that will be removed. For totally recovering the expenses for 182 shipwrecks, in average for each shipwreck it should be cashed in from EU about 25 000 euro. This is doable with the mention that the calculation were made based on a series of simplifying working hyphotesis among which the fact that the ships have an average of weight of 300 tones and the price for scrap is 250 euro/tone etc.

5. CONCLUSIONS

The ship refloating operations are very complex. Their management involves the adaption of methods and plan of action depending on a series of factors mentioned above for which the innovation is its main characteristic. The practical experience allows the diversification of management solutions so that apart from the economic and social benefits of operations we obtain new knowledge in management field. We emphasize that the management of ship refloating operations and removal of shipwrecks represents a mixture of technical and economic knowledge and involves specific competences in the field approached. It's obvious that before any action must be simulated the unreeling modalities of the operations, the possible calamities and the adverse effects. (Popescu, 2015)

The efficiency of these operations is supported by their EU financing. If we limited to the scrap revaluation, the recovery percentage of expenses would be between 3% and 80%. This variation margin is because the refloating conditions from one ship to another are extremely different. In addition, it will be avoided the shipwrecks with high costs of removal. Certainly, if EU finances this kind of project the technical problems that require an adequate infrastructure won't be avoided as exist the necessary reserves for the shipwreck buying under different legal forms. In fact, the project efficiency has multiple social, economic and cultural components which the beneficiary does not quantify directly, being under the strict pressure of the economic efficiency.

For the economy of EU and the Danubian countries it's imperative the urgent starting of financing such a project.

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