

The Development of the Trans-European Transport Network in Greece: A Review and Critique

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Abstract

The construction of modern transport infrastructure in Greece was progressing at a very low pace until the 80's due to the limited availability of financing. The initiation of a large number of projects was only possible in early 90's, as a result of the European Union's decision to develop a Trans-European Transport Network (TEN-T) and to create the European financing instruments to boost it. At the same time, the European Union revitalized Public and Private Partnerships (PPPs) to enable the construction of additional projects. Nowadays, the financial crisis has led to the substantial reduction of public investments and to problems in PPPs advancement, thus limiting considerably the TEN-T progress. In this paper, the TEN-T development in Greece from 1990 to date is critically reviewed in its various aspects and phases: the formation and approval of master plans for each transport mode and the selection of priority projects included therein; the concessions awarded in order to accelerate the programme realization; the procedures employed regarding the legal consents: issuance of expropriations permits, extraction of materials from quarries and borrow pits, archaeological investigations, fauna and flora protection etc.; the project design. Suggestions are made on the way forward to TEN-T completion, taking into consideration the Greek Economy's problems and perspectives.

Keywords

Trans-European Transport Network, Planning, Concessions, Design, Legal Consents.

1. Introduction

In pursuing its aim for increased economic and territorial cohesion across the Member States (MS), the European Union (EU) started financing large transport infrastructure projects in the periphery through the first Community Support Framework (CSF) in the late 80's (EC, 1989). The ex-post evaluation of this first programme revealed in the case of the so-called Cohesion Countries (i.e. Portugal, Ireland, Greece and Spain) serious weaknesses in the design and implementation of the projects as well as delays and quality problems. In order to enhance and facilitate transport, EU established in the early 90's (after combining,

filtering and co-ordinating the MS master-plans) the Trans-European Transport Network (TEN-T), i.e. a master-plan for all transport modes along with a set of common procedures for its effective operation (Figure 1). Obviously, both the realization of the master-plan and the development of the procedures were expected to be progressive, time-consuming and financial resource demanding. In order to accelerate the implementation of TEN-T, the EU promoted in parallel the revitalization of Public and Private Partnerships (PPPs) to increase financing and enable the construction of additional projects. Nowadays, the financial crisis has led to the substantial reduction of public investments and to problems in PPPs advancement in the periphery, thus limiting considerably the TEN-T progress.



Figure 1: Trans-European Transport Network

In an attempt to modernize the production procedure of infrastructure projects in Greece, the European Commission (EC) imposed the following measures during the negotiation of the 2nd CSF (EC, 1994) in the mid 90's:

- Creation of specialized entities, Society Anonymous and Ministry Special Services organized according to the ISO standards, to better undertake the role of Project Owners.
- Recruitment of Project and Construction Managers, following international competitions.
- Quality control of projects from independent specialized consultants, following international competitions.

Regarding quality control in particular, the employment of the independent consultants had immediately resulted in a substantial improvement of the works' quality in Greece. In contrast, during the implementation of the 2nd CSF's projects the budget overruns and the associated supplementary contracts were usual. This was mainly due to the lack of proper supportive designs (geological, hydraulic, geotechnical etc) before tendering the project. As a result, during the negotiation of the 3rd CSF in 2000 the EC focused on the achievement of effective project management, i.e. to satisfy the set targets on cost, time and quality per project (EC, 2000). It should also be mentioned that its status changed during the 3rd CSF and onwards. The EC ceased to be a co-decision maker and contracted itself EU-wide to the role of co-financier and high-level auditor. To fill the gap, national authorities for managing and auditing programmes and projects were created. The critical issues under discussion were the effectiveness of the projects' planning, the management of risks and the efficiency of the stakeholders in project execution.

During the period of the next EU financial programme, i.e. the National Strategic Report Framework (NSRF) 2007-2013, the emphasis was placed on the Management and Control System of Programmes (MCSP), on the operation of the managing authorities and on the audits (EC, 2007). Each MS had developed its own MCSP and submitted it for approval to the EC at the beginning of the said period. The

MCSP included yearly targets and reports and was certified according to the ISO 9001. The implementation of MCSP was audited by national and European institutions and mechanisms (Certifying Authority, Audit Authority, Managing Authority, EC, European Court of Auditors etc). During that period, the symptom of contract budget overruns and the associated supplementary contracts was almost eliminated in Greece. Nevertheless, in many cases, the technical scope of the initial contract was reduced and further contracts were necessary to complete the projects. This was mainly due to ineffective design. In parallel, the recent financial crisis produced catastrophic results. First, many contractors faced severe liquidity problems, which finally led to their forfeiture. Secondly, most Public Services and Companies (i.e. the Project Owners) faced substantial reduction of their staff due to budgetary constraints and subsequently know-how loss.

During the period of the current EU financial programme, i.e. the Partnership Agreement (PA) 2014-2020, the Regulations of the European Structural and Investment Funds (ESIF) foresee that MS financing initiatives will be subject to the following rules:

- Concentration of financing on 11 Thematic Objectives (TO) set by the Europe 2020 EC Initiative and Investment Prioritization according to each TO. The financing of Transport infrastructure has limited priority, with the 7th TO «Promoting sustainable transport and removing bottlenecks in key network infrastructures» to be the only relevant.
- Ex-ante conditions are set for the financing of National Operational Programmes (OP). Regarding transport infrastructure these are: the projects to form part of TEN-T (core, comprehensive and accesses); the OP to include realistic and mature projects; a strategic environmental impact study to be approved; the recipient national institutions to be capable of realizing the OP on time.
- Investment balance is achieved on Regional and TO level.

In this paper, the authors review critically the TEN-T development in Greece from 1990 to date in its various aspects and phases. Firstly, a critical assessment of the formation of master plans for each transport mode and the selection of priority projects included therein is made. Secondly, the concessions awarded to accelerate the investment programme are discussed. Thirdly, the procedures employed regarding the legal consents (i.e.: issuance of expropriations permits, extraction of materials from quarries and borrow pits, archaeological investigations, fauna and flora protection etc.) are reviewed. Finally, project design is assessed and suggestions are made on the way forward to TEN-T completion, taking into consideration the Greek Economy's problems and perspectives.

2. Modal master plans and projects prioritization

Regarding road, consecutive Greek Governments had proposed and supported an extensive national road network to be incorporated to the Trans-European one. This was mainly due to two reasons: first, it was seen as a means to facilitate the approval of European co-financing for those links and, second, it could be presented by the politicians to their constituents as a success.

However, many of the proposed links had by no means a European value but rather a local one like: Ioannina – Kakavia, Larisa - Kozani – Florina, Ardanio – Ormenio, Agrinio – Karpenisi – Lamia, Pírgos – Tripolis, Tripolis – Sparti – Githio, Southern road in Crete. Furthermore, the consecutive Greek Governments failed to achieve the maximum benefit of the investment due to inefficient prioritization and scheduling. For instance, the 150 km motorway link Lamia – Stilida – Larisa is already constructed and the link Sofades – Larisa will soon be completed. Nevertheless, the E65 motorway (Lamia – Sofades – Trikala – Egnatia Motorway) is also under construction as a concession project. Obviously, there was no need to promote two competing projects. E65 could have been alternatively designed to serve the connection to Larisa, i.e. the construction of 150 km of motorway could have been postponed for long or E65 could have been constructed under State financing. Another example is the already constructed 150 km motorway link Lagadas - Asprovalta – Kavala and the link Lagadas – Serres – Kavala which is under construction. Construction of the former could have been postponed since the second is only 30 km longer.

Regarding rail, the national planning has failed to concentrate on main targets and a limited number of projects. Typical examples of the tendency to keep the existing railway network alive without taking into consideration the real demand are, first, the upgrading of the old and not used section Kryoneri- Mesolongi-Agrinion and, second, the upgrading of the old Peloponnese rail network. Despite the capital invested, the latter ceased operating immediately after the upgrade and the first was never put in operation. This is in line with the findings by Flyvbjerg *et al.* (2005) who, after reviewing 210 projects in 14 nations, noted that rail passenger forecasts are overestimated in 9 out of 10 cases, with an average overestimation above 100%. They further argue that this is connected to the strong political or ideological desire to see passengers shifted from road to rail, for instance for reasons of congestion or protection of the environment. Rail transport is competitive to road transport only in the case of people and goods masses, i.e. high demand. However, the population density in the periphery of Greece is very low; in addition, Greece is a mountainous country and the construction cost of railway lines is very high when compared to the construction cost of a parallel road.

Rail investment and construction in Greece should concentrate on the main axis Piraeus port – Athens – Thessaloniki (and port) – northern borders, which connects more than the 50% of the entire Greek population and provides fast access from the Mediterranean Sea to the Central Europe. Realism should prevail and “great” ideas for the development of a West to East corridor in Northern Greece (Egnatia railway) and a North to South corridor in Western Greece (Ionia railway) should be abandoned for many coming years. In addition and further to the construction of metropolitan rail lines in Athens and Thessaloniki, emphasis should be placed on the development of urban railway for commuting transport in their wider areas. It should be pointed out that urban railway should be combined with the parallel promotion of distributing bus lines starting from the railway stations. Unfortunately, in the recently constructed urban railway in Athens no such provision was made for bus stations or for park and ride facilities. The current PA 2014-2020 includes the upgrading of the existing 200 km railway line Athens – Corinth –Patras. This project will be financially viable only if it can serve as an urban railway in synergy with local bus lines.

Regarding ports, heavy investment was planned without sound demand forecasts and proper Cost-Benefit Analyses (CBA). Accuracy in demand forecasts is a point of considerable importance for the effective allocation of scarce funds. Over-investing in idle capacity is hardly the best way to use resources, and especially not in nations where capital for investment is scarce (Flyvbjerg *et al.*, 2005). The port of Alexandroupolis is an extreme example of such a failure; construction started 15 years ago and is still in progress, but the port is rarely used. In addition, the construction of the competitive new Kavala Port -also rarely used- was promoted. It should also be pointed out that in western Greece, three main ports were promoted in parallel (Igoumenitsa, Astakos, Patras); this is by no means justified by traffic demand.

Regarding airports, Greece has also heavily invested in the construction of peripheral ones without sound traffic forecasts and proper CBA. According to Flyvbjerg *et al.* (2002), falsely high benefit-cost ratios lead to two problems. First, the project may be started despite the fact that it is not economically viable. Or, second, it may be started instead of another project that would have yielded higher returns had the actual costs of both projects been known. Both cases result in the inefficient use of resources and therefore in waste of tax-payers' money. Argos Orestikon Airport in Western Macedonia is an extreme example of such kind of inefficient investment as it is rarely used. Another example of inefficient planning is the upgrading of the Andravida military airport to serve as a civil airport as well. The civil airport of Araxos is only 35km away and the Olympia Motorway currently under construction will soon connect them. Flyvbjerg *et al.* (2005) note that the risks generated from misleading forecasts are typically ignored or downplayed in infrastructure planning, to the detriment of social and economic welfare.

It is evident that project planning should always be subject to sound CBA, based on accurate traffic forecast, in order to guarantee the economic efficiency and viability of the investment. Furthermore, when developing transport networks, priority should be appointed to the construction of links serving as much as possible of the needs.



Figure 2: TEN-T Core (Greece)

During the last review of the TEN-T by the EU, with the MSs' agreement, it was decided to distinguish two different networks: Core and Comprehensive. The Core Network consists of the main multimodal corridors which substantially influence the transport at the European level, whilst the Comprehensive Network is extensive and consists of the developed therein modal networks which were updated properly. It should be noted that the Greek Section of the Core Network does not include two important international connections: first, the short sea shipping corridor Brindisi (Italy) – Igoumenitsa (Greece) and, second, the road/rail corridor Thessaloniki (Greece) – Turkish border. This omission degrades in a way the important role of Greece as a transit country in the transport between Western Europe and Asia.

3. Concession projects

In order to accelerate the completion of the TEN-T, the Greek State tendered five concession contracts which foresaw i) the construction of 740 km of motorway and the upgrading to motorway standards of 540 km of existing roads in five years and ii) the operation of 1,335 km for 30 years. The relevant concession agreements were ratified by the Parliament and commenced in 2008.

However, the Greek motorway concession programme had been too optimistic. The estimated time period for the completion of the projects was very short for this length of motorway and in several instances the new sections were not necessary due to low traffic. This led to the considerable increase of the projects' budgets and, subsequently, much greater borrowing needs. Moreover, a cross subsidy policy was adopted in the context of the country's regional cohesion: the user pays also on existing motorway sections near the major cities and the respective revenues repay the construction of new sections at the periphery of the motorway network. Unfortunately, the decisions made regarding the grouping of road sections per contract were not well balanced and led to asymmetric borrowing needs; e.g. the project of Ionia Odos had low borrowing needs and large future revenues for the State while at the same time the project of Central Greece Motorway had high borrowing needs and operation subsidy from the State. Additionally, the traffic volume decreased dramatically as a result of the financial crisis while the market interest rates were rising considerably due to the substantial increase of the country's investment risk (Lambropoulos *et al.*, 2013). The first signs of financial instability of the concession contracts were felt in 2010 and were followed by three years of laborious negotiations which ended at a huge additional cost for the State. Apparently, the State should have split the projects at a greater number of smaller concession contracts; this would have involved smaller groups of shareholders, constructors and lending banks and would ensure better spread of risk.

4. Legal consents

Legal consents and permits has been a highly problematic aspect of the concession projects implementation. On the one hand, the perplexity of the Legal System in Greece and on the other hand, the tendency of the Administration to tender the projects well before the required legal consents and permits were obtained in order to increase EU financing absorption, resulted in huge delays during the construction stage and raised significant compensation claims by the contractors.

Environmental licensing was proven to be the most important impediment to the progress of all public works. This was true not only for the approval of the alignment of the projects, but also in the case of

quarries, borrow pits etc. Environmentalists, action groups and local financial interests took advantage of the existing legal framework in order to delay or even annul projects. The State should have simplified the extremely complicated procedure and adopted strategic environmental impact assessment for transport corridors as early as possible. This way, any appeal to the court at a later stage against a project could only concern specific technical characteristics and not jeopardize its scope and alignment.

Land expropriations have also been a significant barrier to the timely completion of the projects. The local Courts had a strong tendency to postpone their decision many times, thus consuming most of the time allocated to the co-financing programmes by the EU and jeopardizing the availability of funds. This issue could have been efficiently settled if the State had transferred the legal responsibility to higher Courts and also had applied the Olympic Games Special Law (article 7A of the Mandatory Property Expropriation Code) for the acceleration of expropriations. Moreover, time consuming legal fights and further delays arose from the refusal of various Public Utilities Organizations to relocate their networks. The State should have passed specific law in order to initiate the necessary processes.

Further to the above, archaeological investigations have had a significant contribution to the projects' delay. Given that Greece is full of remnants of the glorious past of various civilizations, the State should have promoted early a Memorandum of Understanding between the Ministries of Culture and Infrastructure to streamline and monitor the processes. Furthermore, the State should have introduced by law the creation of a single Special Archaeological Service per big project (i.e. to take the responsibility from local archaeological Services) and the outsourcing to contractors specialized in archaeological investigations.

Finally, in order to reduce substantially the risks and contractors' claims stemming from delays in permits' issuing, the State should adopt the tendering of small preliminary works contracts prior to the main ones (Lambropoulos, 2007). These contracts will be awarded immediately after the road alignment is finalised and the Joint Ministerial Decision on Environmental Terms is published and will be terminated as soon as the main contract is awarded. Their scope will include the occupation of the land, the relocation of the public utilities networks, archaeological investigations and construction of culverts enabling the movement of heavy machinery along the axis.

5. Project design

In many cases, the Design, under which these projects were procured could have been substantially improved and taken into account the environmental problems encountered and reasonable requests of the local population. Functionality improvement could have been achieved not only with minimal impact on time schedule and with limited financial burden to the State, but even to the State's benefit. For example, in the concession motorway Ionia Odos, which is currently under construction, more than 30 technical modifications were identified by the Concessionaire after the contract award; these include minor improvements, such as the addition of underpasses, as well as important re-alignments leading to major changes, such as the addition of a 2,900m tunnel in Klokova (instead of a series of bridges and embankments) and the construction of a series of embankments at Avgo (instead of an 1 km bridge). The identified major technical changes are presented in Table 1. All the above modifications were approved for construction. Similar beneficial technical modifications were identified on time in other motorways under construction. For example, in the concession of Moreas motorway a substantial part of the section Lefktro – Sparta along Evrotas river was realigned; as a consequence, a 300m twin bridge was constructed and three twin-bore tunnels (total length 2x 1000) were not.

Unfortunately, this was not always the case. Relevant examples are found in the construction of the Central Greece Motorway (E65), a TEN-T 170km concession project stemming from the main Athens-Thessaloniki Motorway, 200 km northern of Athens, and ending on Egnatia Motorway in the north-west of Greece. Two important possible modifications were identified very late, when construction was well advanced and changes could not be made (Figure 3). In the first case (Figure 3a) and according to the approved design,

E65 (red line) runs in its first 6 kms almost in parallel with the existing Athens- Thessaloniki motorway (yellow line). A review of the design proves that if the stemming had been located at the end of this parallel section (green line), substantial cost savings could have been achieved.

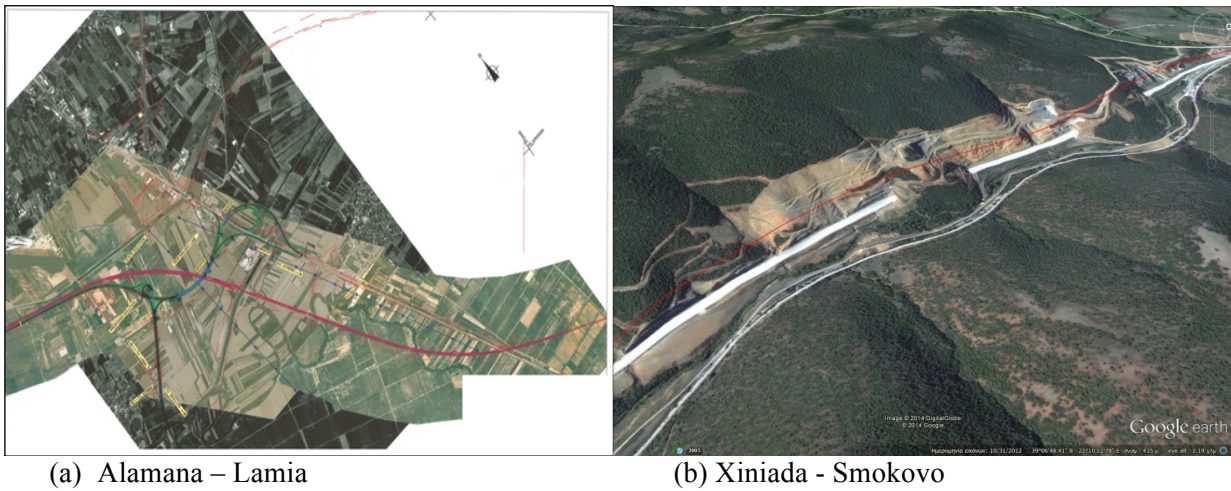


Figure 3: Motorway of Central Greece (E65) – Design problems

In the second case (Figure 3b), 40 kms further to the north, E65 (red line) descends from the Xiniada plateau to the plain of Thessaly through a valley towards the artificial lake of Smokovo. An existing dirt road (fable thin white line), an existing railway line (thin white line), a new high speed railway line under construction (thick white line), as well as a creek (dark green between the railway lines) cross the same valley also. The design of the new railway line was conducted first and included two tunnels. The works were tendered and are in progress. The Motorway design, which was conducted second, included also the construction of two twin tunnels; construction is in progress. A review of the designs proved that should both the designs had simultaneously been conducted, no tunnel at all would be necessary. The construction of three culverts on the small creek would have been sufficient. This would have also reduced substantially the environmental degradation caused.

Table 1: Ionia Odos (Antirrio–Ioannina) major technical changes

Location	Contractual Provision	Amendment
6+000 -10+000	Bridges	Realignment, elimination of a series bridges (total length 1,500m), construction of a 2,900m tunnel, relocation of Klokova IC.
22+000 – 25+000	Cut & Cover	Realignment, elimination of a 200m Cut & Cover.
Amvrakia IC	IC	Upgrading and relocation of Amvrakia IC to establish connection with the 50km Amvrakia – Aktio motorway under construction.
92+847 – 95+968	Cut & Cover	Realignment, elimination of a 200m Cut & Cover and a 150m bridge.
105+521 -108+218	Bridge	Realignment, elimination of a 520m bridge, construction of an embankment and two small bridges (120m in total).
116+289 - 120+671	Tunnel	Realignment, elimination of a 1100m tunnel, construction of a 500m bridge.
Menidi - Elaiochori		Realignment (approximately 3km).
Komboti IC		Addition of a T-junction (to and from Antirrio).
Ammotopos IC		Addition of a T-junction (to and from Antirrio).
163+900 - 166+800	Bridge	Realignment, reduction of a 900m bridge.
179+000 - 181+700	Bridges	Realignment at Avgo, elimination of a 1,000m bridge, reduction of the length of a second bridge from 400m to 200m.

It is evident from the above examples, that project design should be subject to on time value engineering and constructability review in order to secure the selection of optimal technical solutions and their effective construction. To achieve this, both experienced checkers and reviewers should be hired and the public clients should well train their personnel and develop the required know-how.

6. Conclusion

In this paper, the TEN-T development in Greece from 1990 to date is critically reviewed in its various aspects. Regarding the formation and approval of master plans for each transport mode and the selection of priority projects, the lack of sound CBA, based on accurate traffic forecasts, has in many cases led to decisions which failed to ensure the economic efficiency and viability of the investments. Furthermore, the motorway concession programme, developed in order to accelerate the TEN-T realization, had been overly optimistic. Over a short period of time, it foresaw the construction of a great length of motorway, including sections with anticipated low traffic. The recent financial crisis led to further traffic reduction, jeopardizing thus the stability of the financial models and imposing the need for time consuming concession contracts renegotiation. Furthermore, almost all the projects had previously faced important delays in the issuance of the required legal consents and permits, mainly due to the inherent inefficiency of the Administration and the perplexity of the Legal System in Greece. Unfortunately, the situation was aggravated by the tendency of the consecutive Governments to tender the projects prior to the obtainment of the required legal consents and permits, which also resulted in huge delays during the construction stage and raised significant compensation claims by the contractors. Moreover, in many cases, the project design could have been substantially improved to the benefit of the client. The analysed examples specify how the State should have streamlined the necessary processes and taken action towards the timely preparation of value engineering and constructability reviews, the provision of training for the personnel of the public clients and the development of the required know-how.

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