

# **ANALYSING THE CASE OF RION-ANTIRRION BRIDGE THROUGH THE LENSES OF A REDEFINED NOTION OF MUTP SUCCESS: VISIONS, CHALLENGES AND LESSONS**

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## **ABSTRACT**

This paper draws from the outcomes of the research done in Greece by the Greek partner team of OMEGA Centre. Rion – Antirion bridge has been one of the 33 Mega Urban Transport Project (MUTP) case studies on which the OMEGA Centre’s international research programme was based on. The main objective of this case study research has been to investigate, through both secondary and primary<sup>1</sup> data analysis, the sustainability achievements of the project and the treatment of context, risk, uncertainty and complexity in the course of appraisal, planning and evaluation of the project. In this paper, we present the main findings from the analysis of the performance of the project concerning the above achievements along with the feedback from interviews informing the hypothesis that the aforementioned performance (in sustainability and the treatment of risk, uncertainty, complexity and context) is a measure of competence in MUTPs’ decision-making and a measure of MUTPs success in the 21<sup>st</sup> century.

*Keywords: Mega Urban Transport Project, Rion – Antirion Bridge, Sustainability, risk, uncertainty, complexity, context, decision – making*

## **RION – ANTIRRION BRIDGE: FACTS AND FIGURES**

The Rion–Antirion Bridge is considered as a modern landmark of modern Greece. The cable-stayed component of the bridge has three central openings of 560 meters each and two of 286 meters each at the edges. These are based on 4 pylons, whose height above sea level reach 159 meters and are founded at depths ranging from 48 to 64 meters with pedestals (see figure 2). The length of the access bridges is 378 meters on the side of Rio and 252 meters on the side of Antirion (Papanikolas 2004, [www.minenv.gr](http://www.minenv.gr), accessed on 2/12/2009,

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<sup>1</sup> Primary data include fourteen fully subscribed interviews with various key decision – makers and stakeholders of the project.

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[www.gefyra.gr](http://www.gefyra.gr), accessed on 10/07/2009). This project's construction begun in 1998 and was completed in 2004; since then it is in full operation. The 7-year construction period consisted of a 2-year design and preparatory works period and a 5-year pure bridge construction period (Gefyra SA). The cost of construction was about € 800 million and the project was procured as a concession-type PPP.



Figure 1 - The Rion – Antirion Bridge and the national road transport network its location (source: [www.iabse.gr](http://www.iabse.gr) accessed on 16/07/2009 and Pilassi du Rausas, 2006)

The Bridge has been designed and constructed in order to cope with the exceptionally difficult physical conditions in the straits between Rion and Antirion which are high water depth, deep strata of weak soil, very strong seismic activity, strong winds and fault displacements. In addition, the risk of heavy ship collision had to be taken into account as well as the non-stop serviceability of the link (Combault, 2008, Kouloumbis, 1978, Efpalinos Techniki, 1992). For these reasons, quite innovative techniques needed to be developed, such as improving the strength of the in-situ soil by means of inclusions and suspending the bridge deck on its full length so as to be as isolated as possible (Combault, 2008). The technical innovations that have been employed for the realization of this project are manifested by their numerous references in the scientific and technical literature.

The bridge is located in the Region of Western Greece and crosses the Gulf of Corinth connecting the Peloponnese with mainland Greece. The Rion - Antirion Bridge links the towns of Rion at the outskirts of the city of Patras (Prefecture of Achaia, south coast) and Antirion (Prefecture of Aitoloakarnania, north coast). The Bridge links two major road axes of national importance, notably the “Ionian” axis (green line in figure 4), crossing the western part of the country and the segment of PATHE axis (Patras - Athens - Thessaloniki – Evzonoi (FYR Macedonia border) on the north coast of Peloponnese (Law 2395/1996). The “Ionian” axis, thus, besides providing better access to the isolated Region of Epirus, also constitutes the link between Egnatia Odos and PATHE integrating the road network on a national level (Law 2395/1996). The bridge's role is enhanced by its proximity to the port of Patras which, together with the port of Igoumenitsa (northern on the western axis), are the main sea gateways of Greece to Western Europe through Italy (Law 2395/1996, Pilissi du Rausas, 2006).

At the time Rion–Antirion Bridge was planned, constructed and delivered the road network linked with the bridge was in poor condition and not up to motorway standards. All roads, Egnatia Road, the Peloponnese part of PATHE and the Ionian Axis were of quite poor standards or had major segments of them still under construction. Gradually, since that time, these road links have been significantly upgraded and it is anticipated that by year 2014 the remaining roads links will be upgraded to motorway standards (the remaining parts to be upgraded/built are denoted in red and dotted-green colours in figure 5) ([www.yme.gr](http://www.yme.gr), accessed on 12/12/2009).



Figure 2 - Current status of national road transport network (Source: TEN-T EA web-site (<http://tentea.ec.europa.eu/>) and processed by the authors)

### **Project Timeline: Key Enabling Mechanisms and Decisions to Proceed**

The first conception of the Rion-Antirion Bridge was as a rail link project back at 1889 at the time the Greek railways were initially planned and developed. For many years, the bridge had been a vision project, however, it took almost a whole century until the Greek State managed to invite tenders for building a fixed link between Northwest Peloponnese and the mainland. In 1964, there were conducted some initial geotechnical surveys and in the strait between Rion and Antirion (Kaiafa, 2003) and from 1974 to 1977 two national and an international conferences about the potential solutions for the implementation of a link, generating a serious scientific discourse (Gefyra S.A, 2005, Kouloumbis, 1078). In 1980, the Greek State decided to invite tenders for building the fixed Rion - Antirion Bridge. Unfortunately, this first invitation did not proceed beyond the first phase, which included expressions of interest and general suggestions, because there was no interest from the construction companies. As a result the tender was cancelled (Law 2395/1996, Gefyra SA, 2005, INT6).

From 1981 to 1985, the center-to-left wing political party "PASOK" (that won the national election in 1981) excluded the bridge from its initial agenda (Gefyra SA, 2005). However, by 1986 and in view of the potential heavy EU funding that Greece was about to obtain, the same government (PASOK) started envisioning an ambitious program to modernize transport infrastructure and Rion-Antirion bridge re-entered the agenda. The Ministry (MEPPW: Ministry of Environment, Planning and Public Works) started contacting invited teams from GTM and other large experienced constructors from abroad to explore the feasibility of potential large transport projects located mainly in Athens but also the bridge for which the ministry asks for informal feedback from GTM representatives who had shown a

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special interest in the project although they were not sure that the project is technically feasible given the very high seismic activity of the area (Gefyra SA, 2005).

The feedback from GTM in early 1987 was that a link could be a cable stayed bridge, despite the great deal of unknown physical and environmental conditions in the strait (Gefyra SA 2005, INT24). The Ministry by mid-1987 had hired consultants and engineers to prepare the tender documentation and had also already commissioned geotechnical surveys, through-drillings under the seabed. The surveys proved that the subsoil was extremely unstable, so the idea of an underwater tunnel was abandoned (Gefyra SA, 2005). In 1987, a new international tender call for the design, construction and financing of the project, through public work's procurement, begun. At the end of March 1988 five consortia submit proposals (Gefyra SA, 2005, Law 2395/1996) and after prolonged evaluations a French group (led by GTM) gained ground (Gefyra SA, 2005). However, the state had still doubts on some aspects of the technical offers and moreover had serious worries about how much the actual final cost of such a technically complex project would be and how this cost would be financed (INT16).

In early 1989, while PASOK was still the governing party, GTM initiated a discussion with the state about the benefits of a potential PPP arrangement for the procurement of the project (INT16). However, serious political unrest, from June 1989 onwards, resulted in the suspension of procedures due to the reluctance of the transitional governments to make a decision for such a big project (Gefyra SA, 2005). In April 1990 the project is back on the spotlight, but in a new framework: the project will be tendered as PPP concession. In December 1990 the competition that was launched in 1987 was cancelled (Gefyra SA, 2005, Law 2395/1996).

In 1991 the MEPPW launches a new tender process (by a call for an expression of interest), for a concession-PPP for the design, construction, financing and operation of the project (Gefyra SA, 2005, Law 2395/1996). In summer 1992 new drillings to investigate and appraise the sea bottom were undertaken, which were necessary for the design of the bridge (Gefyra SA, 2005). In autumn 1992 the new tender is released, but the risk-sharing proposed by the tender call is seen as inappropriate by both the private parties and the banking sector. Some of the comments of bidders regarding risk – sharing and the results from investigations are amending the tender documentation and, after a number of postponements that the bidders had asked for, the 1st of December of 1993 was decided to be the deadline for submission of the bids (Gefyra SA, 2005, INT24). Only two bids were submitted and group “Gefyra” (GTM led) became the preferred bidder since the other bidder was proposing a tunnel which was not consistent with the tender requirement for either a high or floating bridge (Law 2395/1996, INT6).

In 1993 the Rion-Antirion Bridge was appraised in the framework of a national transport study called GREECE 2010 that also provided an input for the 1994–2000 and the 2000-2006 EU Community Support Frameworks. The study produced a critical input for the accurate appraisal of the traffic of the bridge since it considers the traffic impact to the bridge of the gradual realization of an upgraded national highway network linked with the bridge. The study refers to Rion–Antirion bridge as a vital link of a national transportation network development plan (Transport Research and Development International, 1995).

In December 1994 the EC Essen summit identifies 14 priority transport projects (TEN-T). These included the PATHE motorway in Greece (Patras - Athens - Thessaloniki – Evzonoi/FYR Macedonia border) while the Rion–Antirion bridge was incorporated into PATHE (Gefyra SA, 2005, INT24). This was regarded as an absolutely critical milestone for the realization of the project since it enabled the provision of the EIB loan to the project (EIB

would be the only bank that could provide a 20-25 years maturity loan on a project like this in Greece at that time). EIB had a negative view regarding the necessity and the benefits of such a technically complex project but after the inclusion of the projects into TEN-T priority projects, the bank had to revise its position (INT 24).

In March 1995 the European Commission examined the lawfulness of the tender, after the appeals of the bid competitors on the grounds of the tender procedures and the financial offer of “Gefyra” which was contradicting the tender requirements (and also that the technical offer was not based on a previous application and had not a definite and finalized approach to various technical matters). After a period of uncertainty and serious disputes, the European Commission finally rejected the appeals. Some remaining issues of deviations between the tender call and the financial offer were left to be settled in the concession contract that would be ratified as a law by the parliament so as to be immunised from appeals (Gefyra SA, 2005, INT24, INT16).

In January 1996 the concession contract was signed by the Greek Government and Gefyra SA (Gefyra SA, 2005). In general, there were many issues that needed to be properly contractualised in order for the project to be bankable and both “Gefyra” and the state to feel partners in a fair deal. Those issues had principally to do with the risk (INT16). Major issues were the definition and allocation of force majeure risks and the control of the design and progress of work that had to be assigned to an independent checker and an independent supervisor since the state was not capable to carry-out such a job for such an innovative and technically complex project, despite the fact that the Ministry initially did not want to out-source and neutralise the control (INT16).

A critical decision made just after signing the concession contract was the agreement between the state and the concessionaire to sign the so called “Contracts before the effective date”. These contracts, which were executed in the period between the signing of the Concession Contract and the financial close, allowed the implementation of geotechnical surveys in the subsoil of the seabed. These works were necessary for the confirmation of the construction design assumption and the progress of the final design and were exclusively paid by the state. In the case that the financial close was achieved, the money paid by the state would be deducted from the state’s subsidy; otherwise Gefyra SA would just deliver the full survey outcomes to the Ministry (INT16). These surveys played a very important role in the negotiation with the EIB, since they were proving a maturity of the design of such a risky construction. Finally, in April 1996 the concession is ratified by the parliament (Gefyra SA, 2005).

In December 1996 the Executive Committee of EIB approved the provision of the long term loan to Gefyra SA. EIB was initially not comfortable to provide the long term loan, but they had (since the bridge was a TEN-T priority project) to appraise again the project’s Cost-Benefit ratio and moreover their credit risk. This time, a signed concession contract was in place, which according to EIB’s initial view was addressing risk-sharing in a secure way (INT16). Moreover, a new more advanced Cost-Benefit analysis had been conducted showing the socio-economic benefit of the project (INT16). However, EIB was still expressing a strong stance against assuming credit risk. The relevant issues were resolved mainly through: i) the provision, by the Greek Government, of a “stand by” loan to the concessionaire, which could only be used in case the concessionaire could not fulfil his financial obligations to EIB during the operation of the bridge (INT25, INT11, Gefyra S.A.) and ii) the provision, by a syndication of commercial banks (led by the Bank of America and the Bank of Tokyo – Mitsubishi), of guarantees to the EIB loan to Gefyra S.A. during construction period (INT25, INT11, Gefyra S.A.). In July 1997 the Master Facility Agreement of 370,000,000 € and 25 years repayment period is signed between Gefyra SA and

European Investment Bank (EIB) (Gefyra SA, 2005, INT16, 2004) and in December 1997 the Financial Close was achieved and the concession commenced (Gefyra SA, 2005).

The Ratification Act of the concession contract states that, if any amendments were needed for the bankability of the project, they can be made by Presidential Decree, without going to the Parliament (Law 2395/96). This proved critical, since the concession contract had to be amended (by Presidential Decree 387/1997 in December 1997) in order for specific issues to be clarified and well defined according to the demands of the banks. Also, the amendment allowed for some financial and technical aspects to be articulated more concretely. It is appropriate here to mention that the practice of amending a law with a Presidential Decree could cause serious legal concerns with regard to the power and significance of a Law. However, it should be recognized as a confirmation of the importance of the role of banks and sponsors and their power over the original parties (Trova and Koutras, 2001).

In December 1997 the concession of 42 years came into effect just after financial close. Thus, the project had to start operating, 7 years after the beginning of the concession, on the 24th of December 2004 (Gefyra SA). In September 2000 the first base for the bridge was constructed and after almost 4 years, in August 2004 the Olympic Flame passed over the bridge with final destination the Athens Olympic Games that would begin in 5 days (Gefyra SA, 2005). In August the 12<sup>th</sup> of 2004, the bridge was opened to traffic (Gefyra SA, 2005). In December 2039, the concession period will end (the control and operation of the bridge is to be handed over to the Greek state). However, the concession will end earlier if the concessionaire achieves a predetermined Return on Equity as defined in the Concession contract (11.5%) (Law 2395/96).

## **RESPONSES FROM INTERVIEWS REGARDING PROJECT SUCCESS, ITS MEASURES AND CRITERIA**

### **What constitutes a successful MUTP in the 21<sup>st</sup> Century?**

A number of responses relate success to technical criteria such as design - construction competence and durability. Financial criteria, also, appear to relate to success. Those include the inexistence of cost overruns and the financial success of the project as a PPP (bankability and profitability). A number of respondents predominately relate success with the travel-time savings, the service quality and the contribution of the project to the economic development. There were also interviewees that responded with more holistic approaches to success such as the degree that the project, as an integral part of a spatial plan, is an outcome of wider comprehensive planning (not only based on transport interventions). Others directly relate success with the degree that the project has fulfilled its predefined objectives, the degree that the project achieved minimal negative environmental and social externalities, the degree that the project performance did not deviate from forecasts and finally the degree that the project has been appraised against alternatives on the basis of a balanced spatial development.

## **Are traditional criteria<sup>2</sup> adequate measures of success in the 21st Century as sustainable development concerns become very critical?**

Traditional measures of success (cost overruns, completion dates, and generation of travel time savings for users and rates of returns to investors) are still considered by a majority of respondents as major criteria of success. The interviews revealed a need for attaching quantifiable and measurable criteria to success. Interviewees responded to the project success related questions without linking it with sustainability. However, success was related with fundamental aspects of sustainability while sustainability was not mentioned as a term/notion. In this sense, interviewees tended to stick to an aspect of sustainability, attach special value to it and present it as an achievement (or measure of success) of the project despite the fact that the project was not planned and implemented on the basis of the sustainability vision. The “flexibility” and the “catch-all” character of the term allows for that but also allows for the ignorance of the strategic nature and time and space broadness of the sustainability vision. There has not been nearly any reference outside the local/regional dimension of sustainability by anybody. Moreover, it is noticeable that respondents do not seem to perceive that sustainability becomes much more urgent as an objective in the 21<sup>st</sup> century. To conclude, the hypothesis that sustainability concerns ought to lead to another set of project success criteria cannot be falsified since sustainability is stated as a foremost concern of all stakeholders despite the fact that is not explicitly related to success.

Particularly with regards to the breadth of the notion of sustainability and its dimensions, we have to stress that respondents did not make any clear and explicit reference to sustainability as being multi-dimensional, embracing the interrelated concepts of economic, social institutional sustainability. However, almost all respondents, through an evaluative approach about the project, pointed out major concerns belonging to all those 4 dimensions of sustainability. It has also to be stressed that respondents tended to award more importance to the project challenges related to the environment and the economy. With respect to the respondent’s perception of the sustainability concept, there is a clear tendency to primarily relate sustainability with ecology. The institutional dimension of sustainability, in particular, is mostly discussed in a very generic and implicit way by pointing out the structural inefficiencies and the lack of capacity of the institutions responsible for planning and governing projects and the limited public participation procedures.

## **Is the level of competence in MUTPs decision-making best assessed by the adequacy of the treatment of risk, uncertainty and complexity and sensitivity to context?**

Respondents in general perceive RUC and context sensitivity as absolutely essential in the process of decision – making but there is serious ambiguity on what RUC and context sensitivity would mean when talking about the decision – making process.

A RUC and context sensitive process of decision-making would require the absorption of feedback from a wider set of stakeholders; a less centralized and politicized decision – making approach. Respondents were not always expressing views in favour of that approach. Some of them were insisting that openness and pluralism in decision – making was granted by the fact that the project was known for many years before its implementation.

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<sup>2</sup> Relating to cost overruns, completion dates, generation of travel time savings for users and rates of returns to investors

Others were insisting that the mechanism and procedures for the absorption of feedback from stakeholders were very poor and some others that openness would threaten the progress of the project. What is widely accepted by all respondents is that the involvement of experienced and competent partners in decision – making is something that enhances a RUC and context-sensitive decision-making approach.

In the case of Rion – Antirion Bridge there appeared some conditions that enabled or hindered RUC treatment and context sensitivity. Those conditions are linked with the degree of competence of the directly involved institutions / companies / stakeholders but also with the communication between the decision-makers and the existence (or not) of formal and informal mechanisms that assist the converging to wise decisions at times of changing circumstances and challenges. It can be said that those conditions had been cultivated to a great extent because, as respondents have discussed, there was a risk and context-sensitive decision-making “regime” especially between the state and the concessionaire. This has to do with the fact that the severe risks, emanating from the technical and financial challenges of the project, were known well before the initiation of the project implementation. In this sense, there was time for concentration of resources, consensus building and familiarization of the strengths and weaknesses of the two parties. All those aspects of decision-making have been discussed as beneficial to the success of the decision – making processes and outcomes.

### **How important is context in making judgments regarding project success and RUC treatment as a decision – making competence factor?**

In the case of Rion – Antirion Bridge, respondents stressed the importance of context by awarding special importance to various contextual challenges such as the geographical context, the technological, the EU funding regime, the national legal and institutional context and the context of Rion – Antirion Bridge being perceived for Greeks as a dream project (a further analysis is done in detail in the next section of this paper). Overcoming or taking advantage of the implications of the above challenges has apparently been a factor which has formed the respondents’ perception of success for the project. On the other hand, the risks and complexities that the above challenges have posed to the project is something to be largely attributed to the competence of decision – making processes. As such, the decision - making competence is tested against the degree that the contextual challenges have been successfully treated.

## **TIERS OF SUCCESS: ANALYSING THE ACHIEVEMENT OF STATED PROJECT OBJECTIVES AND, THE SUSTAINABILITY ACHIEVEMENTS OF THE PROJECT AND THE TREATMENT OF CONTEXT, RISK, UNCERTAINTY AND COMPLEXITY**

In this final part of the paper, we analyse (using both the responses from interviewees and secondary data) the success of the project through a two-tier evaluation approach. Firstly, we examine the degree that the project has achieved what has been declared that the project was planned to achieve. If, in other words, the benefits that the project was planned to provide have been realized. We consider this first tier of evaluation as an essential test to whether the project is successful. We then proceed to a second tier of success evaluation



based on the hypothesis that MUTPs' success in the 21<sup>st</sup> century has to encompass a multidimensional sustainability ideal together with decision – making competence in the treatment of context, risk, uncertainty and complexity. In this sense, we investigate how and to what degree the project has achieved to be sustainable and has also achieved to successfully treat RUCC. The fact that the entire analysis is largely based on a wealth of primary data (from in-depth interviews) has enabled the generation of insights on the MUTPs decision – making processes and outcomes. This has facilitated our attempt to produce lessons of both context-specific and generic nature for the MUTP decision-makers and stakeholders.

### **The first tier of success: Has the project achieved its initially stated and later developed objectives?**

The introductory report of Law 2396/1995 for the ratification of the concession contract states the project objectives by describing the importance and necessity of the project. More specifically, the report states that:

1. The connection between Rion and Antirion is undertaken by ferry-boats and the average crossing time is 45 minutes. The bridge will drastically decrease travel time providing, consequently, fast and safe movement of people and goods and a new prospect for the development of the regions of Peloponnese and Western Greece. The bridge will decrease crossing travel time per car by about 40 minutes, and will consequently decrease the total cost of crossing the strait.
2. The bridge will provide a segment of PATHE TEN-T (belongs to TEN-T priority axis 7)
3. It will diminish the pollution and general unrest caused by the car and truck congestion in the ports of Rion and Antirion which will be free of congestion.
4. The bridge, as a part of Western Road Axis from the Albanian border to Kalamata (on the south-west of Peloponnese), will connect PATHE with Egnatia Road, which were the two TEN-T priority axes at that time, enhancing the country's connection to Italy and the rest of Western Europe through the ports of Patras and Igoumenitsa.
5. It will improve the comfort, reliability and quality of service and ensure the continuation of service regardless of weather conditions.
6. The bridge will contribute to the economic and cultural development of the geographical areas of Peloponnese, Western Sterea Ellada and Epirus.
7. The project will provide a basis for the housing development and the production restructuring of the wider area around the bridge. For this purpose, special plans would be conducted and applied for the Gulf of Corinth, the municipality of Rion and the prefectures of Achaia and Aitolokarnania, as well as restoration works for the Byzantine castles of Rion and Antirion.
8. It will enhance the competitiveness of businesses and lead to the establishment of new ones in the isolated areas of the north-western parts of the country as well as the socio-economic and cultural development in these areas.

The Rion Antirion Bridge has been realized as designed and tendered. In this sense, the existence of the bridge itself has accomplished all objectives from 1 to 5. In other words, those 5 objectives were articulated by the government in a way which meant to manifest that if the bridge is realized then all those objectives will evidently be accomplished. Evidence (published in [www.gefyra.gr](http://www.gefyra.gr)) and information gathered from our interviews with people from Gefyra S.A., show that:

- i) The planned travel time decrease has been definitely achieved and the actual traffic is close (though marginally higher) to what was forecasted,

ii) The bridge is a safe project: only one fatal accident has happened in 4.5 years of operation, which was due to a mistake of a bicycle rider. Another incident has been when a cable link of the bridge broke from the top of the third pylon and crashed on the bridge deck. Traffic was halted and the cable was restored and the bridge re-opened. Investigations claimed that the accident was not due to a fault of the design construction or maintenance of the bridge but probably of lighting-hit.

iii) Reliability, quality of service, continuation of service regardless of weather conditions have been achieved. Before the bridge, the ferry service between Rion and Antirion has been occasionally halted mainly due to severe wind conditions that did not allow the ferries to cross the strait. The Bridge made the permanent connection feasible. According to the construction specifications, the bridge is built to withstand a collision of a 180,000 tons tanker, wind speed of 250 km per hour and over 7 Richter scale earthquakes ([www.gefyra.gr](http://www.gefyra.gr)).

The objectives from 6 to 8 imply that the bridge will not make them achievable on its own. However, it is implied that the bridge will contribute to achieving those objectives, which all of them relate to wider - in both spatial range and temporal horizon - development goals for the Prefecture of Achaia and Aitolokarnania and the regions of Western Greece, Peloponnese and Epirus. As such, a fair judgment can only be based on their accomplishment in the long-term and moreover, a potential evaluation has to consider the degree to which other policies and projects (in and outside transport and spatial planning) have assisted the development of the area. In any case, the bridge may be regarded as a “facilitator” of those development-related objectives, given also that the geographical area from Antirion to the Albanian border is isolated in terms of access to the national road network and one of the most lagging areas in EU in terms of GDP per capita and employment.

Regarding the preparation of plans stated in objective nr. 7 we have to stress that since 1995, when the proclamation of those plans and studies was made (in the introductory report of Law 2396/1995), there have been prepared a number of plans and studies concerning various geographical scales, ranging from the direct influence zone of the bridge to the wider metropolitan area of Patras but also ranging from local land-use to regulatory and strategic character. However, those plans are still in the process of finalization and consultation and still, after almost 15 years of the relevant proclamations, they have not attained a statutory standing so as to be applied and enforceable.

Regarding the production restructuring stated in objective nr. 7, we have to stress that according to data from Labour Force Bulletins of the National Statistical Service of Greece ([www.statistics.gr](http://www.statistics.gr)) and ICAP (2007), the production restructuring of the Region of Western Greece is definitely not significant nor can be attributed to the existence of the bridge. However, the marginal economic restructuring that can be noticed is, to some extent, showing a path to competitiveness and some dynamism for the wider Patras city area, but not necessarily the entire region.

### **Delays and Cost**

It is rather obvious that the project's construction within the predefined budget and time comprises an essential project objective. Based on the data presented in the web-site of Gefyra S.A (and also data acquired during visits in Gefyra S.A.), the project achieved a timely construction without significant budget overruns. However, the period from the tender until the beginning of construction, had some prolonged periods of poor progress caused by

the appeals to the EC from the competitors after the tender and the difficulties in finalizing the PPP contractual framework and achieving the financial close.

### **Remarks and Lessons**

If for the purposes of this analysis we have to conclude to whether the project achieved the stated objectives or not, we have to accept that an overall answer would be positive. However, this exercise of evaluating Rion – Antirrion Bridge against the objectives directs us to also point out the following comments and lessons.

A fundamental reason why the state/ministry (or any other governing structure/entity at lower level, responsible for planning and implementing a MUTP) should state a set of objectives would be to make them widely known so as to initiate a debate around them. In this sense, the statement of objectives would also provide a basis for an evaluative discussion on the project's achievements and success. In the case of this project, the stated objectives had the character of a declaration in the introductory report of the law that ratified the concession contract. Those objectives were stated at a time that the bridge was already tendered and the actual reason that they are appearing in that document is to provide a summary on the usefulness of the potential bridge. Only in the case that the bridge had not been implemented at all, would somebody actually challenge those objectives. As far as particularly objectives nr. 6 to 8 are concerned, you cannot actually challenge the achievements of a bridge by criticizing "wishful thoughts" regarding the future of an entire area, region or country. If those "wishful thoughts" have not come true at the time that an evaluation is taking place, you cannot argue that it is a poor achievement of the project. You cannot even judge the wider plans and policies that would assist the realization of those "wishful thoughts" since there was not any measurable target set in terms of time horizon, and degree of accomplishment.

We believe that objectives should be set earlier and should be communicated – not "hidden" in an introductory report of a law. They should be articulated in a way that makes them contestable by stakeholders, impacted people and evaluators.

If the objectives set are contingent to the success of an entire program of projects/policies then those objectives are not objectives of the project, but objectives of a plan. In such case, the plan should ready and agreed and this plan's objectives should be the central concern of planning and evaluation.

In any case, a vision for a whole region can be facilitated by an MUTP but an MUTP cannot on its own show the way forward if not assisted by other projects and policies integrated into a plan. An impressive project does not guarantee an impressive impact.

### **Positive and negative achievements to sustainable development?**

In this section, we analyze the project's major positive and negative achievements to sustainable development. The analysis is based on the following categorization of relevant impacts/outcomes of the project which appear as the most important:

#### **Sustainable Construction and Operation**

Building a fixed structure to link Rion with Antirion is considered as much more environmental- friendly than the connection with the ferries, which were heavily polluting the marine environment (see INADE 2002) and moreover, during the periods of high traffic, there was car and truck congestion in the ports of Rion and Antirion. Apart from that, the impact on

the marine environment would be much heavier if a tunnel alternative or other submerged structure had been chosen (which were initially considered as alternatives).

A satisfactory level in the environmental performance of construction and operation is also guaranteed by the EIA terms that the project has satisfied. Moreover, the environmental friendliness of the operation of the bridge is enhanced by additional measures that the operation company has taken. These include the minimization of greenhouse gas emissions by using new technologies for its own operation (lighting, own cars, heating and ventilation, etc), initiating marine environment protection policies and activities in the gulf of Corinth, carrying out awareness and educational campaigns regarding eco-driving, and hedging their greenhouse gas emissions with green energy investments in India (INT24 and data acquired during the visit at Gefyra SA)

The durability of the project is also of significant importance. It has been the major challenge since the bridge was considered as a very complicated technical achievement that had to cope with an extreme combination of construction challenges.

In the sustainable operation domain we must include the economic viability aspect of the project which can also be regarded as an achievement. The traffic revenues are adequate for the concessionaire to operate and maintain the project, repay the loans to EIB and also make a considerable profit. According to the respondents, this is very much credited to the thorough traffic and financial appraisal conducted by the concessionaire and the state so as to determine the appropriate toll level and sources of funds in the PPP arrangement. However, respondents from the private partner express some worries regarding the future traffic after the full completion of the national highway network.

### **Social and Economic Cohesion on a National Scale**

The social and economic cohesion on a national scale can be regarded as a sustainability aspect and the discourse on the role of the bridge in the balanced development on a national scale has been very prevalent in the interviews and in the relevant academic literature. However, social and economic cohesion on a national scale can not be achieved through the upgrading of a bridge as a part of a highway which is not yet integrated into a national highway network. Moreover, wider social policies and interventions are definitely needed, especially in the case of Western Greece and Epirus (which were the two regions of the bridges direct influence) where declining agriculture and rurality are considered as major causes of poor economic performance. The relative low ranking in economic performance and employment is remaining until today. However, as said before, the bridge is only a facilitator in this process, and moreover, the rest of the western axis has not yet been constructed as a motorway. In any case, economic performance impacts should probably be evaluated in the longer run.

An additional issue of importance in the discourse regarding the social and economic cohesion on a national scale is the national rail network. Epirus and Aitolokarnania (the part of Western Greece region lying north of the bridge) are not accessed by train at all (see figure 2). Moreover, the rail link to Patras and the southern part of Western Greece (south to Rion Antirion Bridge) is in very poor condition. The extension and upgrading of the rail network in western Greece is still in the phase of studies and planning and it is rather unknown when any kind of improvement and new lines will be implemented, besides the Athens–Patras link which is currently in a phase of upgrading ([www.ergose.gr](http://www.ergose.gr)). The fact that the link between Rion and Antirion did not take into consideration a rail connection has been a serious critique on the projects achievements to sustainability. Our anticipation, as it derives from the respondents' views is that a rail link between Rion and Antirion could not

have been incorporated into the PPP tender due to financial reasons. In this sense, another project had to be tendered for a rail link that would cross the straits. What is also apparent is a prevailing priority to road investments on a national scale. According to the analysis done in a National Transport Study conducted in 2005 (Ministry of Economy, 2005), both the environment and the energy saving had never been objectives of the national transport policy nor issues of any serious consideration. Moreover, there was never a serious effort for a combined/integrated rail-road transport development on a country level. This is connected with some of the respondents' views, that roads are perceived by the state as projects that can be more economically implemented through concessions, which attract the private sector since they generate high toll revenues (especially in the absence of competitive roads and rail network).

It is apparent, from the above discussion, that another serious detriment to supporting, through transport investments, social and economic cohesion on national scale is the absence of a strategic transport plan as a policy document. There was never such a plan in Greece and all studies and plans that have been conducted have just a discretionary role in guiding decision-making. Policy for transport has been literally undertaken through the EU mechanisms and the relevant funding support (EC 2009). A national plan would enable the setting of priorities to transport investments on a national scale, according to considerations related to social and economic cohesion targets. In other words, if we are to judge Rion – Antirion Bridge according to its national cohesion impact, we have to consider if the money paid for this project has a high relative cohesion value for the country. This appraisal requires a wider spatial investment planning which definitely was not the one that guided decision-making towards the implementation of Rion–Antirion Bridge. The necessity of the bridge was documented in terms of a Cost-Benefit ratio and the assertion that the bridge will comprise a critical link in the future national road network, but this does not imply that the bridge had to be a first priority transport investment. There were numerous projects that could have high Cost-Benefit ratios and could similarly comprise a critical missing link. In other words, we tend to support, what is also mentioned by respondents, that the resources allocated to this project could have been allocated for other transports interventions (or investments outside the transport sector to more cohesion-sensitive sectors) that could have a more positive effect on cohesion on a national scale.

### **The Economic Development on a Local Scale**

There have been some positive impacts on this level. These impacts have been studied and publicized in media as an outcome of two evaluation studies mandated by Gefyra SA to a research team from Patras University (Bellas 2008). Those positive impacts have to do with an economic benefit of about 1 billion to western Greece from the construction of the bridge and the related activities, the potential that the bridge can be utilized as a landmark that can enhance the touristic attractiveness, the improvement accessibility in the regional level (documented by the increase in the ferry and bridge crossings after the completion of the bridge), the increased real estate transactions and finally the fact that the bridge has imposed a competition with the ferries which are applying a more rational fare pricing compared to the time that they had a 'monopoly'. The later is said to have led to a very significant economic benefit which can be estimated as 44 million euro from 2001 to 2007.

### **The Sustainability of the Metropolitan Area of Patras**

One of the main assertions of the research of the team from Patras University, on the local impacts of the bridge, is that there is an urgent need for the finalisation and approval of the Regulatory Plan of Patras along with a transport plan for the city of Patras (Bellas, 2008). This is required to regulate the development pressures to the areas close to the bridge but

also exploit the opportunities, deriving from the existence of the bridge, towards a more sustainable way. According to the analysis included in the Regulatory Master Plan of Patras which started being conducted in 2007 (still in a final phase of preparation and has not a legal standing, yet), one of the major challenges to the urban environment is the building outside the Patras urban plan limits and the need for protection, though land-use regulation and enforcement, of the peri-urban environment from the uncoordinated expansion of the city. The development pressures to the peri-urban zones have been intensified after the development of the bridge and this is also manifested by Milionis (2008) who also claims that Patras is remaining monocentric while the same time the city is expanding. The latter adds that these suburbanization shifts, characterized by low density development, will further increase in the future. To conclude, the bridge seems that has contributed to a suburbanization trend which is regarded as unsustainable. However, we cannot credit the bridge for this impact, since if an effective planning regime was there to regulate expansion pressures and apply a strategy for the area, the suburbanization could have been avoided and the bridge could have played the role of a leverage for a more sustainable regeneration of the city of Patras and the neighbouring local communities.

### **Public Participation and Stakeholders' Involvement in Decision Making**

We cannot assert any positive achievements concerning the context of public participation practice and stakeholders' involvement in the case of Rion – Antrion Bridge. Some particular remarks discussed in the interviews have to do with the opposition to the project by narrow, short-term thinking and topical interests which included the ferry service related ones and some of Rion residents' opposition to specific project characteristics such as the location of the south end of bridge. Those interests had been asserted through both formal (appeals and protests) and informal ways (by 'pushing' requests to local authorities and politicians). Other reasons of opposition to the project were not at all related to the project itself but had to do with broader antagonistic manifestations among local politicians and their effort to gain disappointed and not well-informed voters.

The long standing debate and discourse on the project has contributed to the easiness of comprehension about its function and the general awareness of the public. However, access to the project details has not been an easy process and, moreover, the constructive participation in a consultation procedure that lasted 20 to 30 days was rather unworkable. This is also due to the fact that stakeholders lacked sufficient resources during the consultation (money, researchers, and studies) that would back a well documented feedback to the consultation exercise.

A final remark has to do with the fact that the EIA was ratified as a law of the state, just as in the case of other major projects in the country. This was done at a time when there was a pending legal appeal against some of the project characteristics (not the project as a whole). According to respondents, this appeal has still not been settled.

### **Project achievements relative to context and RUC treatment in decision making?**

There were two major aspects of the context which are presented below along with the relevant RUC (Risk – Uncertainty – Complexity) challenges they have posed to the project and the way they (context and RUC) were treated. After those 2 overarching contextual aspects we will proceed to an analysis of the dominant factors that influenced positively or negatively the treatment of risk, uncertainty and complexity in the project.

## **1. The National Macro-economyc Context and the Relevant RUC Challenges Related to the Financing and Viability of the Project.**

At the time that the project was being procured, Greece was trying to achieve the macro-economic targets to enter the EMU euro zone (low government debt and deficit). Moreover, Greek banks were not offering long-term lending for PPPs and foreign banks would be uninterested to lend such a technically complex project in a country without experience in PPPs and with a considerable country risk. The treatment of this contextual challenge was treated by promoting and setting-up a PPP procurement. At that time the government was considering to implement the three large MUTPs (Athens International Airport, Athens peripheral highway and Rion Antirion Bridge) through PPPs while GTM, was also promoting/selling the idea to the state. Moreover, there has been an orchestration of moves between the state and the potential concessionaire. According to INT16 and INT24, "Gefyra" Consortium had early enough anticipated the difficulties that would be faced in finding long term lending. "Gefyra" Consortium was led by GTM which had a serious previous experience in concessions. Accordingly, "Gefyra" had firstly made the financial bid to the PPP tender with the support of an experienced international bank; and then, after they won the bid, they had the support of the Bank of America as their financial advisors and they also had communicated with EIB and many commercial banks to enquire about their interest well before the signing of the concession contract. They were aware that financing will be very tough and they had very well informed the state about that, while the state from its side was willing to assist and co-operate for this common goal. The financing challenge was largely dependent on whether EIB would provide long-term lending and the accomplishment of this was clearly an outcome of the commitment and the joint effort of both the private partner and the government.

## **2. The Physical Characteristics of the Strait and the Location and the Relevant RUC Challenges Related to Design, Construction, Cost, Implementation Time and Operation.**

The physical features of the strait present an exceptional combination of many adverse conditions such as water depths up to 65 meters, deep strata of weak seabed subsoil, strong seismic activity and tectonic movement, windstorms and the traffic of ships. According to analysis of the respondents' views, this contextual aspect has been treated by: i) the early initiation of both the scientific discourse and the construction industry's interest, ii) the early involvement of a competent and committed constructor that wanted to produce a unique project and allocate resources in the project in order to develop engineering innovation, iii) the state's tendency to conform to the demands of the constructor so as the project to be properly studied and constructed (this process of conformity was not always easy mainly because the Ministry did not have experience with the business practice of PPP arrangements)

### **Dominant Factors that Influenced the Treatment of Risk, Uncertainty and Complexity:**

The Cultivation of trust and good faith between the Concessionaire and the State: One of the prevailing findings from the interviews is the degree to which trust, respect and constructive communication were gradually embedded in the relations between the state and the concessionaire. The reasons for that seem to be related to i) the long time of the involvement of GTM (now Vinci) in the project, ii) the need of each other in order to cope with the risks, uncertainties and complexities of the project (GTM was not familiar with the Greek cultural and institutional reality and the state was dependent on the expertise of GTM), iii) the gradual "seducement" of both sides by the project and their subsequent strong will to bring such an achievement into reality iv) key persons and cultural harmonization. There was a Greek-

French in GTM who had been a key person in the project from 1987 onwards. This person together with other key people, especially in the GTM side, devoted almost half of their careers in this project.

The Limited Breadth and Depth of Public Participation and Wider Stakeholders' Involvement in Decision-making: This factor influenced the treatment of RUC because i) Decisions were becoming politicized, usually confined to a political risk analysis based on an internal debate within the Ministry, the politicians and the ones that have the power to enter its 'closed doors', ii) Some stakeholders (winners) minimized their own risk exposure in contrast to others (losers) that had not the means and power to do the same (in the winners' side, we include the "triangle" concessionaire-banks-state among which there was substantial risk communication, through the PPP arrangements while in the losers' side, we include the citizens of Greece as a whole, that bore the opportunity cost of a possible diversion of the money spent in the project to other projects/policies that would be more beneficial for the sustainable development of the country as a whole), iii) the breadth and depth of formal public participation which is confined to the consultation on EIA, which as a process has serious inefficiencies (short period of documenting comments, reluctance of authorities to adequately inform the public lack of capacity in the authorities to cope with the increased demands of a formal consultation process for an MUTP like Rion-Antirion.

The Implementation of the Project via a Concession PPP: The fact the project was implemented through a concession PPP influenced RUC treatment in the following ways: i) due to the project life-cycle risk rationale of a PPP (the design and construction of this technically risky project was conducted by taking into consideration the demands and challenges of operation and maintenance (and vice versa), ii) a risk-averse actor such as the banks had a positive overall role in RUC treatment for such a technically risky project, iii) there were mechanisms for involving actors that proved beneficial for minimizing uncertainty and avoiding significant risks. Such actors have been the independent engineer and checker and many other auditing actors, dispute resolution mechanisms and experienced foreign consultants, iv) the contractual and legal issues deriving from the fact that the pre-existing legal regime covering procurement had incompatibilities with the rationale and the demands of a concession arrangement, v) the immense volume of contacts/documentation and the interdependent liabilities among the parties made the widening of risk communication harder and brought additional complexity to the project, vi) the excessive power of the banks in the PPP risk contractualisation process and outcome entails risks in the sense that banks minimized their risk exposure by transferring risks to the taxpayers and the shareholders of the concessionaire.

Strategic Transport Planning and Programming on the National Level: Transport strategy in Greece is conducted and executed in a way that may negatively influence RUC treatment because i) it undermines the potential sustainability performance of the project and increases relevant risks deriving from an unsustainable future path (deriving from an unsustainable rail-road balance on the national scale; from a biased prioritisation of projects; and an unsustainable balance between physical infrastructure and institutional infrastructure investments), ii) the project may be exposed to viability risks due to competitive routes and means of transport, iii) the promotion of rail network may be influenced by the fact that the project has to remain viable.



**Lessons from testing success as being context-sensitive, sustainability dependent and linked with the decision-making competence in treating RUC.**

- A project's value has a very important intangible element which can be perceived in extremely diverse ways. Rion–Antirion Bridge was perceived as a bridge linking two villages, as EIB had initially stated (INT24) or linking nowhere to nowhere (economist 2004) and at the same time as a project in which a century of dreams has gone into it. In this sense, its implementation has been a success on its own. This intangible element of the project's value may be a decisive factor for: i) prioritizing the project against others which rationality and technocracy would indicate, and ii) putting extreme efforts to implement it successfully. In many times rationality and technocracy prove more flexible than the intangible value. No doubt that the confinement of decision–making exclusively to the higher political level is a factor that may increase the pre-mentioned bias.
- If the “service” of the project is simple (a road bridge linking two points in contrast to a metro in a city or an urban highway), then the project can proceed much more smoothly (and successfully in terms of budget and time overruns) despite any hurdles deriving from technical complexity or institutional inefficiencies.
- A project's technical and traffic aspects are always studied, but the way a project integrates spatially and temporarily (programming) within a multimodal national transport plan aiming to sustainability is something that may not be adequately considered and studied.
- In the light of harsh uncertainties such as climate change, the fuel prices volatility and the financial crisis, we are obliged to plan for a wider scope and time scale, abandoning the practice of piecemeal transport interventions. It is just not enough to plan interventions based on medium horizon spending plans on missing highway links.
- Redesigning and establishing processes for public participation according to the Greek context or more precisely aiming to combat the negative aspects of the Greek public participation culture and practice. This entails a great effort in informing, educating and sharing with the public and the stakeholders. The key to the success of such an authority would be to adjust the trade-off between its strength and its openness so as to have both at an adequate degree and to absorb democratic input, putting decisions and plans into effect.
- There can be serious benefits from the participation of the private sector through PPPs. However, these benefits can be undermined and probably turn to serious detriments to the public interest and the sustainability ideal if: i) the tendering documentation and legal aspects are thoroughly studied according to the PPP rationale; ii) the criterion of a “project's attractiveness to the private sector” constitutes a major reason of prioritising it, at the expense of more sustainable projects that are programmed according to the directions of an integrated planning exercise.
- Market practices and competition regimes can generate technological and engineering innovation in MUTPs.
- The cultivation of trust, which can prove extremely critical for a project's success, is achieved through the existence of some planned conditions but also by chance.

*Analysing The case of Rion-Antirion bridge through the lenses of a redefined notion of MUTP success (KAPAROS, George)*

- The subject of RUC management should be strategies and plans, not projects. Otherwise, RUC treatment will be always incomplete and ineffective. This is very important, especially when we need to manage wider risks related to the impacts of projects on sustainability.
- The human factor is absolutely critical in RUC management and context treatment. Champions/project heroes and inspired teams around them can stir up communication and performance, even during the most demanding and difficult occasions throughout the project life-cycle. There should be a governance mechanism to make those actors widely identifiable, to entrust decision-making power to the critical non -- political ones and to protect the critical political ones from intra-polity antagonism.
- A widely communicated project has much better chances to be a good project in terms of sustainability. MUTPs are political projects and are confined to a political appraisal where the political gain is the first priority. However, political gain is not always related to the long-term benefit of a country.

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INT6, INT11, INT16, INT24, INT25 are codified names of people interviewed