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TITLE OF DIPLOMA THESIS:

THEORETICAL APPROACH OF COST-BENEFIT ANALYSIS OF INFRASTRUCTURE PROJECTS AND FEASIBILITY STUDY ANALYSIS OF A TRANSPORTATION PROJECT.

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ABSTRACT

The present dissertation studies the economic, social and environmental assessment of a roadwork project and its feasibility to society and National Growth in terms of its contribution to the implementation of the design of Regional Development Plans. The project in question is the “Improvement of the level of road safety of the THESSALONIKI-POLYGYROS motorway (MOTORWAY 16) - motorway section THERMI- GALATISTA (with an overall length of 23.4 km). The study requires the collection of various types of data regarding all kinds of cost involved and the parameters that affect the environment and society. The processing of the above-mentioned data includes the following stages: 1. Financial analysis, concerning its sustainability and highlighting the need for its co-financing by the European Union Structural and Investment Funds according to EU’s directives. Therefore, there should be an estimation of all financial data of the project (investment cost, operation and maintenance, revenue, residual value, etc.) and the processing of the assessment and co-financing criteria (FNPV, FRR), 2. Economic analysis, in order to draw conclusions as regards the external effects bringing about social and environmental benefits and costs. We consider data like the impact of pollution on the atmosphere, the soil and subterranean water, noise emissions, the impact of the project on accidents and transport duration and others. All the data is quantified and its financial value is estimated in order to come up with comparable figures in the overall valuation of the investment activity, 3. Sensitivity analysis, to find the critical and non-critical variables of the projects, 4. Risk analysis, to process undesirable incidents that affect the project, which includes: a) qualitative risk analysis, which is conducted through the use of the “PROBABILITY AND IMPACT MATRIX”, to determine the risk of each undesirable incident and the measures required in order to prevent and mitigate each risk and b) probabilistic-quantitative risk analysis, to deal with the remaining high-probability risks involved even after the qualitative analysis. During this procedure, there is a processing of all aforementioned critical variables by determining their reasonable value variations, about which the values of the assessment criteria (NPV και IRR) provide information relevant to the risk level of the project. The assessment of the aforementioned investment was conducted based on the following indicators: • The Net Present Value (NPV) • The Internal Rate of Return (IRR) • The Benefit- Cost ratio (B/C ratio). From the analytical estimations we can conclude the following: • The Financial analysis indicates that there is a need for the European Union to co-finance the project; and in view of the fact that there are no proceeds (tolls), the project is not financially sustainable, • The Economic analysis produces positive assessment indicators ($NPV > 0$, $IRR > r$ και $B/C > 1$), which ensures the social and environmental feasibility of the



project, • The sensitivity analysis within the Financial analysis did not produce any critical variable, while the Economic analysis produced only one critical variable (AADT), for which a probabilistic risk analysis followed, • As regards the AADT and the investment cost (which the qualitative analysis showed to be at high risk), the probabilistic analysis showed that the investment is safe and beneficial for the society considering any possible changes of the aforementioned variables. The analysis was conducted regarding a 30-year assessment period, with a 3-year long construction, during which the existing road was under constant operation. The procedures followed are mainly based on: The directives, analyses and demands included in the new 2014 publication of the “Guide to Cost-Benefit Analysis of Investment Projects” regarding projects co-financed by the Structural Funds of the European Union, well known software which solve problems of high complexity (e.g. @risk software - Monte Carlo simulation), an online search for programs, examples, articles and instructions relevant to the aforementioned analyses, project data from EGNATIA ODOS S.A., essential for the dissertation.

KEYWORDS

Cost-Benefit Analysis, Financial Analysis, Economic Analysis, Feasibility Study, Risk Assessment